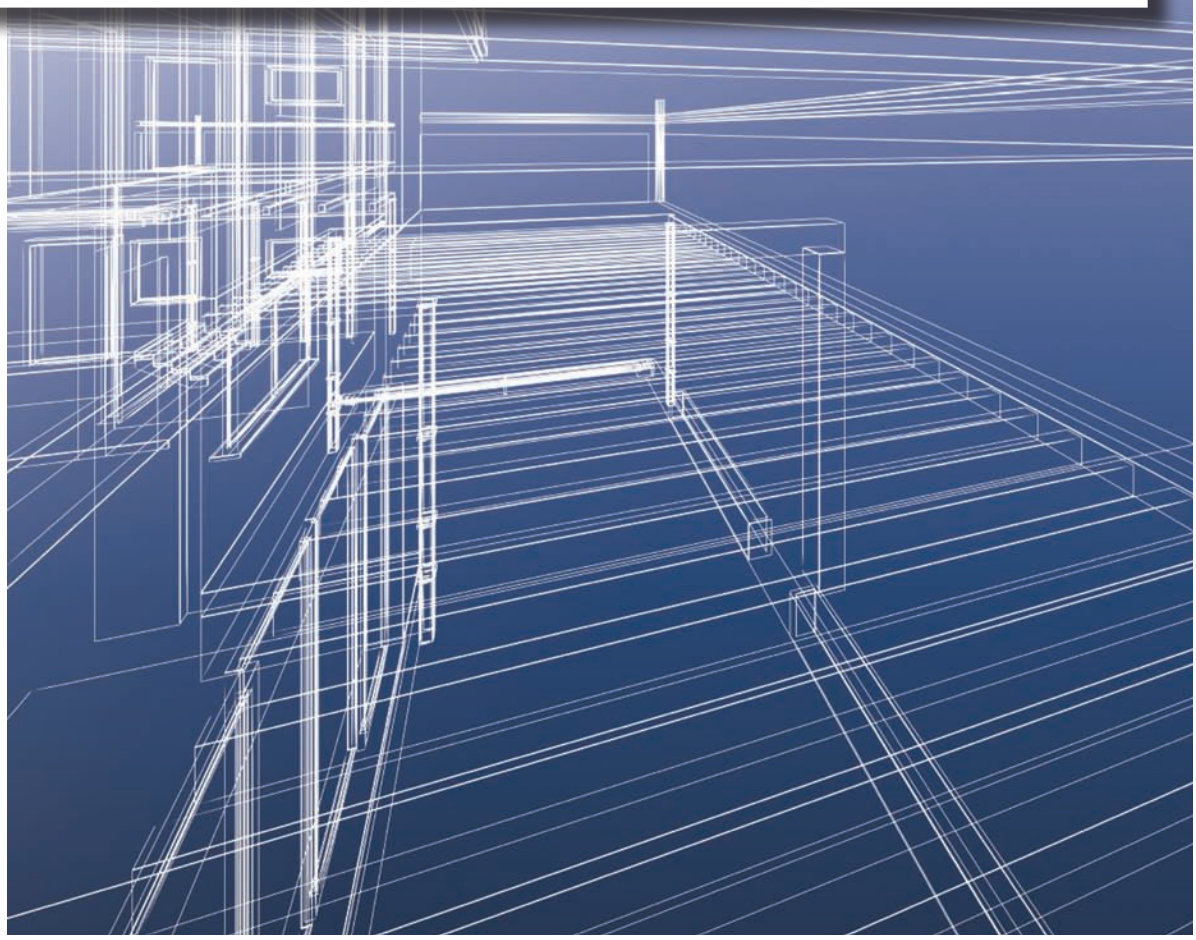
National Food Service Management Institute

The University of Mississippi

Equipment Purchasing and Facility Design for School Nutrition Programs



Applied Research Division ■ The University of Southern Mississippi

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NATIONAL FOOD SERVICE MANAGEMENT INSTITUTE

The University of Mississippi

Building the Future Through Child Nutrition

The National Food Service Management Institute was authorized by Congress in 1989 and established in 1990 at The University of Mississippi in Oxford and is operated in collaboration with The University of Southern Mississippi in Hattiesburg. The Institute operates under a grant agreement with the United States Department of Agriculture, Food and Nutrition Service.

PURPOSE

The purpose of NFSMI is to improve the operation of Child Nutrition Programs through research, education and training, and information dissemination. The Administrative Offices and Divisions of Information Services and Education and Training are located in Oxford. The Division of Applied Research is located at The University of Southern Mississippi in Hattiesburg.

MISSION

The mission of the NFSMI is to provide information and services that promote the continuous improvement of Child Nutrition Programs.

VISION

The vision of the NFSMI is to be the leader in providing education, research, and resources to promote excellence in Child Nutrition Programs.

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Introduction

Purchasing foodservice equipment and/or planning new and renovated school nutrition facilities can be one of the most challenging projects school nutrition directors undertake in their career. Success with these projects can be achieved by school nutrition directors providing the leadership to making informed decisions. Communication with other professionals involved in the process is vital to convey a profile of the school nutrition program and the goals of the project. In doing so, the information will aid in achieving a functioning design that is financially and operationally efficient in supporting program goals, both present and future.

The National Food Service Management Institute (NFSMI), Applied Research Division (ARD), facilitated a meeting of school nutrition directors, state agency staff, and facility design industry representatives to explore the gaps in two reference manuals, *A Guide for Purchasing Foodservice Equipment* and *The New Design Handbook for School Food Service*, manuals which provide information, background, and processes for designing, renovating, and equipping school nutrition facilities. Results of the gap analysis process supported the need for revision, expansion, and consolidation of the two NFSMI manuals and the need to design a new Web-based resource.

The concept, *Trusted Advisor*, was also developed by the meeting participants. They expressed concerns that school nutrition directors are often stereotyped by others within the school community and the facility design/equipment industry. The participants articulated that the responsibilities of school nutrition directors have increased due to the growing demands of newer and more student-friendly dining areas and menus. In addition to the escalating complexity of administrating a school nutrition program, school nutrition directors are expected to operate a successful business within the school setting. Participants came to consensus in support of the phrase *Trusted Advisor* to capture the vision of the school nutrition director as a professional administrator, savvy business person, and nutrition expert. Participants determined that success would be achieved when school nutrition directors are actively involved and have access to credible resources for the design and renovation of school nutrition facilities, which would in turn facilitate better designed and equipped facilities. In addition, these school nutrition directors would become industry resources and *Trusted Advisors* in school districts.

School nutrition directors are faced with unique challenges and opportunities when making equipment and facility design decisions for their school nutrition programs, many of which focus on the specific goals of the programs and the experiences of the directors. School nutrition directors operating as *Trusted Advisors* face these challenges and opportunities with a commitment to excellence. The key to becoming a *Trusted Advisor* is to be adept at strategic planning and critical thinking. Underlying these skills is the importance of using the correct information to make the right decision. Objective information collected in a systematic process and analyzed appropriately can assist school nutrition directors in making data-driven decisions which address equipment purchasing and facility design issues. By operating as *Trusted Advisors*, they seek to know the needs of the facilities by understanding the customers' expectations, production needs, and overall environmental issues facing school nutrition programs in the 21st century.

Throughout this resource, information is provided that will assist *Trusted Advisors* in making decisions regarding the purchase of foodservice equipment for new construction, renovation, or replacement of outdated or non-functioning equipment. In addition, the following issues were identified as themes throughout this resource:

- The **menu drives everything** in the school nutrition operation, especially in equipment and facility design decisions. Students' food preferences are constantly changing and are certainly more sophisticated than ever before.
- **Nutrition and wellness** considerations influence all menu choices. The menu is not just based on popular food choices for students.
- **Food safety** and nutrition are equally important to the health of students.
- **Safety** of the environment for both school nutrition staff and students influences equipment choices, as well as layout and design of the kitchen and cafeteria/dining areas.
- **Security** issues have grown in importance and are vital when making decisions for equipment and facility design.
- **Emergency preparedness** means planning for how to handle the worst possible situations, even though there is hope for never needing those emergency procedures.
- **Budget/finance issues** may limit the vision for the ideal school nutrition operation. Even so, the goal of a *Trusted Advisor* would be to optimize options while still being fiscally responsible.
- **Regulations, policies, and requirements** exist at federal, state, and local levels. School nutrition directors must be aware of these and rigidly adhere to them when making equipment purchases and facility design decisions.
- **Critical path planning** and scheduling require foresight and the ability to see the "big" picture, no matter the focus of the project.
- School nutrition directors should **plan with the future in mind**. Creative thinking and decision making skills are vital to lengthening the life expectancy of the facility. School nutrition directors will make decisions about whether the school nutrition program's needs are best served with a single piece of equipment, a kitchen renovation, or perhaps a completely new facility. The **needs of the school nutrition program also change**. As with other issues faced in a school nutrition program, the only certainty is change itself.
- The term ***Trusted Advisor*** is used throughout the resource. This term has become synonymous with describing a school nutrition director who is visionary, professional, savvy, and prepared to administer all aspects of the school nutrition program as a nutrition-centered business operating within the school setting.

Equipment Purchasing and Facility Design for School Nutrition Programs was designed for use by school nutrition professionals at the district and state level. Several features were incorporated into the resource to maximize the value and facilitate the use of this resource:

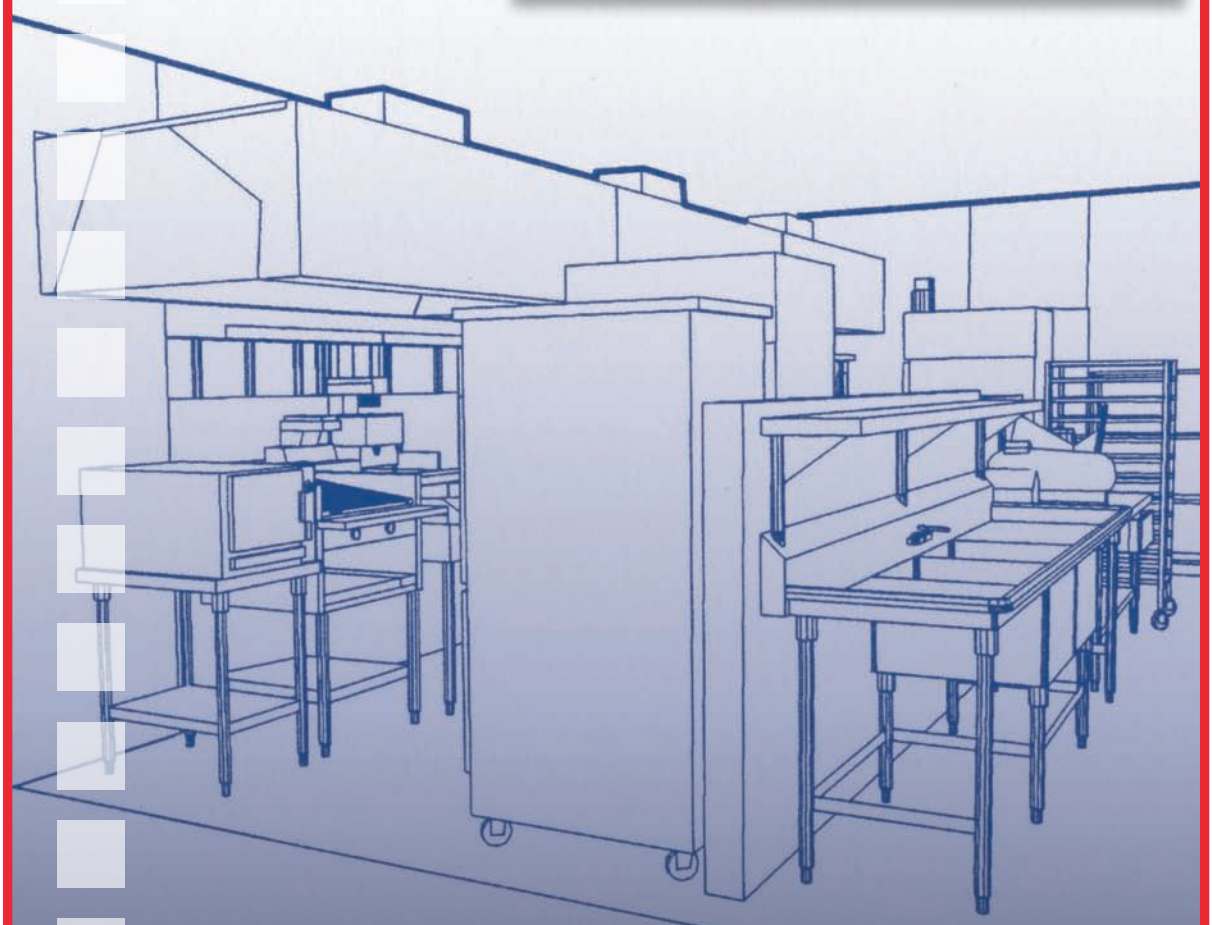
- **Chapter highlights** are presented at the beginning of each chapter to outline key points covered in the chapter.
- **Chapter summaries** are presented at the conclusion of the chapters to underscore the major concepts.
- **Sample forms** are included, such as the School Nutrition Program Profile, fabricated equipment boilerplate specifications, and bid documents.

Equipment Purchasing and Facility Design for School Nutrition Programs is divided into two major sections. Section one, "Introduction to Equipment and Design for School Nutrition Programs",

includes chapters one through eight. Chapter one provides an overview of the equipment and design industry, while chapter two outlines trends in foodservice equipment for school nutrition programs. Chapter three introduces the planning team as a key resource in making decisions on equipment and facility design issues, and chapter four describes the project planning process. Chapters five and six discuss layout and space guidelines and principles of foodservice equipment selection. The final two chapters in Section one summarize getting ready to bid, the bid process, receiving and installing equipment, and training school nutrition staff. Section two, "Making Specific Equipment Choices", is an eight chapter unit that focuses on the following specific types of foodservice equipment purchased by school nutrition programs: food preparation equipment; ovens and ranges; tilt skillets, broilers, and fryers; steam equipment; refrigerated and low-temperature storage equipment; serving equipment; cleaning equipment; and utensils, trays, and tableware.

The intent of *Equipment Purchasing and Facility Design for School Nutrition Programs* is to serve as a useful resource that will give school nutrition directors a competitive advantage as they approach their equipment purchases and facility design projects as *Trusted Advisors*. The information was also designed as a content resource for the National Food Service Management Institute to develop training programs for school nutrition professionals.

Section One



Introduction to Equipment and Facility Design for School Nutrition Programs

CHAPTER ONE

Understanding the Equipment and Design Industry

CHAPTER HIGHLIGHTS

Introduction

- Equipment purchasing is complex and requires the expertise of the school nutrition director acting as the *Trusted Advisor*
- School nutrition directors as the *Trusted Advisor* are the most knowledgeable about the student customers, their school, community, and national trends in school nutrition programs
- As *Trusted Advisors*, they are also most familiar with the menu which is used as the basis for all equipment decisions

Total Cost of Ownership

- Life cycle cost analysis or the total cost of ownership evaluates the cost of owning a particular piece of equipment over its lifetime
- School nutrition directors as *Trusted Advisors* should consider these factors in equipment decisions, even though an actual estimation of these costs may be impossible

Traditional Equipment Purchasing

- Equipment purchasing has changed since the mid 1980s when all purchasing was done through a full-service dealer

Equipment Industry Segments

- The majority of equipment purchasing by schools is still done with full-service dealers
- Other equipment industry segments include broadliners, independent manufacturer's representatives, company direct sales force, design/contract houses, bid houses, and e-dealers

How to Make the Decision of Who to Purchase From

- Alternatives to the full-service dealers provide fewer services to account for the different equipment prices
- The decision of who to purchase equipment may be different from one school to another, but school nutrition directors as *Trusted Advisors* understand the importance of open competition among bidders

Concerns When Purchasing From Different Types of Dealers

- Although about one-third of restaurant managers report having purchased kitchen equipment on the internet, relatively low customer service ratings were given to internet dealers
- Mixed results were found with customers' perception of where to find the best prices
- Blurring of purchasing method choices means that school nutrition directors need to consider where conflicts of interest might compromise recommendations being made to them

Understanding the Equipment and Design Industry

Introduction

Purchasing new equipment can be complicated. For new facilities, the decisions may seem overwhelming, but even replacement decisions for one or more pieces of equipment may be complex. For example, some schools are old and the space and initial design are outdated. In these schools the original space and design may limit equipment choices.

School nutrition directors have "lived" with their school and are the best at judging their school's needs. They are experts at understanding their student customers, as well as their menu which serves as the basis for all equipment decisions. Clearly, school nutrition directors play a critical role as the *Trusted Advisors* in all equipment choices for new or remodeling kitchen plans.

Because these decisions can be complicated, school nutrition directors also have the responsibility as *Trusted Advisors* to prepare for their key role by learning as much as they can about kitchen equipment and how to purchase the equipment most cost effectively. At the same time, they will need to be fully aware of how their program impacts and is influenced by the rest of the school, their community, and national trends in school nutrition programs. Understanding the equipment and design industry is an important part of that role as *Trusted Advisor.*

Total Cost of Ownership

Understanding the true "cost" of equipment is essential when equipment is purchased. Life cycle cost analysis evaluates the total cost of owning a particular piece of equipment over its entire operating lifetime. It includes many more variables than just the purchase price. School nutrition directors, as the *Trusted Advisors*, know that a piece of equipment "costs" much more than just the purchase price. They clearly understand the additional costs or savings to be considered, which include:

- Removal and disposal of the old piece of equipment
- Salvage price of the old equipment
- Freight charges for the new piece of equipment
- Installation and utility hook-ups
- Removal of packaging materials
- Employee training on the new piece of equipment
- Utility costs
- Maintenance costs
- Repair costs
- Savings in food cost if less expensive food may be purchased (for example, if raw ingredients may be purchased instead of convenience foods)
- Differences in labor cost if the new piece of equipment offers labor saving benefits (for example, pot and pan washing equipment)

School nutrition directors are wise to consider these factors in equipment decisions, even though an actual estimation of these costs or savings may be difficult. For example, utility costs may be

impossible to determine, particularly if the school does not monitor energy use for each area of the school. In particular, future cost of equipment repairs is likely to be the most difficult to estimate. On the other hand, if repair costs are not considered, some equipment may actually cost more money in the long-run than equipment with greater durability and a better warranty.

Traditional Equipment Purchasing

Distribution systems for equipment have changed since the mid 1980s, although much of the purchasing in schools is still done through full-service distributors. Many new opportunities exist for non-traditional purchasing. School nutrition directors need to be aware of these new opportunities because they may be able to save money, but be alert to the impact of alternative choices in a variety of areas, such as customer service, maintenance and repair of the equipment, and warranties.

Typically, full-service dealers have supplied equipment needs for school nutrition through traditional purchasing methods. These full-service dealers, in addition to their equipment expertise, offer a variety of value-added services. The value-added services from the manufacturer's viewpoint may include that the full-service dealer maintains a warehouse, a sales force and a showroom of the manufacturers' products, a marketing program, and a replacement service for the customer which requires a large investment in inventory of equipment parts. Value-added services of the full-service dealer from the customers' viewpoint may include assistance with determining which products might be most useful, delivery, installation, start-up, testing, demos, and employee training.

Equipment Industry Segments

Foodservice equipment manufacturers sell their equipment through various industry channels of distribution. Although the majority of equipment purchasing by schools is still done with full-service distributors, other types of dealers have also been developing since the 1980s. Outlined below are the various equipment industry segments that school nutrition directors will encounter when purchasing equipment. Definitions for each one of these may differ slightly from one industry expert to another, but the functions of each of these are starting to overlap from the customer's viewpoint. One such example is the situation where some layout and design consultants working under contract on a project now also offer equipment for sale.

Full-Service Equipment and Supplies Dealers

- Dealers that sell a broad range of equipment from several manufacturers
- Services may include:
  - Educating end-users/operators about all manufacturers' product lines and services
  - Making recommendations to end-user based on needs assessment
  - Providing sales quotes
  - Determining product availability
  - Installing products
  - Providing on-site demonstration and staff training
  - Providing service and repair for all items sold

Broadliners or Broadline Distributors

- Traditionally, these were companies that provide a range of services similar to equipment dealers except that they sold primarily food rather than equipment
- Some broadliners today have expanded and sell a very wide range of both equipment and

food supplies which they purchase from other distributors in the industry
- Offer highly competitive pricing

Independent Manufacturers' Representatives

- Independent organizations that represent more than one line of non-competing products. These companies:
  - Cover large geographic areas
  - Base employees salaries on commissions set by manufacturer
  - Rarely take title to the goods that they are selling
- Services may include:
  - Determining customer expectations
  - Educating others about several manufacturers' product lines and services
  - Providing sales quotes
  - Assistance with:
    - Installation
    - On-site demonstrations
    - Staff training
    - Service problems

Company Direct Sales Force

- Employees of a manufacturer that sell one manufacturer's product line
- Services may address:
  - Determining customer expectations
  - Educating others about several manufacturers' product lines and services
  - Providing sales quotes
  - Assistance with installation
  - Providing on-site demonstrations
  - Conducting staff training
  - Assisting with service problems

Design/Contract Houses

- Layout and design consultants/companies which also sell equipment
- Services may include:
  - Providing layout and design expertise to end-user
  - Recommending equipment and supplies to meet the goals of the end-user
  - Providing assistance in determining which products might be most useful

Bid Houses

- Companies that sell equipment that they obtain from manufacturers
- Prices may be lower, but bid houses generally do not:
  - Maintain an engineering staff for creating kitchen designs
  - Offer assistance in determining which products might be most useful
  - Stock the equipment
  - Maintain a sales force for calling on customers
  - Provide delivery and installation
  - Have a customer service/warranty department
  - Have a showroom

E-dealers

- Diverse group of companies selling equipment through the internet
- Represent the ultimate in discount prices
- Few services are provided so prices can be kept very low
- Although e-dealers have been growing in popularity, they still represent a very small portion of commercial kitchen equipment sales, particularly for schools

How to Make the Decision of Who to Purchase From

As discussed in other chapters, a determination will first need to be made about the facility's equipment needs. The next step is to find out more about the equipment marketplace. School nutrition directors, as *Trusted Advisor*s, need to become knowledgeable about equipment and equipment companies. Some school nutrition directors find it helpful to start this process by talking to manufacturer's representatives, viewing the equipment at trade shows, or by obtaining equipment specification sheets from different companies. During this process, school nutrition directors will use their knowledge of the total cost of ownership for equipment to help determine exactly what equipment they are looking for, services needed, and which dealer will offer the best price.

Although alternatives to the full-service dealers have been growing in popularity because of the lower equipment prices, customers are provided with fewer services to account for the very different cost of doing business through each. In the past, cost reductions or benefits were generally only derived from volume discounts and many services were provided by the full-service dealers. Today, because of the different types of purchasing methods available, customers may, in actuality, choose the amount of "services" they require with their choice of purchasing method. In addition, some full-service dealers today may use a system of functional discounting where the equipment cost is adjusted to provide for these additional services required by the customer.

The decision of who to purchase equipment from may be different from one school to another, but school nutrition directors must be fiscally responsible when spending tax payer dollars and allow for open competition among bidders. School nutrition directors, as the *Trusted Advisor*s, should take into consideration which services are desired for each purchase. For example, very different services may be desired when replacing equipment as compared to new construction or major renovation. When customers need to replace a specific piece of equipment and they are certain about exactly what they wish to purchase, relatively few services may be needed (McDonough and Fusari, 2005). By contrast, new construction may require assistance in design or in determining which pieces of equipment are needed, procurement, delivery, installation, final hook-up, set up and testing, demos, and employee training. Full-service dealers are able to assist school nutrition directors with all of these functions. In addition, they may help track the status of orders to ensure they arrive at the right time or even stage and hold ordered products until the school needs them (Kinney, 2006). Because new construction or major renovation projects account for about half of equipment sales volume, full-service dealers will obviously continue to be an important route for equipment purchase. School nutrition directors should carefully consider what their needs are in regards to additional services versus lower pricing.

In addition, although many schools still purchase from full-service dealers, competition has forced many full-service dealers to change the way they operate in order to maintain profits. Some

dealers have cut the number or quality of services provided or asked factories for more back-end incentives to sell their equipment (McDonough and Fusari, 2005). School nutrition directors should be aware that these marketplace changes may affect the way some full-service dealers conduct business and consider this also in deciding where to purchase equipment. Services that used to be offered by certain companies may no longer be offered and roles or responsibilities of each party in an equipment purchase should be clearly understood in advance.

A survey conducted in a variety of foodservices (Schechter, 2004) found mixed results in regard to customer opinions about where to do their equipment purchasing. Of those surveyed:

- 31% reported having purchased kitchen equipment on the internet (the figure was even higher among hotel respondents at 60%)
- The lowest ratings for service were given to internet dealers
- The highest ratings for service were given to full-service dealers
- Contrary to what was expected, almost half (49%) of those surveyed credited dealers with the best prices as compared to only 40% who thought they had found the best prices on the internet

A later study by Schechter (2005) found somewhat different results. In this study:

- About half of all purchases (51%) were done through equipment/supplies dealers
- Next most common were broadline distributors (17%)
- Closely followed by purchasing directly from manufacturers (15%)
- Relatively few purchases were done through
  - Club stores (6%)
  - Distributor web sites (5%)
  - Cash 'n carry operations (4%)
  - E-Bay (1%)
  - Non-distributor web sites (1%)
- Highest equipment sales were in the areas of
  - Refrigeration
  - Ice machines
  - Small wares
  - Cooking equipment

Concerns When Purchasing From Different Types of Dealers

Finally, the blurring of roles and responsibilities for planning and purchasing new equipment may also create concerns with a possible conflict of interest. For example, there may be a concern where the same individual or firm is making recommendations for equipment who is also designing the configuration or layout of the kitchen to support that equipment when they, in fact, may profit from the sale of that equipment. Similarly, writing of the bid specification should not be done by the manufacturer or dealer. School nutrition directors should ask themselves who is likely to profit from the school's purchase of particular pieces of equipment. Obviously, all equipment distributors are seeking to make a fair profit, but schools should always carefully evaluate equipment purchasing decisions for conflicts of interest. School nutrition directors should use their knowledge of purchasing in their role as *Trusted Advisors* to avoid ethical conflicts and maintain fiscal responsibility.

SUMMARY

For equipment purchasing, school nutrition directors first need to clearly understand their equipment needs. In addition, school nutrition directors need to understand the equipment and design industry in order to purchase the equipment and services they want in order to obtain the most fiscally responsible choices. Traditional purchasing through full-service dealers is still the most popular type of equipment purchasing. However, lower priced methods have become available since the 1980s. Generally, these alternative purchasing methods offer fewer services along with the lower prices. School nutrition directors, as *Trusted Advisors*, need to use their knowledge of purchasing to avoid ethical conflicts when making purchasing decisions.

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CHAPTER TWO

Trends Associated with Foodservice Equipment in School Nutrition Programs

CHAPTER HIGHLIGHTS

Introduction

- Manufacturers want to produce quality equipment with value-added features while maintaining profitability
- Manufacturers seek to provide equipment that meets customer expectations, incorporates flexibility, saves labor, provides nutritious and safe food, and is environmentally friendly
- School nutrition directors, as *Trusted Advisors*, need to evaluate all trends carefully to make certain that food and equipment choices will result in safe, healthy, and nutritious foods for students

Examples of Trends for School Nutrition Programs

- Increased emphasis on health and wellness
- Food security and emergency preparedness
- Alternate food production systems
- Smaller and more mobile equipment
- Equipment with new or blended technologies
- Labor saving options
- Better ventilation
- Increased emphasis on food safety
- Incorporation of electro-processors and computers into equipment
- Changes in refrigeration/freezer needs
- E-commerce for small wares, tabletop or small pieces of equipment, tracking deliveries
- Display cooking
- More colorful and/or less expensive construction materials
- Environmentally friendly equipment
- Changing student customers and service systems
- Growth of culinary science as a career

Trends Associated with Foodservice Equipment in School Nutrition Programs

Introduction

Manufacturers face a substantial challenge. They want to produce quality equipment with value-added features while maintaining profitability. In turn they are expected to offer the equipment at an affordable price, even though the cost of manufacturing has become more expensive due to cost increases for stainless steel, energy, workers' compensation, transportation, and insurance (Schechter, 2005).

Equipment and layout and design challenges are also occurring in schools. As a result, manufacturers are introducing new types of production and service system equipment that will:

- Meet customer expectations for food quality
- Incorporate flexibility for changing needs
- Require fewer employees to operate
- Provide more nutritious methods of preparation
- Focus on food safety
- Be more environmentally friendly

Computer technology is being used in many types of foodservice equipment, particularly as cost for this technology decreases and the computers are smaller. In addition, the growth of international companies has expanded the types of foodservice equipment available in the U.S. Manufacturers are not bound by "the way we have always done things." Equipment design engineers are continuously developing and testing new foodservice systems to meet the needs of the ever-changing foodservice environment. As a result, more new types of equipment are available today than ever before!

Forces driving foodservice equipment changes include labor shortages, food safety issues, cost-control (including energy saving), competitive foodservices, increased regulatory pressure, and children's health issues. Some of the trends that are occurring because of these forces are highlighted in the next section.

It is important for school nutrition directors to be aware of foodservice equipment trends because they may impact food equipment choices. On the other hand, school nutrition directors, as *Trusted Advisors*, will want to evaluate trends carefully before making any changes. School nutrition directors as *Trusted Advisors* will use their knowledge of food and nutrition to make certain that foods offered and the equipment used to prepare food will result in safe, healthy, and nutritious choices for students.

Examples of Trends Occurring in School Nutrition Programs:

Increased Emphasis on Health and Wellness

The Child Nutrition and WIC Reauthorization Act of 2004 requires that each school district participating in the National School Lunch Program adopt local school wellness policies that address healthy eating and physical activity by the first day of the school year in 2006. This Act has reemphasized the need for schools to focus on wellness (SNA, 2006). Ramifications for the wellness policies include nutrition education, foods and beverages sold during the school day, the food environment and foodservice operations, and physical activity and education. The policies also give very specific focus to foodservice equipment and design. For example, local policies might suggest the following in regards to the eating environment.

- Dining areas should be clean, attractive, well-lighted, and well maintained and should provide adequate time and space to eat meals
- Dining areas should be designed to minimize the amount of time that students spend waiting in line
- Safe drinking water and convenient access to facilities for hand washing and oral hygiene should be available during all meal periods
- Dining areas should consider additional wellness issues in their design, such as the need for signage or demonstrations that incorporate wellness education
- Schools should also make nutrition information readily available at product displays in snack bars, a la carte, vending, and school stores

The increased emphasis on healthy methods of cooking has also changed the types of equipment that used to be standard in foodservice kitchens. Fryers are often not even placed into new construction. Instead, combi-ovens have become extremely popular, as well as tilt skillets. Even traditional "fried foods" are changing. New product formulations allow for different cooking methods. Ovenable French fries are now available, for example, that do not need to be fried, but are instead cooked in a combi-oven.

If different cooking methods and equipment are used, school nutrition directors as the *Trusted Advisors* need to evaluate their impact on the nutritional content of the meals served. Use of combi-ovens, for example, instead of fryers may help schools better meet their wellness policies for fats as defined by the Dietary Guidelines.

Food Security and Emergency Preparedness

Although we would like to believe that we live in a safe world where protection from terrorist acts and natural disasters did not happen, we know from unfortunate experience that we do, in fact, need to be prepared to react to such situations. As a result, food security and emergency preparedness are very real issues for today's school nutrition programs.

Several resources are available to assist with this preparation. For example, *A Biosecurity Checklist for School Foodservice Programs (2004)* provides useful information setting guidelines, levels of priority, and a schedule for checking the tasks necessary for protecting a school foodservice. Equipment related guidelines might include:

- Instructing employees to look for signs of wear, tear, and tampering before operating equipment
- Establishing procedures to monitor the operation of foodservice equipment are particularly important when:
  - Products are uniformly mixed using mixers or blenders
  - Products are made in large quantities
  - Liquid bulk storage containers are used where a contaminant might be easily added and mixed
- Keeping emergency supplies of disposables for foodservice in case utensils, trays, etc. are contaminated, or in case items cannot be decontaminated
- Installing carbon monoxide detectors in kitchens to detect build-up due to improper ventilations and the danger to both students and foodservice personnel
- Setting up emergency planning procedures such as shutting down heating, ventilation, and air conditioning systems and securing windows and doors to create a barrier to prevent harmful agents from entering the building

Violent crime in schools is also a concern. According to Susan Gryder (2004), young people have the highest chance of any American of being a victim of violence and 36% of high school students do not feel safe in schools. Today there is a focus on preparedness and effective communication during any emergency, including those that might include snipers, shootings, and other types of violent crimes. Crisis management may include having a plan in place in case of lock-down of a school building. Such a crisis may require schools to plan food to accommodate a different number of students, particularly for centralized or satellite operations. Security planning may include additional locking, camera, or communication systems, such as phone tree networks, or a NOAA radio which was originally used to transmit weather-related information, but can also be used to communicate other alerts and emergency information.

Emergency planning for natural disasters is also receiving renewed attention, both from the standpoint of planning for evacuation and for sheltering in-place (Gryder, 2003). The idea of sheltering in-place as a response to an emergency situation is a relatively new one for schools and may mean that schools must contend with the possibility that a major incident might necessitate keeping students at school for longer periods of time, such as days rather than hours. The use of schools for emergency shelters for both students and residents of the community has also become a priority planning issue with disasters such as Hurricane Katrina.

Alternate Food Production Systems

Labor shortages are not new, but continue to be a concern across the whole foodservice industry, including schools. To answer this problem, some large school districts have switched to centralized production facilities which prepare some or all of the food in bulk for several smaller or satellite schools. A similar production system is also being used today, called a cluster kitchen where a larger school kitchen prepares specific entrees or meals for three to four smaller schools which then reheat or hold the food hot.

Other industry experts indicate a focus on blast chill or cook-chill methods of production. In this system, the school prepares the food in bulk in advance, rapidly chills the food with special blast-chill or cook-chill equipment, and then holds it until it is used on the menu a few days later. Because of the specialized equipment, Hazard Analysis Critical Control Point (HACCP) can

easily be incorporated into this production system. HACCP compatibility and labor savings are given as some of the advantages of this production system.

Another labor saving trend is the use of cook and hold cabinets which automatically switch from cooking to holding of food at the completion of the cooking process. Cook and hold cabinets use a combination of temperature and humidity to maintain food safety and quality for a short period of time. Cook and hold cabinets are different from the traditional warming cabinets in which foods are placed after cooking to hold foods before service. Traditional warming cabinets control temperature, but not humidity, and can easily dry foods held in them. School nutrition directors, as *Trusted Advisors*, understand the appropriate use of both cook and hold cabinets and warming cabinets. Foods prepared too early and held too long in these cabinets can negatively influence food quality and student acceptability of the food items.

Finally, the most commonly reported labor saving trend is the use of pre-prepared foods where reheating is all that is needed to serve food. The use of pre-prepared food also requires fewer pieces of food preparation equipment, such as mixers and slicers. In addition, fewer pieces of cooking equipment are generally needed. Commonly used cooking equipment for pre-prepared food includes combi-ovens, tilt skillets, or steamers.

Smaller and More Mobile Equipment

Newer equipment trends include a focus on smaller equipment and more mobile units, particularly for self-service areas such as salad bars. Smaller and more mobile equipment offers the maximum flexibility to accommodate daily, as well as long-term menu needs. In addition, smaller, more mobile equipment also allows the service of food in schools in non-traditional locations.

The use of smaller equipment at locations which are more convenient for employees has also become more popular. Sales of under the counter model dishwashers and refrigerator drawers have been increasing, for example. In addition, under the counter ice machines are now available to minimize the need to constantly refill or transport ice to dispensers.

Equipment with New or Blended Technologies

Cooking equipment with multiple or blended cooking options has become more common. Blended cooking equipment offers efficient and faster cooking. Examples include:

- Combi-ovens which offer the opportunity to cook with or without steam
- Central cooking units or "mono-blocks" may include gas burners, induction cooking plates, electric solid tops, wok ports, etc.
- Combined convection and microwave systems
- Combined lightwave and microwave ovens

Combination technology is now being found in other areas besides cooking equipment. Blixers or combination blenders and mixers are a more versatile and powerful option in food preparation.

Conversely, more specialized equipment is also popular. Although, not as commonly purchased in schools, bagel mixers, pizza ovens, and specialty coffee equipment have become popular in commercial restaurants. At least one private high school has been reported to implement an upscale coffee service for its students. Examples of new technology being incorporated into equipment include:

- Combination oven-steamer
  This equipment has been available but is now a standard piece of equipment for schools. Now considered today's "work horses", they provide speed, higher yields, good food quality, less handling, the ability to cook more than one food at a time with no flavor transfer, and ease of cleaning.
- Induction cooking
  Induction cooking provides instant heat with no open flames or hot spots. As a result, it heats the food, not the kitchen and it is easy to clean. Induction uses a magnetic field to "heat" the pan or pot while the unit itself stays cool. The first cooktops were stand alone single units, but they are now being offered as multiple units and can be incorporated into built-in cooktop settings.
- Boiler-less and variable-temperature steaming
  Steamers provide fast cooking and help to preserve color, texture, and nutrients. There are a few new steamers that create saturated steam without a boiler. This cuts water, energy, and maintenance costs dramatically. In addition, some do not require overhead ventilation.
- Cooking with light
  These also may incorporate microwave cooking ability. These units have the speed of a microwave, yet cook and brown naturally. Originally, this type of oven was used to prepare special meals or meals at odd hours; it is now starting to be used for more cooking purposes in a variety of settings.
- Combination convection-microwave oven
  These ovens speed up cooking time dramatically. They have the speed of a microwave and the browning of a convection oven.

Labor Saving Options

Automation of equipment has already been used as one solution to the labor shortage in quick service restaurants. While schools may not be able to take advantage of this solution as completely as other segments of the foodservice industry, purchasing labor saving options to equipment may be one way to combat the labor shortage. Examples of options that schools might consider include self-cleaning or descaling systems on certain types of equipment, such as steamers, or water washing hoods that can be pre-set to wash when they are not being used. A trend toward manufacturing equipment with built-in maintenance operations is being observed across the board for many types of equipment. As it becomes a value-added feature, it may also reduce warranty cost.

More simplified controls or programmable controls are other methods of combating labor shortages and can minimize the need for employee training. In addition, some manufacturers are responding to the needs of a diverse workforce and are offering universal or multilingual labels on equipment.

Better Ventilation

Newer technology in ventilation systems allows for more comfortable work environments. Newer technologies include ventless hoods and cooking equipment that have been developed to allow the use of equipment outside of a ventilation hood, an example would be some specialty steamers. Local regulations should be followed in regards to the use of these, however some schools have profited from the expanded cooking area. Less equipment underneath the hood might also be

considered energy saving as it decreases the load on the heating, ventilation, and air conditioning (HVAC) systems. Because of increasing energy costs, the goal to minimize ventilation needs is also a trend for the future.

In addition, ultraviolet hoods are now available for cleaning grease that accumulates in and above range filters and ducts. These systems may ultimately result in the phasing out of water-wash hoods.

Increased Emphasis on Food Safety

Implementation of HACCP-Based Standard Operating Procedures as required in the 2004 Child Nutrition WIC Reauthorization Act is an important focus for schools. HACCP moves the focus of food safety from inspection to prevention. HACCP standards will influence all the areas of the school foodservice operation shown below.

- Improved chilling of foods with small wares and refrigeration equipment
- Better temperature tracking with faster and more convenient types of thermometers (for example, thermocouple and infrared thermometers) and better documentation systems
- Decreased cross-contamination with equipment and supplies that are color coded
- Greater availability of equipment that meets HACCP standards
- More effective hot and cold-holding of foods
- Greater emphasis on equipment that is easy to clean and sanitize, and more effective, easier to use cleaning supplies
- Equipment systems that are integrated into computerized smart systems for better tracking and efficiency

As a result, HACCP compatible equipment continues to be a growth trend (Schechter, 2005). Increased regulation of the sanitary aspects of equipment, such as self-service areas and refrigeration equipment is also occurring.

Incorporation of Electro-processors and Computers into Equipment

The use of electro-processor based controls from electro-mechanical controls has become the standard. Electro-processor based controls may be seen as digital read outs, touch pads, and computer programming options. As these controls have become more reliable and multi-functional, they also have become smaller. This enhancement results in a smaller piece of equipment with the same or greater production capacity. Programmable equipment can also result in significant energy savings if it is used to adjust equipment settings during periods when the equipment is not needed. It has been used extensively for heating, ventilation, and air conditioning systems, but is also possible in other areas.

Computer technology also includes computer monitored freezer alarms that will dial the central office or designated manager's home phone if the temperature falls to a certain level. Food loss can be avoided and food safety maintained with the proper use of these alarm systems. Computers can even be used to track defrost cycles and how long the freezer doors are open.

Smart kitchens are one of the latest trends that make a great deal of sense in light of today's energy concerns. In a smart kitchen, equipment is hooked up to modems to remotely monitor temperature changes, malfunctions, data related to food safety, and data related to food quality. Smart systems are thought to be the wave of the future for efficiency, quality, and control, but

require a significant investment to start. Examples of equipment that could be hooked up to smart systems include warewashers, blast chillers, walk-in and other refrigerators, and cooking equipment, as well as heating, ventilation, and air conditioning systems.

Changes in Refrigeration/Freezer Needs

Refrigerators and freezers continue to evolve. Trends including the use of blast chillers, cook-chill equipment, and smaller refrigerators have already been discussed.

In addition, the space requirements for refrigerators as compared to freezers have also been changing. Many operations report the need for more freezer space because of the use of more frozen food and the preparation of pre-prepared food that is heated and served from a frozen state.

E-Commerce

Although a growing trend, e-commerce is not likely to replace traditional purchasing systems. E-commerce is more often done for smallwares, tabletop or small pieces of equipment. The savings that are achieved for ordering on-line for larger pieces of equipment is not likely to offset the significant risks from ordering on-line. Risks might include ordering equipment sight unseen, and complications related to transport and delivery. Some schools may find e-commerce useful for replacing pieces of equipment in limited situations. Some clear advantages to the internet marketplace include the ability to check orders on-line and track deliveries.

Display Cooking

It has been estimated that in commercial restaurants, 60-80% of the food is prepared in full view of customers. While schools may be limited in the ability to offer this opportunity and still achieve the need for speedy service for students, preparation of the food in view of the students reinforces the freshness of the product and stimulates appetites. In schools where display cooking is done, the use of the induction cooktop has been found to be a safer alternative around students, because the unit itself does not heat up. In addition, the purchase price of induction cooktops has been coming down. When this is coupled with their high efficiency rating of 75-85% as compared to 45-55% for radiant cooktops, induction cooktops are expected to increase in popularity.

More Colorful and/or Less Expensive Construction Materials

Construction materials have also been changing. Although stainless steel will continue to be viewed as one of the most durable materials, newer materials are being developed that are attractive, less expensive, yet still very practical. Some of these materials even incorporate additional benefits, such as antimicrobial properties. Examples range from colorful porcelain or enamel surfaces on equipment surfaces to the use of new materials such as silicone for small wares. Silicone bake ware offers unique properties for insulation, but is considerably more expensive than metal bake ware and is not as likely to be used in volume preparation. Color-coded cutting boards, utensils, and plastic boxes offer food safety protection through their ability to identify their separate use for different food products, such as poultry versus beef, versus vegetables, thus minimizing the risk of cross-contamination.

Environmentally Friendly Equipment

Manufacturers are also adapting equipment to meet growing environmental concerns. These concerns include energy use, air quality, water quality, and water use. Pulpers, for example are a much more water efficient piece of equipment for disposal of food and paper wastes as compared

to food disposals. Dish machines are also becoming more water and energy efficient. For example, insulated machines help to reduce heat in the room which makes the working environment in the dish room more comfortable and increases worker productivity, but also reduces the load on air conditioners.

"Green schools" are another trend identified by foodservice consultants that might impact the foodservice operation. In some areas, monetary or other incentives are offered to schools that use environmentally friendly products, equipment, or design features. Examples might include reflective window glass, products made from recyclable material, or energy saving equipment. The "green school" trend may also increase the selection of permanent ware and dishmachines over the use of disposables. Air cooled ice machines may also be selected over water cooled ice machines.

Manufacturers of equipment are also considering new ways to introduce water or energy savings into the engineering of the product. For example, some dish machines save water by recirculating wash water, whereas others are looking at reduction of water usage by adjusting the spraying mechanisms. School nutrition directors should carefully compare the different types of water and energy saving devices being incorporated into equipment as manufacturers start to compete for the "best" in environmentally friendly equipment.

Changing Student Customers

Changing lifestyles have affected the way we serve food. Today's fast paced world has created the need for convenient and quick service of food as society moves about in the hectic flurry of job, home, and family activities. As a result, students' lifestyles are also different. Students are clearly more savvy and sophisticated in their tastes and desires for foodservice. Students have higher expectations resulting from their dining-out experiences. Their expectations demand a wider variety of foods, better quality, increased foodservice choices, and an enhanced dining atmosphere. Menu demands include healthier foods, more "ethnic" menu items, and retail appeal.

Competition with commercial restaurants has prompted changes in display and service of school foods. School foodservice operations are expected to introduce even more innovative serving systems based on the expectations of today's sophisticated customers. One design expert referred to this trend as "we've been through the scramble system and now we're moving on to other systems that focus on the student as a customer". Finally, experts suggest that speed of service is again a determining factor in the success of the service, expressed as a statement of "kids don't want to wait in line", so that multiple points of service are a growing trend.

The long term trend in school foodservice programs will be a blend of self service and multiple points of employee service with greater showcasing of food. This will include more open kitchen/preparation areas allowing for some part of the food preparation to be seen and appreciated by the student customer. Rounding out this trend is the foodservice operations' use of school kitchens to prepare meals for non-student populations. If a school program provides meals to groups outside of the school population or is considering it in the next five years, this may be an additional set of customer expectations to address in the purchase of foodservice equipment. A guiding principle should be making equipment purchasing decisions with flexibility to meet future needs of the customers. This will allow operations to handle incoming fads and long-term trends while maintaining operational viability. Service system trends include:

- Food court concepts
  This has been an extremely popular design trend where students select from various specialty stations, such as burger bars, salad bars, and pizza bars. Designers recommend that these kiosks or stations should consider providing standard pieces of equipment in each station so that flexibility is still retained for redesigning menus as student tastes changes. Straight line configurations along the kitchen side of the cafeteria or L-shaped configurations are among the most popular. One staffing change related to the use of food court concepts has been that foodservices may train many more employees to both prepare and then switch to serving of food at these multiple points of service.
- Window service
  Particularly popular in middle and high schools, quick service walk-up windows are being offered in some schools with extremely good success. Some large school districts have found them so successful that they have increased the number so that they now serve from 12 quick service windows. Generally focusing on a limited menu, they offer several advantages. The first is speed of service as this is often a bottleneck in moving students through the luncheon meal. Second, it draws more students who may not find it "cool" to eat in the dining room, but are willing to get food from a walk-up window. The third is the impact on the dining room. Some schools have actually shrunk the size of the dining room while still maintaining their student customer meal counts. Some schools in areas where weather permits allow students the opportunity to eat outdoors. Landscaping or tables and seating area may be done and has generally been found to be relatively inexpensive to offer. Another advantage of these window service points is that they are often located in a central courtyard or location of the school so that foot traffic makes them a very visible outlet. As commercial restaurants often recite – the three most important things to remember to increase one's customer count are location, location, location. Finally some schools also feel that the window service allows additional opportunities. Clubs, for example, may use the windows after hours to sell concessions for different events at the school.
- Speed lines
  Speed lines provide a fast system where multiple points of service are offered. Foods may include pre-wrapped products, such as chef salads, standard bagged lunches, breakfast meals, or prepared picnic lunches. Lines are often double-sided and the focus is on efficient movement of the students.
- Branded concepts
  Popular branded restaurant concepts may be approved to offer specific menu items. In other schools, self-branding has been used. Self-branding may include the use of the school name or mascot, such as Bulldog Burgers and Panther Rib Sandwich.
- Kiosks
  Kiosks offer foods for faster service at small, free-standing carts. This increases or diversifies the number of service locations.
- Packaged "componentized" meals
  To speed service, some schools have turned to packaged "componentized" meals where students select prepackaged, reimbursable meals at a pick-up and go setting.

- Food boutiques and convenience stores
  Some schools have offered the convenience and speed through the use of food boutiques and stores where the appearance is similar to that of retail stores with specialized food choices.
- Marche concepts
  Marche concepts are based on European open-air marketplaces. The emphasis is on visual display, exhibition preparation, and random points of service.

Vending Machines

Another trend has been the use of vending machines, not only for a la carte items, but complete reimbursable meal service in some schools. In these schools, vending machines are an approved Point-of Sale (POS) and have been set up to accept student cards that debit their account as part of a reimbursable meal, as well as make a meal purchase by punching in a personal identification code or through biometric finger imaging. Some of these schools have also used vending machines to offer meals at remote locations where space and time limitations restrict what might otherwise be available.

Growth of Culinary Science as a Career

Not directly related to school foodservice, but still interesting is a design trend that consultants have suggested is popular in school curriculums. That trend is teaching culinary arts in high schools as a career choice. Popularity of this career may be advanced because of greater visibility with television networks and the celebrity status now afforded many professional chefs. School designers have reported that as wood shops, metal shops, and some traditional home economics kitchens have been removed, some schools have requested these rooms be redesigned so that they might be used to teach culinary arts with sophisticated commercial kitchen equipment.

School administrators report that this provides an opportunity to partner with the school nutrition program staff to introduce potential employees to a positive career field. Other reported benefits include:

- Culinary students provide a resource to work with in developing recipes
- Culinary students may help with testing new concepts that could be incorporated into school nutrition programs
- Programs provide an opportunity for students to participate in the preparation of school meals for credits as well as pay
- Culinary students could oversee taste tests of new food items to gain food preferences of other students

SUMMARY

In order to be a successful school nutrition program today, school nutrition directors need to be aware of equipment and design trends. Forces driving these trends include children's health issues, labor shortages, food safety issues, cost-control, energy conservation, competitive foodservices, and increased regulatory pressures. Because of these forces, equipment choices in school nutrition programs may be changing.

As *Trusted Advisors*, however, school nutrition directors should evaluate these trends carefully. Not all trends are beneficial. School nutrition directors need to use their knowledge of food and nutrition to make sure that the equipment selections they make promote safe and nutritious foods in their school nutrition program. Rather than following trends, school nutrition directors, as the *Trusted Advisors*, should continue to be the trend setters in their focus on the health of America's children.

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CHAPTER THREE

The Planning Team

CHAPTER HIGHLIGHTS

Introduction

- School nutrition directors, as the *Trusted Advisors*, should carefully research all equipment purchases, even for equipment replacements

Importance of Proper Planning

- Start by setting up the planning team with those that are involved in the day-to-day operation
- Look 10-20 years into the future
- Complete the *School Nutrition Program Profile* to help describe what is needed

Importance of Good Communication

- The larger the planning team, the more critical is the communication
- Ultimate responsibility for the planning process lies with the school nutrition directors

How to Make Communication Easier

- Identify team players
- Supply information in a timely manner
- Facilitate the communication with review agencies and anticipate lengthy reviews

Members of the Planning Team

- School nutrition site staff
- Architect
- Board members/other administrators
- Foodservice consultant

Guidance and/or Approval Groups

- State agency
- State building commission
- State and local health departments
- State school architect

Members of the Architect's Team

- Mechanical engineer
- Electrical engineer
- Structural engineer
- Interior designer
- Acoustical consultant
- Building contractor

CHAPTER HIGHLIGHTS *(continued)*

School Nutrition Director's Role as a *Trusted Advisor* on the Planning Team

- The role of the school nutrition director on the planning team includes knowledge about:
  - Equipment operation
  - Applicable codes and regulations
  - Equipment safety standards
  - Sources of information on equipment

Equipment Safety Standards

- OSHA requires certification of equipment through one of the relevant approval agencies:
  - NSFI
  - UL
  - CSA International, or
  - ETL Semko
- Use of residential models of equipment is not allowed in school nutrition programs

Sources of Information on Equipment

- Professional associations
- Other useful Web sites
  - Equipment magazines
  - Manufacturers' Web sites
    - Cleaning and operation manuals
    - Manufacturers' "specification sheets"
    - Warranties
    - Model numbers
    - Sizing information
- Evaluation of Web site information
  - Careful evaluation includes:
    - Using the Web address extension
    - Asking whether the information is intended to market a product
    - Deciding how such information applies to their operation
    - Watching for links to other web addresses

The Planning Team

Introduction

The process of purchasing can be demanding and stressful. It also can be exciting as one's vision of what will improve the operation is achieved. School nutrition directors as *Trusted Advisors* should feel empowered to take charge of the process and let others know exactly what they need. School nutrition directors are the school nutrition program experts, particularly for their own operation and their knowledge is of value to other members of the planning team. Although they are the expert in school nutrition, when it comes to purchasing new equipment, they need to do their homework based on current information. Because equipment lasts several years, even simple replacement of equipment requires carefully researching the options. For example, other pieces of equipment with new technology may provide a better way to prepare foods. In addition, even if one thinks that the replacement should be done with the same piece of equipment; new options on the equipment may have been developed and should be considered. Whether one is simply purchasing a replacement piece of equipment, remodeling, or building a new kitchen, school nutrition directors can benefit from the expert advice of others as they make their decisions. Some decisions involve relatively few people. For example, some simple equipment replacement decisions may only involve the school nutrition director, local school nutrition program personnel, and the approval of the local superintendent and/or board. Other projects are huge and may involve the use of all of the possible planning team members discussed in this chapter. Whatever situation school nutrition directors face, there are helpful resources at their disposal.

Today, many resources are available for school nutrition directors that are "doing their homework" in preparation for an equipment purchase, remodel, or new construction. Perhaps the biggest change has been the internet. The use of the internet is a powerful source of information for school nutrition directors, but all of the information on the internet may not be reliable. Equipment consultants, however, cite the internet as one of the easiest and most complete sources of information. Equipment companies are obviously trying to market their products through their Web sites. No longer do school nutrition directors use hard-to-read equipment catalogs, but instead can download articles, manufacturers' "specification sheets", pictures, training manuals, warranties, and sometimes even pricing information. This chapter will focus on how to best use the wide variety of information sources available as it describes how to set up and begin the purchasing process.

The Importance of Proper Planning

School personnel call it 'creating educational specifications', architects call it 'programming.' No matter what the professional language, it describes the planning process necessary to make key decisions that guide the school design and construction from the very beginning. That planning requires a multi-faceted understanding of the importance of school nutrition programs.

Proper planning requires the diverse skills of a variety of experts, whether constructing a multi-million dollar new facility or renovating a small kitchen. The following suggestions help when getting ready to start setting up the planning team.

- Begin by including the people responsible for planning and building the facility and the people who are responsible for its day-to-day operation. It is crucial that the local school nutrition program director as well as school nutrition managers and assistants be included in preliminary planning session. In cases where a new school does not have a staff assigned when preliminary planning takes place, it is extremely important that either staff be assigned or that the local school nutrition director be involved in all aspects of decision making because of the huge diversity of school nutrition programs.
- Always look 10-20 years into the future when planning a facility. Kitchens are one of the most difficult and costliest spaces to renovate.
- Remember, questions are a good and usual part of the process when planning a building project.
- Complete the *School Nutrition Program Profile* which is provided at the end of this chapter. The more information provided to the architect and/or foodservice consultant and engineers, the better they can serve the client in making sound design decisions. With sound information from the school nutrition director that describes program needs, the architect and consultants are prepared to perform their jobs more effectively.
- Set realistic goals. At the very least, plan for the efficient use of construction funds to provide an efficient kitchen with a minimal amount of floor space to prepare and serve food. More space does not mean that the operation is more efficient!

Importance of Good Communication

Planning and communication are the keys to a well-designed school nutrition program facility. Both must be present in any successful project. The final result will ultimately depend on the effective planning and communication of the entire team. As everyone comes to the project with different backgrounds, interests, and levels of expertise, common ground must be achieved in the communication of ideas. In foodservice design, there are lots of small, unfamiliar skills that must go into constructing the whole. Things will go easier, with a good chance for success if, in the planning and execution of any school nutrition program facility, the key role of good communication is kept in mind. This is critical with the larger size planning teams found in schools. Generally speaking, the larger the size of the planning team, the more critical is the communication needed to guide the judgment of the team for timely and high quality decisions.

Most planning teams will have designated members, each wearing their "hat" of responsibility. The scope of the project will determine the final composition of the team. Keep in mind that the architect should always be informed of all communication between consultants and the school nutrition director. Check state regulations regarding architectural services. Listed below are suggested members of the planning team, based on the scope of the project.

Suggested Team Members	New Construction	Renovation	Replacement or Addition
Architect	■	■	
School Nutrition Director	■	■	■
School Nutrition Site Staff	■	■	■
District Superintendent/Designee	■	■	■
School Administrator	■	■	■
Local Code and Regulatory Agencies	■	■	■
Health Department Representative	■	■	■
District Board Member(s)	■	■	
Engineering and Specialist Consultants	■	■	
Foodservice Consultant	■	■	■
Customers	■	■	
Parents	■	■	
Interior Designer	■	■	
State Agency Representative	■	■	■
Other(s)			

How to Make Communication Easier

- Identify the team players. Review the team chart in this chapter, modify it for the project and then be sure to understand the role that each team member plays.
- Scheduling and deadlines are important in any construction project and even more so in school nutrition program facilities because of the coordination required between all the tasks. In addition, the architect has a critical timetable for his/her work. Supply information in a timely manner to keep the project on track.
- Identify all reviewing agencies for the project right from the start. This is often determined by the funding sources for the project. The type of building can also affect which agencies will have authority. All of the team members should have input into preparing the list of reviewing agencies. Research this information early to prevent overlooking any agencies. This will avoid delays and other problems late in the process.
- Anticipate lengthy agency review. Some reviews can take up to a month or longer. It is helpful to establish contact with agencies, confirm their requirements for submittals, and make appointments to sit down with them to conduct 'workshop' reviews, if possible.
- Remember to check state requirements. Many states require approval of the final plans and specifications by the state school architect, state building commission, state health department, and state agency overseeing school nutrition programs prior to the project architect advertising for bids. If one's state has an official school or state architect, this would be the person to ask about final plan and specification approvals.
- Remember to seek the advice of the state agency school nutrition representative when faced with equipment purchasing and facility design decisions.

Members of the Planning Team

School Nutrition Director

Ultimate responsibility for the planning process lies with the school nutrition director. The goals to be met, the procedures to be followed, quality standards, and areas of responsibility should be defined by the school nutrition director. A school nutrition program has many aspects calling for special skills in relation to finance and construction. Information from experts in these fields can help guide the school nutrition director's decision making, but school nutrition directors will still need to gather detailed information about the foodservice size, type, and desirable characteristics upon which to base the goals, procedures, costs, standards, operations, and limitations. Because the school nutrition program director is the key individual in planning a new or renovated foodservice facility, they will provide input for the following functions:

- Working with the local planning committee during the early stages of planning
- Determining the basic goals and objectives of the new or renovated foodservice facility
- Determining the basic operational concepts and philosophy of the school nutrition program, including menu system, fit of foodservice to students' age/grade and ethnic diversity, and the school nutrition program role in the overall educational program
- Providing input in the selection of a consultant for the school nutrition program facility
- Reviewing and recommending approval of the final architectural drawings. In addition, it is important for the school nutrition director to keep their own set of blue prints and a copy of all changes so that appropriate oversight can be done on the final project
- Providing information and details on equipment specifications
- Monitoring progress during construction to ensure that needs are met
- Recommending final approval when specifications are met and items completed

School Nutrition Site Staff

The school nutrition site staff provide information and suggestions for the school nutrition program. They should serve as advisors to the director and members of the planning team. The school nutrition site staff are responsible for providing input in the following areas:

- Sanitation and safety issues
- Equipment needs related to menu design
- Efficiency of the work environment
- Simplification of work areas
- Productivity improvement issues
- Student needs for speed and volume of service

Architect

The architect plays a pivotal role on the planning team. The planning of a food facility, whether it is new construction, renovation, or an addition, puts the architect in the pivotal role to offer technical guidance, advice, and counsel. An architect is someone who has fulfilled the qualifications fixed by state law.

An architect's expertise may be sought for size, costs, and general layout even before a final decision has been made for major renovations or construction. Once the project is approved, the architect interprets the ideas provided by the school nutrition director and offers creative guidance as ideas are being translated into a physical plan. In addition, the architect plays a major role in the complete project. They guide the architectural design and engineering principles, select materials, prepare the plans and specifications, and estimate construction costs. After

the contracts have been awarded, they supervise construction, issue certificates of insurance, and notarize affidavits and waivers of lien. They contribute valuable expertise on financial arrangements, legal aspects, décor, and the operations of the school nutrition program.

The architect may use the services of professional engineers or other experts but he/she is still in control of all parts of the building process. It is important to remember that architects can't control market factors which affect bid prices. In addition, architects only recommend, clients make the final decisions. In summary, the services of the architect include that they:

- Participate as a team member in the planning phase for school nutrition program design
- Examine the laws, codes, rules, and regulations of governing agencies
- Prepare schematic design studies based on the educational and school nutrition program specifications (building program) developed by the team
- Coordinate work and information with foodservice consultants, engineers, interior designers and others working as consultants on the project
- Prepare detailed working drawings and specifications from which contractors will submit bids to the owner and from which the facility will be built
- Submit preliminary and final plans and specifications to the necessary authorities as required by law
- Provide on-site inspection during and after completion of the school nutrition program equipment installation and check contractor payment requests for the owner
- Verify that all warranties and guarantees on school nutrition program equipment have been submitted

Board Members/Other Administrators

Other district administrators and school board members play a key role in planning decisions. Other administrators could include the superintendent, the principal, the chief financial officer, and the district maintenance director. Ultimate responsibility for the project resides with the school board as the Local Education Agency (LEA). All design and planning decisions must be approved by the school board. Often the superintendent/school board will rely on others to do the actual work involved, but they must still approve and bear the responsibilities for the project. The local superintendent/school board generally will:

- Develop statements of basic goals and objectives for the project
- Develop the basic operational concepts for the school nutrition program which will affect the building design, using information gathered by the school nutrition program director
- Develop policies regarding standards of operation for the school nutrition program with the involvement of students, patrons, teachers, administrators, school boards members, etc., and the advice of the foodservice consultant
- Select an architect
- Work as a team with the school nutrition program director and school nutrition program personnel
- Approve the preliminary building plans and space allocation, school nutrition program equipment specifications, final building plans and specifications
- Provide equipment to enable facilities to function properly

Foodservice Consultant

The foodservice consultant works closely with the architect and school nutrition director to develop a functional and efficient design of all areas in the school nutrition program. He/she is knowledgeable in all the up-to-date equipment and new developments in school nutrition programs. He/she has no affiliation with any manufacturers or suppliers that would cause a conflict-of-interest in the designing and specifying of equipment. Services of the foodservice consultant include:

- Examining the laws, codes, and regulations of governing agencies that apply to the preparation and serving of food
- Preparing schematic design studies, construction documents, and cost estimates required to convey the scope of the school nutrition program equipment to the team members and bidders
- Preparing an equipment layout and schedule and other details required, such as an engineering data manual with technical data for all equipment
- Assisting the architect and owner in reviewing acceptable school nutrition program equipment contractors and bids and reviewing all submittals of the equipment contractor to verify that they comply with the contract documents
- Providing on-site inspection during and after completion of the school nutrition program equipment installation
- Preparing a list of any deviations from the contract documents and making recommendations for final approval of the installation
- Observing and approving the satisfactory demonstration of the equipment
- Verifying that all warranties and guarantees have been submitted

Guidance and/or Approval Groups

State Agency

Child nutrition state agencies may act in an advisory role for the local planning team. The state school nutrition programs staff may provide the following:

- Guidance to school districts in the implementation of school nutrition programs by helping school districts comply with federal and state mandates
- Assistance with planning the efficient production of quality meals and the financial integrity of local programs
- Review of architectural plans for renovation or construction to assure properly designed facilities to provide the school nutrition programs with
  - Potential and efficient use of staff and maximal production
  - Adequate space for appropriate storage and preparation of high-quality foods
  - The potential for efficient use of state, local, and federal funds

In addition, some states may require school nutrition programs to submit:

- The schematic plans and planning program
- The preliminary plans and outline specifications
- The final plans and specifications to the state school nutrition programs for review and approval

State Building Commission

State building commissions may be responsible for publicizing laws, rules, and regulations to ensure that all facilities utilizing public funds are constructed according to the applicable building codes. All local school projects that involve alterations, additions, or new construction may require approval by the state building commission. These agencies are usually staffed with architects, engineers, and inspectors that review and monitor projects for the safety and soundness of public facilities. The state building commission may do the following:

- Review all plans and specifications of code compliance
- Provide consultation services to local boards of education
- Provide contract administration on state bond issue projects
- Provide periodic inspections to ensure compliance with contract documents

State and Local Health Departments

Many health departments are involved in the review process for kitchen plans and sewage disposal systems, if a public sewer is not used. For projects subject to approval by the state building commission, the state health department may conduct a joint plan review with a county health department. For all kitchen facilities, the county or city health department may review the kitchen floor plans and equipment specifications. The general functions of a health department are to:

- Review the floor plans and equipment specifications for the kitchen facility in schematic, preliminary and final forms for conformance with sanitation regulations
- Make suggestions for revision if necessary
- Issue approval of plans when sanitation requirements are met
- Issue a food permit when construction is completed and meets the conditions of the final plan

Many states have regulations requiring review of school nutrition program plans by the state health department. It is important to check state and local health department's requirements at the start of the project.

State School Architect

Some states may have a state school architect who acts as an agent for the State Superintendent of Education. His/her major responsibility is to assist local boards of education with the planning and construction of school facilities. Even though not directly involved in the design process, he/she can provide pertinent data relative to methods of construction, area considerations, and current costs that will guide the planning team. Through his/her monitoring of construction projects, the local board of education is assured of approvals by all applicable review agencies. The State School Architect does the following:

- Reviews and approves architectural and engineering contracts for compliance with state board of education-adopted regulations
- Reviews all plans and specifications as they pertain to the educational process
- Reviews and approves construction contracts submitted by the local boards to assure compliance with state bid and contract laws
- Inspects completed projects as required to verify that they are completed according to plans and specifications

Members of the Architect's Team

Mechanical Engineer

The mechanical/plumbing engineer works as part of the design team. His/her role on the team serves two functions. In the early phases of the project, the mechanical/plumbing engineer is an advisor, highlighting or explaining the mechanical/plumbing design economics and code related issues and how they affect the systems. The second part is to execute the design, incorporating the foodservice consultant's equipment into the building. The mechanical/plumbing engineer is responsible for:

- Designing HVAC systems required or desired for the kitchen and associated areas
- Coordinating information on kitchen equipment, especially the hood, in determining types of HVAC systems to be used and sizes required
- Designing plumbing systems for school nutrition program areas, including grease traps
- Coordinating waste and water requirements of school nutrition programs
- Advising members of the design team during the preliminary phase of planning
- Coordinating with the other design disciplines
- Submitting preliminary and final plans and specifications to the architect
- Providing construction administration services that include site observation, answering contractor questions, checking pay requests, and shop drawings

Electrical Engineer

The electrical engineer provides electrical engineering services for the team. This is usually done as a service to the team architect. The electrical engineer is someone who is certified to practice engineering by state law. The electrical engineer is responsible for the electrical portions of the work including lighting, power distribution, fire alarm systems, etc. Services of the electrical engineer include:

- Visiting the site prior to the design of any renovations
- Examining codes, rules, and regulations of governing agencies
- Coordinating electrical requirements of school nutrition program equipment, mechanical equipment, etc., as needed
- Preparing detailed working drawings and specifications for the electrical portion of the work
- Providing construction administration services that include site observations, answering contractor questions, and checking shop drawings

Structural Engineer

The structure of a building (foundations, columns, beams, slabs, joists, decking, etc.) is designed by the structural engineer. The structure must be capable of supporting its own weight and what are known as live loads, lateral loads (wind, earthquake), and thermal loads. Live loads are created when the room is in use and differ because of the occupancy and use of the space. A classroom, for example, is not designed for the same live loads as a storage room.

In addition, the structural engineer may assist with planning for special mechanical, plumbing, and architectural conditions which require the support of concentrated loads which are not evident from the weight of the building or code requirements. These must communicated to the structural engineer by the team members. The structural engineer relies upon the accuracy and completeness of information furnished by the architect and other consultants for the building dimensions, occupancy classification, geotechnical report and recommendations, and equipment loads. Services of the structural engineer include:

- Evaluating the structural systems so that they fit the building's functional requirements
- Evaluating the structure of existing buildings to assess the need for additional structural work to accommodate renovations and additions
- Assisting the architect in the selection of the overall structural system for the building based on loading and other information
- Investigating the foundation design requirements
- Providing the structural design
- Developing the structural contract documents, including drawings, and specifications

Interior Designer

Not every project has an interior designer or foodservice consultant and very often the architect provides these vital services. Concern over such things as atmosphere, furniture, colors, and textures can affect student customer satisfaction and participation in the meal programs. Successful designs in school nutrition programs are as important as they are in restaurants. An interior designer may be responsible for:

- Developing floor plans and seating plans in dining areas
- Developing color schemes and selecting finishes
- Suggesting signage and merchandising related design needs
- Providing furniture layouts and furnishing material/finish specifications
- Working with architect and electrical engineer to design the lighting

Acoustical Consultant

An acoustical engineer or consultant has specialized knowledge in the way sound can travel, is amplified, and is controlled. As a team member, the acoustical consultant works closely with the architect and other consultants in determining how room sizes and proportions, along with finishes affect noise. Acoustical consultants may be responsible for:

- Determining the acoustical quality of spaces
- Providing recommendations on how to achieve the desired acoustical qualities
- Recommending finishes and placement to minimize noise levels
- Designing audiovisual systems and installation criteria for multipurpose rooms such as cafetoriums which serve as both cafeterias and auditoriums

Building Contractor

The job of the building contractor is to take the plan and specifications of the architect and convert it into a physical structure for the school nutrition program with working equipment. Their areas of expertise are desirable building materials, construction features, and timing of the different phases of construction and coordination.

School Nutrition Director's Role as a *Trusted Advisor* on the Planning Team

School nutrition directors are obviously experts in their school nutrition operations. In addition, to function effectively as a *Trusted Advisor*, school nutrition directors also must be knowledgeable in relevant areas, such as:

- Equipment operation
- Applicable codes and regulations
- Equipment safety standards
- Sources of information on equipment

School nutrition directors, as *Trusted Advisors*, also need to broaden decisions by including a long term view of their school's needs. For example, they will need to look at the expected growth of the school and the implications of making specific equipment choices.

Equipment Operation

School nutrition directors in their role as *Trusted Advisors* on the planning team should take the time to understand the actual operation of any new pieces of equipment being recommended. Understanding the operation of a new type of equipment is far easier when one is able to see a piece of equipment being used. School nutrition directors have the opportunity to do this in several ways. These include:

- Attendance at regional or national trade food or equipment shows. Manufacturers may have pieces of equipment "hooked up" so that they can be more easily demonstrated.
- Visits to dealer showrooms
- Participation in professional electronic mailing lists, such as MealTalk, that may offer advice from school nutrition programs already using that equipment
- Visits to other schools. Advantages of visiting other school nutrition directors' foodservice facilities include:
  - Unbiased views of equipment function
  - Practical advice on needed maintenance
  - Real-life examples of what repairs might be needed
  - Advice on equipment add-ons that would be useful

Applicable Codes and Regulations

Every project involving school nutrition programs must meet the requirements of the following codes and regulations. Depending on the location of the project, local codes may apply also. Check city, county, and state regulations for the exact codes that apply to the project. Examples of some regulations that may apply are:

- State and local building and fire codes
- State and local health department regulations
- Construction requirements for county and city public schools published by the State Department of Education
- Americans with Disabilities Act (ADA) guidelines
- Occupational Safety and Health Administration regulations (OSHA)

Most cities and counties have a building commissioner or building department that has specific requirements for alterations, additions, and new construction. Usually, approval of the final plans and specifications by the state/city school architect, state/city building commission, and state/city health department is required prior to the architect advertising for bids. In many places the

following information will be needed for official approval of the project:

- Education specifications, planning program, and schematic plans
- Preliminary plans and outline specifications
- Final plans and specifications

Equipment Safety Standards

In the information gathering role as the *Trusted Advisor*, it is important to consider the food and equipment safety standards that each piece must meet and the requirements of the school system. The Occupational Safety and Health Administration (OSHA) requires such certification be done by an independent third party and not by the manufacturer. The primary safety approval agencies are the National Sanitation Foundation, International (NSFI), Underwriters Laboratory (UL), and CSA International. Other agencies include ETL Semko and the Food Service Technology Center. Identification of their seal on a piece of equipment should provide a sense of security related to the safe and appropriate use of that piece. In addition, the International Standards Organization (ISO) investigates quality standards of equipment and is becoming widely recognized for its assessments.

It is essential to purchase commercial quality equipment that meets the standards set by these organizations. Occasionally, school nutrition directors may be tempted to use home or residential models of equipment which have not been tested or intended for commercial use. Their use is not recommended as home or residential equipment will likely not perform well under the rigorous use of a school kitchen and may need repair or become a fire or safety hazard. This equipment typically is not acceptable to health departments when health inspections are conducted and may not be allowed by fire protection insurance. Finally, commercial use of home or residential equipment generally invalidates the equipment warranty.

The cost of certifying safety standards of school nutrition program equipment is borne by the equipment manufacturer. The safety standards specify the requirements for the production, and performance. The manufacturers' marketing materials include information on compliance with safety approval agencies. Each agency is described below.

- National Standard Foundation International (NSFI)
  Founded in 1948, the National Standard Foundation International (NSFI) is dedicated to public health, safety, and protection of the environment. NSFI develops extensive standards and is a primary agency involved in equipment evaluation services. NFSI committees within the foundation help to review and develop these standards and are made up of representatives from government, equipment users, manufacturers, and installers. More than twenty detailed NSFI standards define requirements for foodservice equipment materials, design, construction, durability, and performance necessary to meet the criteria of cleanability, food protection, and freedom from harborages. In order to receive and use the NSFI certification mark on products and marketing materials, the equipment must conform to all NSFI requirements.
- Underwriters Laboratories (UL)
  Underwriters Laboratories (UL), founded in 1894, is a leading product certification organization for equipment that is used in the home, commercially, and industrially. UL listed products are tested for fire, electrical shock, and other safety hazards. Historically, UL only evaluated electrical equipment and was focused on safety standards for fire and electrical shock. However, the organization has expanded and now offers manufacturers

certification of gas equipment, and finally, the UL Classification Program now evaluates equipment for other hazards, such as sanitation.

- Canadian Standards Association International (CSA)
  CSA International is a provider of Canadian equipment standards for performance, design, and safety, and also conducts testing of electrical, mechanical, plumbing, and gas equipment. As Canada is the largest trading partner of the United States (U.S.), school nutrition directors should be aware that equipment that is manufactured in Canada or sold in Canada may carry this designation.
- Electric Testing Laboratories (ETL) Semko
  ETL Semko is a competitor to UL and provides certification of gas and electric equipment. ETL also works with NSF International to ensure that manufacturers of ETL certified equipment may meet international certification requirements.
- International Standards Organization (ISO)
  The ISO 9000 certification is a series of standards sponsored by the International Standards Organization (ISO). ISO investigates the processes of manufacturing and service firms related to these quality system standards and evaluates them for this internationally recognized certification. Many end users, operators, and consumers look for companies which have acquired this ISO 9000 series certification. They recognize that it means the standards are met from the time of concept to the time of purchase by the customer.

Sources of Information on Equipment

- Professional Associations
  School nutrition directors can find out about new equipment in a variety of ways. One of these is to visit trade association Web sites which host a variety of links to their association members. Some of these association Web sites are conveniently organized to allow searching for manufacturers by equipment type. Some associations also have a variety of links available to other sources of information. A description of each industry association follows.
  - North American Food Equipment Manufacturers (NAFEM), www.nafem.org
    NAFEM is an international foodservice equipment manufacturer trade association which seeks to provide leadership to improve the global foodservice experience. NAFEM hosts a trade show every two years for over 650 exhibitors of foodservice equipment and supplies. This trade show provides school nutrition directors the chance to view one of the largest exhibitions of commercial kitchen equipment. They also offer educational opportunities, publications, market research, and technical information.
  - American Gas Association (AGA), www.aga.org
    The American Gas Association is an energy trade association founded in 1918 that represents 200 local utility companies supplying natural gas to more than 69 million U.S. residential, commercial, and industrial customers. Services include representing the interests of its members and their customers, and providing information and services promoting efficient demand and supply growth and operational excellence in the safe, secure, reliable and efficient delivery of natural gas.
  - Foodservice Equipment Distributors Association (FEDA), www.feda.com
    FEDA is another nationally recognized trade association for foodservice equipment and supplies dealers with approximately 300 members. Its goals include setting

industry standards for dealers and acting as an educational voice.

- School Nutrition Association (SNA), www.schoolnutrition.org
  The School Nutrition Association is an internationally recognized professional association of school food and nutrition experts with more than 55,000 members. It is the authority on school nutrition and has been advancing the availability, quality, and acceptance of school nutrition programs as an integral part of education since 1946. It provides continuing education, publications, training, certification and credentialing, and an annual conference for its members.
- National Restaurant Association (NRA), www.restaurant.org
  NRA is one of the oldest trade associations of the foodservice industry and was founded in 1919. NRA is a diverse group of 60,000 member companies plus individual members. Its membership includes restaurants, allied members (suppliers, distributors, and consultants), student and faculty membership, and not-for-profit members. Together with the National Restaurant Association Education Foundation, the NRA provides industry support through its annual trade show, its lobbying efforts, its publications, and various training, and certification programs.
- Commercial Food Equipment Service Association (CFESA), www.cfesa.com
  The ongoing mission of CFESA is to continually enhance the original vision of its founders by providing services and education that enable members to ensure the satisfaction of their customers while improving the proficiency of their businesses. In addition, CFESA provides opportunities for its membership to promote their image and interests within the food equipment industry. CFESA member categories include service and repair companies, companies that sell commercial foodservice equipment, commercial food equipment manufacturers, and others actively involved in the foodservice industry.
- Foodservice Consultants Society International (FCSI), www.fcsi.org
  FCSI is a professional association with over 1,000 foodservice consultant members in more than 35 countries. Foodservice consultant members include specialists in the areas of layout and design, planning, research, training, technology, operations, and management. Members must meet strict criteria assuring their experience and overall professionalism in order to be allowed to join FCSI. Its goals are to provide educational opportunities for state-of-the-art developments in the foodservice industry and networking opportunities with other professionals in the industry.
- Manufacturers' Agents for the Food Service Industry (MAFSI), www.mafsi.org
  MAFSI is the primary interest group of independent manufacturers' sales representatives and offers associate membership for manufacturers and other professionals interested in sales and marketing in the foodservice industry. Its goals address issues in education, public relations, industry planning, and strategic alliances.
- National Association of Wholesaler-Distributors (NAW), www.naw.org
  NAW is a trade association that represents virtually all products that move to market via wholesaler-distributor and encompasses more than 40,000 companies in the wholesale distribution industry. It is active in the areas of government relations and political action, research and education, and group purchasing.

- Other Useful Web Sites

  School nutrition directors can also benefit from a search of informational Web sites and a comparative search of manufacturers' Web sites. These are described below.

  - *Foodservice Equipment and Supplies* magazine, www.foodservice411.com

    Foodservice Equipment and Supplies magazine provides useful information for equipment dealers and distributors, those who design foodservice facilities, and those interested in equipment and supplies for multi-unit chains, as well as individually owned or operated foodservices. This trade magazine is published electronically twelve times a year and maintains a subscriber list of almost 25,000. It is not a research journal, but does publish a variety of useful equipment articles that school nutrition directors can electronically access through its "archives" at no charge.
  - Food Service Technology Center (FSTC), www.fishnick.com

    The Food Service Technology Center, operated by Fisher-Nickel, Inc. is a group which conducts tests on commercial kitchen appliance performance and provides useful information to the industry on kitchen energy efficiency. The FSTC has developed over 30 standard test methods for evaluating commercial kitchen appliances and is funded by California utility customers through the Pacific Gas and Electric Company under the auspices of the California Public Utilities Commission.
  - Manufacturers' Web Sites

    Manufacturers' Web sites provide a huge and growing amount of information about their products. The ability to place information about their equipment on the internet has expanded school nutrition directors' access to specific equipment information and allowed manufacturers to provide a wide variety of the most current information at less cost than in the past. Cleaning and operation manuals, manufacturers' "specification sheets", warranties, parts lists, service manuals, model numbers, and sizing information are just a few of the kinds of information provided on many manufacturers' Web sites. Much of the information provided is incredibly useful when comparing pieces of equipment for purchase. Keep in mind, however, that manufacturers' information is provided as a service to buyers with an eye to marketing their equipment. The school nutrition director, as the *Trusted Advisor*, will need to interpret the information for their school nutrition program. For example, yield information provided by a manufacturer may include impressive results, such as the cooking times of foods or the number of dishes per hour cleaned by a dish machine, but do not include time requirements related to loading and unloading of the machine, or for that matter, cleaning of the equipment. Real world use of the equipment in one's school nutrition program must be considered. Similarly, other information should be evaluated carefully. For example, information about add-on options, such as automatic stirrers on steam jacketed kettles, may suggest that these options are labor saving and may pay for themselves in lower payroll costs. This would only be true if one employed fewer personnel or decreased the labor hours in one's operation; these changes, however, may not be possible or desirable.

- Evaluation of Web site Information
  Even though there is a vast and growing amount of information available on the Web in almost any subject one would care to know about, not all information is reliable. To evaluate information, school nutrition directors, as the *Trusted Advisors*, should carefully look at its source. Government provided information, with a "gov" extension in the Web address, such as the USDA, one's state agency, or one's health department Web site can be trusted upon to be reliable. Similarly, Web sites with an "edu" extension in the Web address are providing information often through college and university Web sites which generally can be relied upon or may be from elementary, middle, or high schools which may also have very helpful information based on personal experiences. School nutrition Web sites from organizations such as the School Nutrition Association and the National Food Service Management Institute are also creditable sources. Other trade and professional association's Web sites may also be useful. Keep in mind, however, that association Web sites may be focusing on the industry perspective, which includes very practical information, but some information may also be from personal opinion rather than testing and research. On the other hand, equipment manufacturers' or other businesses' Web sites may provide great information in certain areas such as equipment "specification sheets", warranties, and manuals, but some caution should be used. For example, capacity information about equipment may be extremely useful in determining the appropriate size to purchase, but may include cooking times only and not take into account time needed for loading and unloading of the product from the equipment. School nutrition directors should actively decide how such information would or could apply to their operation. In general, school nutrition directors should always ask themselves about the reason why information may be posted on the internet. If the answer is that the information will help to sell something, caution should be used. School nutrition directors should also be conscious of links that happen from one Web site to another when one "clicks" on words that may divert the user to different Web addresses. It can be very helpful to have such linkages provided, but one may also be sent to a very different Web address with a very different reliability without realizing the change.

SUMMARY

School nutrition directors have many resources available to them as they plan and proceed with kitchen design and equipment purchasing. Trade associations, equipment manufacturers, the internet, safety approval agencies, other school nutrition directors, and trade shows may all provide useful information.

The most important resource however, is the planning team, who are experts in the wide variety of knowledge areas needed for kitchen planning and construction. The key player on this team is the school nutrition director. The school nutrition director is the knowledge expert in school nutrition program operation and a *Trusted Advisor* to the other members of the planning team.

Along with this responsibility is the added function of making sure that there is proper communication. As the *Trusted Advisor* and key player in kitchen design and renovation, it is the school nutrition director's job to make sure that communication flows smoothly back to school nutrition director and from the school nutrition director to the other members of the team. Those familiar with building projects may have heard the expression, "It is best to measure twice and cut once rather than measure once and cut twice " – which says that something clearly understood and determined in advance does not result in mistakes which are costly and wasteful. This is also true for working with a planning team on a kitchen project. If everyone clearly understands exactly their role and communicates to other members of the team exactly what, where and how things should be done, the project will proceed far more smoothly. It is the role of the school nutrition director to make sure that communication happens.

School Nutrition Program Profile

I. CONTACT INFORMATION			
Project Name		School District	
District Representatives			
Name	Name	Name	
Phone	Phone	Phone	
Cell Phone	Cell Phone	Cell Phone	
Fax	Fax	Fax	
E-mail	E-mail	E-mail	
Address	Address	Address	
Project Architect	**Foodservice Consultant**	**Other(s)**	**Other(s)**
Contact	Contact	Contact	Contact
Phone	Phone	Phone	Phone
Cell Phone	Cell Phone	Cell Phone	Cell Phone
Fax	Fax	Fax	Fax
E-mail	E-mail	E-mail	E-mail
Address	Address	Address	Address

School Calendar for Meal Service:

Project Timelines:

Design Completion Timelines: Bid Process Timelines:

Construction Timelines: Equipment Installation Timelines:

Foodservice Facility Budget: (Attach)

Approval Procedure: (Note here the steps in the approval procedure, dates, contact names, and numbers)

II. SCHOOL SITE INFORMATION

Grade Levels	Student Ages	Student Capacity	Projected Enrollment	Location of School
				☐ Rural ☐ Urban ☐ Suburban

Meal Service Offered (Check all that apply)

☐ Breakfast ☐ Lunch ☐ Snack Programs ☐ Meal on Wheels ☐ Extended School Care

☐ Community Meal Service ☐ Senior Citizens Program ☐ Other _____

Daily Projected Customer Count

Customers	Breakfast	Lunch	Other
Students			
Teachers/Staff			
Others			

III. MEAL SERVICE INFORMATION

Number of Breakfast Periods		Service Time	
Number of Lunch Periods		Service Time	
Block Class Scheduling	☐ Yes ☐ No		
Continuous Service	☐ Yes ☐ No		
Open Campus	☐ Yes ☐ No		
Student Canteen	☐ Yes ☐ No		
Other _____	☐ Yes ☐ No		
Other _____	☐ Yes ☐ No		
Maximum Seating Capacity			

IV. TYPE OF FOOD PRODUCTION SYSTEM

- ☐ On-site Production and Serving
- ☐ Finishing: Finish Production and Serving
- ☐ Central: Production Only
  - ☐ Full Menu Items
  - ☐ Specialized Menu Items (list)
  - ☐ Bakery Items
- ☐ On-site Production for Outside Serving and Satellite Locations

Number of Meals Served

Satellite School/Location (Include catering functions)	Breakfast	Lunch	Other

- ☐ Satellite Receiving and Serving
  - ☐ Bulk Hot
  - ☐ Bulk Chilled for Heating and Serving
  - ☐ Pre-plated
    - ☐ Hot
    - ☐ Chilled for Reheating and Serving

V. TYPE OF PRODUCTION

- ☐ Cook and Serve
- ☐ Chilled Food System
  - ☐ Blast Chill
  - ☐ Blast Freeze
  - ☐ Water Bath Chill
  - ☐ Combination System
- ☐ Rethermalization System
  - ☐ Conventional Equipment
  - ☐ Specialized Equipment
- ☐ Other

VI. MENUS	
☐ Meat/Meat Alternate Choices	☐ No Meat/Meat Alternate Choices
☐ Vegetable Choices	☐ No Vegetable Choices
☐ Fruit Choices	☐ No Fruit Choices
☐ Bread/Grain Choices	☐ No Bread/Grain Choices
☐ Milk Choices	☐ No Milk Choices

VII. TYPES OF SERVICE SYSTEMS	
Serving methods (Including those used for catering)	
☐ Traditional Straight Serving Line	☐ Kiosks and/or Multiple Decentralized Areas
☐ Scatter or Scramble	☐ Mobile Units/Carts
☐ Self-service, Specialty Bars	☐ Marche Concepts
☐ Self-service, Serving Line	☐ Window-style Service
☐ Food Court	☐ Vending Machines
☐ Other (Specify)	☐ Other (Specify)
☐ Other (Specify)	☐ Other (Specify)

VIII. DINING AREA		
☐ Inside Facility	☐ Outside Facility	☐ Both
Seating Capacity		
Common Area		
Dining Room		
Facility/Staff Dining Room		

IX. INFORMATION FOR STORAGE

Decisions on the following will influence type of storage and equipment required.

Meat/Meat Alternate Items – Indicate weekly average of cases

Items	Refrigerated	Frozen	Dry Storage
Chicken Products			
Fish Products			
Ground Beef			
Ground Pork			
Ground Turkey			
Hamburgers			
Turkeys			
Pizza			
Sandwich Meats			
Other			
Other			
Other			
Other			
Other			
Other			
Other			

Vegetable Items – Indicate weekly average of cases by storage area

Items	Refrigerated	Frozen	Dry Storage
Green Vegetables			
Onions			
Potatoes			
Root Vegetables			
Other			
Other			
Other			

IX. INFORMATION FOR STORAGE (continued)

Fruit Items – Indicate weekly average of cases by storage area			
Items	Refrigerated	Frozen	Dry Storage
Oranges			
Apples			
Bananas			
Juices			
Other			
Other			
Other			

Bread/Grain Items – Indicate products used weekly and method of preparation				
Items	Basic Scratch Ingredients	Mixes	Frozen	Ready-to-serve
Bread (Sliced, Loaf)				
Rolls				
Muffins, Biscuits				
Pastry, Cookies				
Buns				
Other				
Other				
Other				
Other				
Other				

Liquid Type Items – Indicate products used weekly and method of preparation					
List	Raw to Ready	Bases	Canned	Frozen	Chilled Bags
Chili					
Sauces					
Soups					
Stews					
Other					
Other					
Other					
Other					
Other					
Other					
Other					
Other					

X. STORAGE INFORMATION

Length of storage periods is directly related to the purchasing procedures of food and supply products. The agreed upon delivery schedules from the food and supply product vendors may determine the length of storage periods. The length of storage may also be a result of available space coordinated with the product vendors.

Meal Components by Storage Area	Maximum Length of Storage Periods
Meat/Meat Alternate, Refrigerated	_____ Days
Meat/Meat Alternate, Dry Storage	_____ Days
Meat/Meat Alternate, Frozen	_____ Days
Vegetables, Refrigerated	_____ Days
Vegetables, Dry Storage	_____ Days
Vegetables, Frozen	_____ Days
Fruits, Refrigerated	_____ Days
Fruits, Dry Storage	_____ Days
Fruits, Frozen	_____ Days
Breads/Grains, Refrigerated	_____ Days
Breads/Grains, Dry Storage	_____ Days
Breads/Grains, Frozen	_____ Days
Milk, Refrigerated	_____ Days
Milk, Dry Storage	_____ Days
Milk, Frozen	_____ Days

Check all disposables to be put in dry storage are (Including catering needs):

☐ Straws ☐ Napkins ☐ Hot Cups ☐ Cold Cups ☐ Bowls ☐ Eating Utensils ☐ Plates ☐ Trays

☐ Pan Liners ☐ Sandwich Wrap/Bags ☐ Aluminum Foil Pans ☐ Other _____

Check additional dry storage needs

☐ Cleaning Supplies ☐ Catering Supplies ☐ Other Foodservice Items ☐ Equipment Storage

Miscellaneous Items	Maximum Length of Storage Periods
Staples 60° F	_____ Days
Paper Goods – Routinely Used Products	_____ Days
Emergency Disposables	_____ Days
Cleaning Supplies	_____ Days
Catering Supplies	_____ Days
Other Foodservice Items	_____ Days

X. STORAGE INFORMATION (continued)

Special Requirements for Storage		
Type of Refrigeration Equipment		
Refrigerator:		
Reach-in	Single, Double	Walk-in
Reach-through	Single, Double	Walk-through
Other		
Freezer:		
Reach-in	Walk-in	
Ice Cream Cabinet	Milk Shake Machine	
Ice Machine	Soft-serve Machine	
Other		

XI. SERVING AREA CONSIDERATIONS

Are Point-of-Sale (POS) computers used? ☐ Yes ☐ No		
Computers linked to a network? ☐ Yes ☐ No		
Location of Server:		
Methods of Payment: ☐ Cash ☐ Tickets ☐ Computer Cards ☐ Other		
Special merchandising is used in serving area? ☐ Yes ☐ No		
☐ Menu Boards	☐ Signage	☐ Other
Type of Condiments Provided:		
Location of Condiments:	☐ Serving Counters	☐ Condiment Counters
☐ Serving Area	☐ Dining Room	☐ Other
How will condiments be dispensed?		
☐ Pumps	☐ Portion Packs	☐ Other
Beverages to Be Offered and How Dispensed:		
Extra Purchase Items to be Offered and How Dispensed:		
Tableware:		
☐ Compartment Tray, Size	☐ Flat Trays, Size	
☐ Dishes, Permanent Ware	☐ Dishes, Disposable	
☐ Eating Utensils, Permanent Ware	☐ Eating Utensils, Disposable	

XII. DISH/TRAY WASHING

Will students self-serve tray/dishes/flatware?	☐ Yes ☐ No
If Yes:	☐ Full Self-scrapping ☐ Partial Self-scrapping
Tray/Dishes/Flatware Sanitizing System:	☐ Chemical Sanitizing ☐ Hot Water Sanitizing
Pots/Pans Sanitizing System:	☐ Chemical Sanitizing ☐ Hot Water Sanitizing
Kitchen Cleaning Equipment:	☐ Hand ☐ Steam ☐ Hydro
Kitchen Cleaning Equipment Location:	☐ Foodservice Area ☐ Elsewhere

XIII. WASTE DISPOSAL

What size trash receptacles?	How many?
Preferred location for can wash and storage?	
Waste Disposal System to Be Used:	☐ Garbage Disposal ☐ Compactor ☐ Pulper ☐ Cans/Dumpster
Frequency of Trash Pick-up:	
Trash Storage Space Needed:	☐ Yes ☐ No
Recycling Options:	

XIV. EMPLOYEE FACILITIES

Employee toilets and lockers:	
☐ Hand Washing Facilities/Lavatories	
☐ Men's and Women's Facilities	☐ Number of Lockers Each _____
☐ Unisex Facility	☐ Number of Lockers _____
Number of office's required? _____	Person(s) Per Office? _____
Office Furniture and Equipment Requirements:	
Educational Facilities:	
Will a clothes washer and dryer be needed?	☐ Yes ☐ No
Will a time clock be required?	☐ Yes ☐ No, Location: _____

XV. TECHNICAL INFORMATION

Available utilities:

☐ Gas ☐ Propane ☐ Natural	☐ Water	☐ Sewer	☐ Electricity	☐ Steam

Power specifications:

Electricity – voltage/phase

☐ 110-120/1 ☐ 208/3 ☐ 208/1 ☐ 220-240/3 ☐ 220-240/1 ☐ 440-480/3

Steam:

psi _____ flow _____

XVI. EQUIPMENT SELECTION MATRIX

Using one's menu as the guide, select and check equipment to prepare menu items. Many menu items may be prepared by using several different types of cooking equipment. Select equipment based on the best quality cooking results, utility energy efficiency, and human energy efficiency. When completed, analyze the total number of checks per type of equipment item. The results should justify and direct the equipment selection, therefore influencing equipment and design decisions.

This chart is not meant to be inclusive. Use the blank columns as necessary. Examples are provided.

Menu Items	Tilting Braising Pan	Steam-jacketed Kettle	Pressure-less Steamers	Pressure Steamer	Range-top	Convection Oven	Combination Oven-Steamer	Conveyor Oven	Griddle	Char-broiler	Other	Other

XVI. EQUIPMENT SELECTION MATRIX (continued)

Menu Items	Tilting Braising Pan	Steam-jacketed Kettle	Pressure-less Steamers	Pressure Steamer	Range-top	Convection Oven	Combination Oven-Steamer	Conveyor Oven	Griddle	Char-broiler	Other	Other

XVII. OTHER CONSIDERATIONS

Will any existing equipment be used? ☐ Yes ☐ No
If so, local department of health may require:

- Present location of item
- Name of manufacturer
- Model number
- All dimensions of item (length, width, height)
- Utility requirements for connection
- School install or contractor installation
- Any special requirements not listed above

Students with special needs that require unique preparation or serving equipment

Special requests for overall design

Facility designed for expanded for future capacity

Should facility be designed for future capacity

Description of innovations/experimental ideas which may be incorporated

Method of procurement of equipment

Desired finishes for equipment and spaces

XVIII. USE OF FACILITY BY OTHERS

Will facility be used by outside groups?
If so, how?

☐ Food Preparation ☐ Dining Area Use

What equipment will be used?

What areas should have limited access?

Frequency of use by outside groups?

Times of use? Typical size of group?

How will groups gain entrance to facility?

Who will supervise outside groups?

RENOVATIONS CHECKLIST

- ☐ Complete the Program Profile Data Sheets.
- ☐ Obtain a set of architectural drawings (including structural, mechanical, and electrical).
- ☐ Verify information shown on existing drawings such as dimensions, utility locations, etc.
- ☐ Call a structural engineer if adding equipment to the roof or a framed floor or if cutting openings in walls, floors or the roof.
- ☐ Determine if shut-down of the facility is required and how this will affect the meal service at the school.
- ☐ Make a list of equipment that will remain, will be removed and will be ordered.
- ☐ Who will buy the equipment?
- ☐ Do existing systems meet present building codes and health department regulations?
- ☐ What up-grading must be done to comply with new laws?
- ☐ Is the selected equipment flexible in usage in the future?
- ☐ Contact the electrical utility company to assist in evaluating the existing electrical service and verify what type of service exists.
- ☐ Is natural gas service adequate in pressure and flow to meet new requirements?
- ☐ Review plumbing riser or plan sheets indicating connected fixture units or flow.
- ☐ Decide on a path of future growth, if possible. Can utilities be located away from this?
- ☐ Can mechanical systems and equipment installations be located away from the path of future growth?
- ☐ Will new equipment add a significant heat load to the kitchen?
- ☐ Will mechanical systems be able to provide adequate cooling and heating?
- ☐ Has 25% spare capacity been provided in the electrical panel box?
- ☐ Can the existing electrical panel box be left in place (to save money)?
- ☐ Evaluate existing lighting. Is it energy efficient?
- ☐ Are the supply ducts lined? If so, removal is recommended.
- ☐ Verify that the capacity of water heaters is adequate to serve new equipment.
- ☐ Are the sanitary sewers deep enough to extend? Review inverts of plumbing piping below floor.
- ☐ Is the grease interceptor (grease trap) adequately sized? Is the interceptor located to serve the kitchen properly and to meet code?

ADDITIONS CHECKLIST

- ☐ Complete the Program Profile Data Sheets.
- ☐ Assemble the project team.
- ☐ Determine if shut-down of the facility is required and how this will affect the meal service at the school.
- ☐ Make a list of equipment that will remain, will be removed, and will be ordered.
- ☐ Who will buy the equipment?
- ☐ Do existing systems meet present building codes and health department regulations? What up-grading must be done to comply with new laws?
- ☐ Is the selected equipment flexible in usage in the future?
- ☐ Contact the electrical utility company to assist in evaluating the existing electrical service and verify what type of service exists.
- ☐ Is natural gas service adequate in pressure and flow to meet new requirements?
- ☐ Review plumbing riser or plan sheets indicating connected fixture units or flow.
- ☐ Decide on a path of future growth, if possible. Can utilities be located away from this?
- ☐ Can mechanical systems and equipment installations be located away from the path of future growth?
- ☐ Will new equipment add a significant heat load to the kitchen?
- ☐ Will mechanical systems be able to provide adequate cooling and heating?
- ☐ Has 25% spare capacity been provided in the electrical panel box?
- ☐ Can the existing electrical panel box be left in place (to save money)?
- ☐ Evaluate existing lighting. Is it energy efficient?
- ☐ Are the supply ducts lined? If so, removal is recommended.
- ☐ Verify that the capacity of water heaters is adequate to serve new equipment.
- ☐ Are the sanitary sewers deep enough to extend? Review inverts of plumbing piping below floor.
- ☐ Is the grease interceptor (grease trap) adequately sized? Is the interceptor located to serve the kitchen properly and to meet code?

NEW CONSTRUCTION CHECKLIST

- ☐ Will decisions be made by one person or by agreement of key staff?
- ☐ Who are the most qualified people to be involved in the project?
- ☐ What needs have been identified?
- ☐ How does expansion factor into the future of the facility? Be realistic.
- ☐ What is the construction budget? Is there a percentage for foodservice?
- ☐ What are the time constraints?
- ☐ What equipment will be used from other locations/schools?
- ☐ Is there specialized equipment that will need to be accommodated?
- ☐ Who will buy the equipment?
- ☐ Have the Program Profile Data Sheets been completed?
- ☐ Is the project team assembled?
- ☐ Has staff been assigned to the new facility (if possible) and have they been included in the decision making?
- ☐ Have all reviewing agencies been identified for the project, as well as their submission requirements?
- ☐ Is the equipment selected for purchase flexible in usage for the future?
- ☐ Is natural gas service adequate in pressure and flow to meet requirements?
- ☐ Can utilities be located away from the path of future growth?
- ☐ Can mechanical systems and equipment installations be located away from the path of future growth?
- ☐ Has 25% spare capacity been provided in the electrical panel box?
- ☐ Is the grease interceptor (grease trap) adequately sized? Is the interceptor (trap) located to serve the kitchen properly and to meet code guidelines?

CHAPTER FOUR

Planning the Project

CHAPTER HIGHLIGHTS

Introduction

- Project planning is a key phase directed by the school nutrition director as the *Trusted Advisor*

Project Planning Considerations

- Project planning is based on the issues and topics addressed in the program profile
- Accurate program profiles are essential because budgets, and operational functions are determined based on the information provided
- Critical path scheduling is a valuable tool in keeping projects on schedule

Choose a Concept

- Key questions include:
  - What is unique about us?
  - What trends are changing school nutrition programs?

Study the Customers and the Marketplace

- A thorough study of the students and the marketplace will help the school nutrition director in project planning

Define the Scope of the Project

- Projects will fall into one of several categories, new construction, major or minor additions or renovation, or purchase of new equipment

Budget Considerations

- The school nutrition director is obligated to make prudent use of federal, state, and/or local funds

Consider the Future Growth

- Flexibility in design is an important consideration
- Useful information for future planning related to demographic trends may be obtained from the:
  - Chamber of Commerce
  - Center for Economic Development
  - School district superintendent's office

Concerns Related to Renovations, Additions, and New Construction

Renovations

- Steps include:
  - Locating the existing drawings
  - Evaluating the existing structure (including weight loads, utilities, and plumbing)
  - Leaving room for future electrical service needs

CHAPTER HIGHLIGHTS *(continued)*

- Locating utilities or mechanical equipment out of the path of growth
- Sizing the kitchen and mechanical equipment to be flexible

Additions

- Assistance of an architect may be required by state law

New Construction

- If kitchen shutdown is required during construction, preliminary plans should include ways to serve meals

How to Work With an Architect and Read Drawings

- Architects provide assistance during programming, schematic design, design development, construction documents, bidding and construction administration
- A building section is a view of a building after making an imaginary vertical cut through the building, whereas an elevation is a straight-on view of a building wall
- As-built drawings should be kept in a safe place in the school district

Planning the Project

Introduction

Project planning is the time to put all of one's ideas on paper and establish the planning strategy. Although some school nutrition directors may believe the time associated with this task would be challenging to incorporate into their busy schedules, the bottom line is that one cannot afford not to participate in this process. Completing this planning stage thoroughly is essential to the overall success of the project.

Thorough project planning results in a foodservice operation that is designed around the menu. School nutrition directors, as *Trusted Advisors*, understand the key role that the menu plays in this planning process. All equipment and layout and design decisions in all schools should revolve around the menu needs.

Thorough project planning also results in a comprehensive view of the unique characteristics of one's school nutrition program. The following examples illustrate these differences:

- Some schools are small satellite operations and do not have an on-site kitchen, others are large kitchens preparing food for hundreds of students per day
- Some schools will have multiple food deliveries a week and will need less refrigerator or freezer space than similar size schools that only have weekly deliveries
- Some schools use loading or delivery docks and others do not want docks, but prefer the delivery trucks access to the back door without facing challenges in backing up to a loading or delivery dock

Project Planning Considerations

Project planning is the time to formulate decision making pathways and to develop some preliminary details based on one's need to replace equipment, renovate a school(s) or undertake a new construction project. Most project planning is directed by the school nutrition director in conjunction with a team of organizational representatives and industry advisors.

The cornerstone of project planning is a program profile. Experts recommend using a team approach for collecting and analyzing the program profile. The profile documents information that will influence all equipment purchasing decisions and reflect all facility requirements. This is a critical planning step because:

- Budgets are often based on the program profile
- Operational functions are determined through the planning process
- It reflects one's guiding principles
- It is a tool to inform school officials about the details of the project

The scope of the project will determine the size of the team used to prepare the program profile. New construction projects will have the largest teams while equipment replacement projects will have the smallest. The importance of this tool increases with the accuracy and completeness of the profile. This tool is designed to ensure one's equipment decisions are analytically sound. This is a responsibility that every project team must take seriously since decisions impact taxpayer resources, the health of students, and the overall financial integrity of the program.

Stephen Covey, author of Seven Habits of Highly Successful People (1989) recommends starting with the end in mind. "Beginning with the end in mind" is based on the principle that all things are created twice. "There's a mental or first creation, and a physical or second creation to all things."

The *School Nutrition Program Profile* form which is provided at the end of chapter three will help in gathering and organizing the information to help confirm the desired end result of the school nutrition program. Whether planning for new construction, full or partial renovation, or adding and replacing equipment, this form should be completed. The results will be the development of an operational model of the school nutrition program facility.

Critical Path Scheduling

One tool in making sure that one's project is staying on schedule is called Critical Path Scheduling. This concept was developed in the 1950's and uses a mathematical formula to schedule a set of project activities. Today, software packages have been developed to assist with this process, but the essential information that is necessary to complete the scheduling is:

- The list of remodeling, renovation, or construction activities needed
- The time required for completion of each activity
- The dependencies between each activity (if there is a required sequence, for example, the water, steam, and gas utilities must be installed and hooked-up to equipment before the equipment may be tested for use)

Based on the information provided above, critical path scheduling will determine the activities that are most critical to the completion of the project and determines the path(s) of those activities. These paths are called the critical paths. Those activities that are less critical are scheduled in as "float time". Any delays along the critical path are carefully controlled as these will clearly affect the length of time that a project takes.

Delays along the critical paths will also generally lead to additional costs. Because of the ability of critical path scheduling to minimize delays, disruptions, and building costs, it has become recognized as one of the most important tools available to project managers. For further information about critical path scheduling, read "First Choice, A Purchasing Systems Manual for School Foodservice (NFSMI)".

Choose a Concept

It is important for all members of the planning team to understand what the vision of the project. To determine that concept, it is important to define for the team, the answers to the following questions:

- What is unique about us?
- What trends are changing school nutrition programs (for example, health issues, food security, and regulations)?
- Does technological development in our industry threaten us or offer us new opportunities?
- Who are our customers? Is their number growing or shrinking, and why?
- What do our customers really want? How do we know this?
- Who are our competitors? What are our competitors doing to meet customer wants?

- Will the same foodservice system still accomplish our goals one year (two years, five years) from now?
- How has our business changed in the last five years?
- What are we doing to attract and retain school nutrition staff?
- What is our commitment to students, teachers, parents, administrators, staff, the board of education, suppliers, the local community, and society at large?

The success of the project will depend in large part on the school nutrition director, as the *Trusted Advisor*, identifying needs clearly to the project team. It is often difficult to state what is wanted when the choices are many. Another approach is to start with a list of what is not wanted. Alternatively, visits and discussions with other schools may assist in determining what is liked and/or disliked about the foodservice facilities. A list outlining one's likes and dislikes should be made and provided to the architect at the time the *School Nutrition Program Profile* is provided. This information should be referred to when evaluating the project and will help maintain a clear focus for the project team.

Study the Customers and the Marketplace

One's first guiding principle should be to know and meet customer expectations for the menu and for the cafeteria or eating area. To better understand one's customers, the students or parents are sometimes asked about their expectations regarding food or the atmosphere in the cafeteria.

Other schools may regularly use focus groups or taste panels of students. Customer feedback is essential to knowing more about student preferences. Why is it that some schools have extremely high participation rates and others struggle to cover their costs with lower participation rates? It is very likely that schools with higher participation rates know their customers better than other schools. Some schools find it useful to complete a chart like the sample table shown below.

What are our customers' needs/expectations	What equipment/designs will help us meet those needs?
A wide variety of food choices	Multi-use equipment (i.e. combi-ovens)
Food that tastes good	Steamers (which will help retain flavor)
Healthy food	Combi-ovens (not fryers)
Speedy service	Multiple "Point-of-sale" service systems (i.e. walk-up windows and/or kiosks/carts)
Ethnic and cultural preferences	
Value priced meals	
Attractively displayed food	
Other:	
Other:	

Define the Scope of the Project

This is the first and most important part of getting started. The project will fall into one of the following categories:

- All new construction.
- Major additions or renovation to an existing facility. This would require total "shut-down" of the facility in order to accomplish the work.
- Minor additions or renovation to an existing facility. This work can be performed with little or no interruption of the existing operation.
- New equipment only. No building construction required. Beware of this category! As a rule there is not a member of the design team involved and the wrong equipment selection can lead to very costly results; it is important to avoid purchases of unneeded equipment.

Budget Considerations

The school nutrition director as the *Trusted Advisor* is obligated to make prudent use of federal, state, and/or local funds. Public sector purchasing has the added dimension of accountability to taxpayers for how funds are used. In other words, one's purchasing decisions will be evaluated by how well federal, state, and/or local funds are used. Remember that selecting the least expensive equipment with the fewest options may not meet one's customer expectations, provide flexibility, or meet one's future needs.

Consider the Future Growth

The *Trusted Advisor* builds flexibility into the design to meet future needs of the program. Flexibility means:

- The ability to easily move certain pieces of foodservice equipment
- The ability to use one piece of equipment for more than one cooking method
- The freedom to expand, reduce, and/or reorganize one's foodservice system when the customers' needs and expectations change

It is often useful to brainstorm one's vision of flexibility by asking oneself these questions:

- Under the most ideal circumstances, how would I make the foodservice facility more efficient?
- What new kinds of equipment have I seen that would add flexibility and broaden the scope of my current operations?
- Would any of these pieces of equipment make my operation more energy or labor efficient?
- What is the best location for the foodservice facility in the school building?
- How can space for the foodservice facility be as flexible as possible?
- How can future expansion be planned into the new construction at this time?
- How can I prepare for district changes that would impact the school nutrition program, such as different class schedules?

Most school districts have a long-range plan to build, reopen, close, or convert schools from one level to another (for example, to convert an elementary school to a middle school). In addition, the superintendent's office may have historical and projected enrollment numbers to establish

district growth trends. Other useful information may be obtained from the local Chamber of Commerce or Center for Economic Development. The following questions should be asked to help determine the school nutrition program's long-range needs:

- How has the general population in my school district changed in the last five years? Are these changes a trend that will continue?
- Are the changes in the population specific to various age groups (for example, more young families may have moved to the area due to increased job opportunities)?
- Will the changes in the general population impact the school district?
- Are these changes in numbers of students specific to grade levels (for example, more elementary students, but fewer high school students)?

Concerns Related to Renovations, Additions, and New Construction

Renovations

- Locate existing drawings

  Architectural drawings are of great value in giving information about the existing facility to be renovated. It is very important to find these drawings. They are generally found in the school district office, district maintenance office, or local building office. If none of these locations has a set of drawings for one's school, the architect of the original building may be able to provide a copy. Architects keep a set of drawings for all projects they have been involved in. Unfortunately, not all architectural drawings will be accurate. A new piece of equipment should never be ordered or a wall torn down without verifying the drawing information. It is not uncommon for the final foodservice facility environment to differ from the drawings, as changes during construction may occur. Therefore, before any work is done or equipment purchased, existing measurements and engineering work should be verified with district maintenance staff. And given all this, original drawings should never be lent out. If a contractor needs a set to give an estimate, the individual responsible for maintaining the original drawings should take the necessary steps to provide a duplicated version of the drawings. There should be no exception to this issue, otherwise, original drawings could be lost and never seen again.
- Plan for flexibility

  Because foodservice areas are highly engineered and designed spaces, they are very costly to renovate. What is done during new construction can make it easier or harder when renovation is needed. Important suggestions include:
  - Look for flexible equipment – In minor renovations that involve only equipment replacement, remember to purchase equipment that is flexible in use. Do not get locked into an equipment layout in the foodservice facility or specific serving pieces that can not provide flexibility, should the menu changes. Flexibility in equipment usage and layout will save money in the long run, even if it costs a little more initially.
  - Design the electrical service for future growth – All electrical panels that supply foodservice equipment should be sized with at least 25% spare capacity, and perhaps even more if extensive future growth is anticipated. Whatever the case, this should be evaluated by the electrical engineer during the design phase. It is much more expensive to add electrical service than to design the additional capacity during new construction.
  - Locate utilities out of the path of growth – Attention should be paid to the location of electrical panels. They should not be located on walls that would most likely be

removed if renovation were to occur. It is impossible to know exactly what might be done in the future, but it would be helpful if some evaluation could be done to determine the most likely renovation/addition routes.

- Locate mechanical equipment out of the path of growth – Planning for flexibility involves careful consideration of equipment locations. Avoid locating air handling equipment, condensing units, etc., in areas that will be affected by construction. Avoid locating water heaters, gas meters, grease interceptors, etc., in the path of growth for future expansions.
- Size kitchen and mechanical equipment to be flexible – Modular sized air handlers in the 10 to 20 ton range are adaptable to several different services such as dining, food preparation and holding. Avoid one large air handler as it will be less flexible.
- Select a direction that the kitchen can grow without abandoning all the foodservice plumbing – This is not a cost effective method for renovating or adding kitchen space.
- Never displace the kitchen by converting it to dining – This is not a cost effective solution for renovating or adding a new dining space.

- Evaluate the existing structure

  The structural engineer should be involved from the very beginning of the project. Evaluation of the existing facility to accommodate the addition or renovation is the first item of business. Many times simple modifications to an addition or renovation plan can be made to allow simpler and less costly structural approaches to the design. An early evaluation will also verify that the addition ideas can work within existing structural capacity or that the modifications to the structure are reasonably budgeted and considered. All buildings are designed for a purpose or intended use. Codes change and the original mechanical and equipment loads may require more support capacity than originally. The main structural question to be answered is, "can the new loads added to the building be safely supported by the existing structure?" If additional load capacity is required, knowing its cost and impact on the renovation should be established. The following considerations are important.

  - Roof loads. These are normally the minimum required to support new equipment loads such as hoods, exhaust fans and air conditioning equipment.
  - Floor loads. Normal live loads for classrooms are 40 pounds per square foot (psf). Kitchen live loads can be almost twice as much (80 psf). Adding finishes to rough floors (such as concrete topping and thick set ceramic or quarry tiles) to create slopes to drains should be carefully reviewed. New storage areas can add a much higher floor load to a facility.
  - Equipment loads. New kitchen and mechanical equipment will add or change the loads on the floor and roof. If the kitchen floor is a concrete slab on grade (solid ground), there should be little concern about normal kitchen equipment loads. However, if equipment is supported from a framed floor which is not a concrete slab on grade, or if equipment is supported by the roof, the structural capacity should be verified before the equipment is installed. This consideration should be made regardless of who installs the equipment.
  - New openings. Kitchen renovations normally require new openings, in the floor and/or roof, as well as through existing walls. These openings may be for new doors, mechanical duct penetrations, and other structural changes. It is essential to know if the wall that is being cut is a weight bearing wall or a partition, and what type of support, if any, is needed.

- Electrical

  The electrical system in a typical foodservice operation is complicated and extensive. In renovations or additions, verify the available existing electrical service before any equipment is ordered. It is best to verify the service even before major decisions are made so that equipment is properly specified. The three main questions to ask regarding the existing electrical service are:

  - Is adequate power available for the new equipment?
  - Is the power that is available for the new equipment the right type of power?
  - Is there space in the existing electrical panel box to make connections for the new equipment wiring?

  Remember that building codes may have changed since the facility was built. Most utility companies will evaluate existing conditions and assist the school in determining how much capacity is available on the existing electrical system before the school buys equipment. This is especially helpful for small schools and/or small budget renovations. Take advantage of this service. As a rule, replacing one piece of equipment will not normally require any engineering. However, a new piece of equipment may have features which did not exist at the time of the original purchase. These features may require some engineering and additional equipment purchases that were not part of the project budget. Therefore, it is so important to conduct a facility evaluation at the very beginning of the project.

- Other electrical issues
  - Keep in mind that it can be very costly to relocate electrical panels and associated equipment. If at all possible, renovated space should plan to leave panels in their existing location.
  - If the existing building has been in use for some time, it may be time to think about changing out existing lighting in the foodservice area. New fixtures on the market offer more energy efficient and easily maintained choices than were available years ago. Lighting should also be somewhat vandal resistant in student areas of the foodservice facility.
  - All electrical equipment and devices should be of good commercial quality.

- Mechanical and plumbing

  Mechanical and plumbing are very difficult to change or add on to. Renovations or additions usually involve a growth in service or square footage. The tendency is to patch and add mechanical service such as ventilation in a haphazard manner which often leads to inadequate ventilation in the kitchen. As a *Trusted Advisor*, it is important to understand issues related to the mechanical and plumbing systems, such as:

  - It is difficult to expand mechanical systems – especially ventilation hoods. Ventilation hoods are usually sized and typed for a specific application. Air handlers can be supplemented by additional air handlers. Water heaters can be added in parallel.
  - Plumbing lines are very often set in a concrete slab floor. This makes it difficult to add additional service without tearing out concrete and a major expense. For these reasons, try to work with existing plumbing lines whenever possible.
  - Obtaining the architectural and mechanical drawings for the building will help determine sizes of existing lines and locations, but remember that lines are not always installed where the drawings say they should be.
  - Utility services in many cases will need to be run separately outdoors and then be joined together (water, gas, and sewer).

- Check existing air handling systems and equipment to see if they meet present building codes.
- Ask if the existing systems are able to provide adequate cooling and heating. Also evaluate the condition of the equipment. A rooftop unit has an expected life span between 10 and 14 years.
- Verify that the natural gas service is adequate (pressure and flow) to meet new requirements. Local utility companies may be helpful here.

- The importance of the renovation checklist

  Renovation of foodservice spaces can be one of the most costly and complicated of building and planning tasks in schools. Kitchen equipment is expensive! A good rule of thumb is that unless the renovations involve only the purchase of replacement equipment that is furnished with a cord and a plug, a member of the design team should be consulted. Completion of the Renovations Checklist form provided at the end of the chapter will help to ensure that proper consideration is made of layout and design issues prior to beginning renovation work. The following actual examples of what can happen when professionals are not called highlight why it is important to work with one's design team, even on small projects.
  - A hood vent exhaust fan was purchased of which part had to be mounted on the roof. The structure was such that it could not handle the additional weight without being modified. This created problems because no funds were available to make structural modifications to the school building.
  - A piece of equipment was purchased which required gas service; gas was not available at the school and could not be easily obtained.
  - Equipment was purchased which added a lot of heat to the kitchen area. As a result, the existing HVAC equipment could not adequately cool the space.

Additions

- Importance of a project team

  According to laws in many states, the services of an architect registered to practice in the state shall be required for the design of all new structures, additions and/or alterations to existing structures, and adjacent work. The selection of the right contractor for new construction, additions or renovations is also very important. Keep in mind that vendors must be bonded, licensed, and insured. The services to be provided by an architect usually include what are commonly termed "basic services", consisting of the schematic and design development, construction documents, bidding and award, and construction administration of the project. If the project is engineering in nature, an architect is usually not required if the service of a professional engineer is obtained. It should be noted that although the architect is the lead and directs the project team, 40-60% of the decisions he/she makes are directed by the advice from the engineering consultants. The sooner the total team is assembled and involved, the sooner many potential problems can be resolved. When the project team is not set up early and used effectively, the following actual examples point out what can go wrong.
  - Water heaters and the electrical control panels for the entire school were installed in the foodservice facility storage rooms. The water heater and the air conditioner worked against one another and the panels took up one whole wall of potential storage space. Access to the control panels was also a problem when the storage room was locked.

- Electrical conduit was installed in the middle of the doorway. Alternatively, in another school, electrical conduit was installed in the middle of the hallway floor.
- Drain systems were laid which required an uphill flow. No pumping or lift system was considered.
- Bathrooms were built in the middle of the dining area. In another school, bathrooms were built in the middle of the kitchen.
- Electrical outlets were installed on one wall of the foodservice facility only, while the water supply was on the other side only and the drains were in the middle.

- Things to think about

  Adding on to foodservice spaces can be complicated. This is because there is quite a bit of electrical, mechanical, and plumbing work already in the foodservice area that may not be suitable for the addition. New construction is generally easier to plan because it is basically starting with a "clean slate". When adding on to existing spaces, a lot of coordination is necessary with existing conditions. Completion of the Additions Checklist form provided at the end of the chapter will help to ensure that proper consideration is made of layout and design issues prior to beginning work. If operations in the school are not to be interrupted, sequencing of the structural modifications will need to be evaluated very carefully. Scheduling becomes very important and phasing of the work must not interrupt service if construction is performed when school is in session.

New Construction

New construction gives the opportunity to take advantage of all the suggestions that this resource has to offer. In addition, some things can be considered during the design phase of the project that will not only make the construction go more smoothly, but will make any future work on the foodservice facility much easier and less expensive. Completion of the New Construction Checklist form provided at the end of the chapter will help to ensure that proper consideration is made of layout and design issues prior to beginning the project.

How to Work With an Architect and Read Drawings

Working with an Architect

Whether the school nutrition program director is involved in renovations, additions, or new construction, they will need to work with an architect and be able to read architectural drawings. Like many professions, architecture has its own unique methods for conveying information. Architects communicate using drawings and words to describe how a building will look and function but, the drawings he/she prepares can be complicated and difficult to understand. On the other hand, non-architects must clearly understand what an architect does and what the drawings say in order to give the architect feedback and make sure that they are satisfied with what the architect has done. Architects provide work in six phases of the construction.

1. Programming – The most preliminary phase is to understand what the client needs in terms of space and function. The architect understands these needs through information the client provides so that the building reflects what the client wants. The program simply catalogues the client's needs, wants and budget. The *School Nutrition Program Profile* will provide most of this information to the architect.
2. Schematic design – Next, the architect must figure out the best approach to realizing the program. Schematic design sketches reflect the architect's initial reaction to the program.

These drawings show the general arrangement of spaces and their relationship to one another. These sketches commonly take the form of bubble diagrams.

3. Design Development – These drawings are drawn to scale and show the complete building and all spaces and functions required by the program. The design shown in the drawings is flexible, in that it allows for the architect and client to make changes and revisions. These drawings include plans, sections, elevations, and sketch details. They also begin to show work of the consultants such as mechanical, structural, and electrical considerations.
4. Construction Documents – Final drawings are produced by the architect as a detailed set of instructions for the contractor. Written specifications are also produced which give detailed information about the quality of workmanship and materials expected. All the information relevant to the building is shown on these drawings which are issued to contractors and owners in the form of blue line drawings. They are to scale and include a complete site plan, architectural, mechanical, plumbing, structural and electrical documents.
5. Bidding – The architect sends out the construction documents to contractors who bid a price for the work.
6. Construction Administration – The architect observes construction through periodic site visits and answers questions from the contractor and sub-contractors related to the construction documents. Payment requests to the owner from the contractors are reviewed by the architect.

How to Read Plan Drawings

The floor plan is a bird's eye view of a particular floor level of a building after an imaginary cut is made horizontally through the walls. The upper floors and/or roof are then removed so you can "see down into the building". The floor plan shows the exact size and outline of a particular floor. It includes every wall, door, window, permanent fixture, electrical outlet, and other proposed interior construction.

How to Read Section and Elevation Drawings

A building section is a view of a building after making an imaginary vertical cut through the building. One side of the building is then pulled away so you can see inside the rest of the building. The purpose of a section is to show the interior space of a building, its floor-to-ceiling heights, foundation depth, framing material, wall finishes, and mechanical equipment. An elevation is a straight-on view of a building wall. This is like taking a photograph of the wall of a building. The elevations are usually oriented north, south, east, or west. The purpose of an elevation is to show the treatment of exterior or interior walls and roof.

Importance of As-Built Drawings

When the project is complete, the contractor should provide as-built drawings for all new and renovated construction. These drawings must be kept in a safe place by the school nutrition director. Additional sets of drawings should be kept with school maintenance personnel and in the principal's office. The minor field modifications and relocation of any plumbing, electrical, and mechanical work during construction can play a major role in additions and renovations done at a later date.

SUMMARY

Project planning is a key phase in the equipment purchasing and facility design process and is started through the creation of an accurate program profile. The program profile provides the foundation for decision making, and is essential as a communication tool among the team members. The school nutrition director will need a thorough understanding of the goals for the school nutrition program and the students and marketplace in order to create the program profile.

After the program profile is created, the planning team is organized, and the budget and applicable codes/regulations are determined. Flexibility in design is an important consideration because school nutrition program needs may change. Flexibility allows the operation the freedom to expand, reduce, or reorganize, based on need. Useful information for future planning related to demographic trends may be obtained from the local Chamber of Commerce, the Center for Economic Development or the school district superintendent's office.

Based on program profile information, projects may fall into one of several categories: new construction, renovation, or purchase of new equipment. Steps in renovation projects include: locating the existing drawings, evaluating the existing structure (including weight loads, utilities, and plumbing), leaving room for future electrical service needs, locating utilities or mechanical equipment out of the path of growth, and sizing the kitchen and mechanical equipment to be flexible. No matter the nature of the project, if kitchen shutdown is required, preliminary plans should include ways to serve meals during the process.

School nutrition directors will work closely with architects and architectural drawings during process. Because modifications may be made in the architectural drawings during construction, it is important to keep as-built drawings in a safe place for future use. Remember, original drawings should never be loaned out, but copies are helpful for those involved in the project.

Chapter Four References

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CHAPTER FIVE

Layout and Space Guidelines

CHAPTER HIGHLIGHTS

Introduction

- School nutrition directors, as *Trusted Advisors*, are valuable assets on the design team because they understand the design priorities of the food preparation and cafeteria/dining areas

Important Considerations in the Planning Process

- Sanitation
- Ergonomic design and worker fatigue
- Employee safety
- Security
- Esthetics
- Noise control
- ADA design

Planning for Controlled Operating and Maintenance Costs

- School nutrition directors, as the Trusted Advisors, make energy efficient choices
- Controlling operation and maintenance costs requires a:
  - Focus on energy conservation
  - Careful selection of equipment
  - An energy conservation system
- Energy efficiency could be improved by as much as 20%
- Self-audits identify energy efficient needs and practices

General Principles of Work Centers, the Flow of Work, and Material Handling

- Efficient layouts take into account:
  - Motions required
  - Distances traveled
  - Type of equipment required
- The three parts of the layout are the work center, work sections, and the total layout
- Work flow designs can be straight-line flow or a functional flow

Types of Foodservice Preparation Systems

- Types of foodservice preparation systems include the traditional or on-site preparation system and the satellite system

Types of Service Systems

- Traditional or straight line method
- Scatter or scramble system
- Self-service
- Food courts

CHAPTER HIGHLIGHTS *(continued)*

- Kiosks
- Mobile units/carts
- Vending

Space Allocation

- Space should not be so large that it adds unreasonable amounts to building, operating, and maintenance costs

Dining Room Space

- Space allocation is different for pre-kindergarten to middle schools to high schools

Dry Food and Paper Goods Storage

- Should be:
  - Located so that it has proper security and is accessible
  - Visible from the school nutrition program manager's office
  - Adjacent to food preparation and food storage
  - Sized according to the frequency of deliveries

Refrigerated Storage

- Should be:
  - Accessible to receiving
  - Adjacent to the food preparation area

Preparation

- Work stations should include space for portable carts and racks
- Aisle widths should allow free movement of employees and carts or racks

Holding and Serving

- Should be:
  - Located between food preparation and the service area
  - Allow for employee space for replenishing food

Pot and Pan Washing

- Should be:
  - Located out of the preparation and cooking areas
  - Located near the dishwashing area and have space for portable pot/pan racks

Dish/Tray Washing

- Should be located adjacent to the dining area near the dining room exit
- Traffic flow is critical in this area
- Areas for flatware sorting and space for dirty dish "parking" prior to washing should be available

CHAPTER HIGHLIGHTS *(continued)*

Receiving and Waste Disposal

- Size is dependent on the number of truck deliveries at any given time
- Loading docks should have overhead weather protection and bumper pads

Toilets and Lockers

- Should be located adjacent to the kitchen and near serving areas

Office

- Should give a good view of receiving, storage, and food preparation/cooking

Cleaning Supplies and Cleaning Equipment Storage

- Ideally located in a separate room or closet area

Layout and Space Guidelines

Introduction

School nutrition directors need to understand the complexity of designing spaces for school nutrition programs. Decisions are based on sanitation, ergonomics and worker fatigue, employee safety, security, esthetics, noise control, and accessibility issues related to the Americans with Disabilities Act (ADA). In particular, knowledge about local health codes, safety issues that impact school design, and how to provide security for the school nutrition program are key issues for today's school nutrition directors. These decisions are also complex because priorities will be different in the food preparation area as compared to the cafeteria.

In addition, school nutrition directors, as the *Trusted Advisors*, will consider how to control operation and maintenance costs with a focus on energy efficiency in design of the facility. The expertise of the school nutrition director is clearly needed for this important process as part of the design team.

Important Considerations in the Planning Process

Sanitation

School nutrition facilities must be designed and kitchen equipment selected so that the food produced in the school nutrition program is sanitary and safe to eat. The manner in which these are accomplished is highly regulated. Examples of safe material requirements for food contact surfaces include:

- Durable material that resists denting, buckling, pitting, and chipping
- Non-toxic in contact with food
- Corrosion resistant and non-absorbent
- Smooth and sealed
- Easily cleanable

Construction requirements might include that the equipment has:

- Rounded internal corners where cleaning might be required
- No protrusions that might be difficult to clean, such as, nuts, bolts, or screws
- No cracks or seams that are impossible to clean

Facility requirements also are very specific. For example:

- Approved floor, wall, and ceiling materials must be used
- Lighting must be at the appropriate level and shielded
- Ventilation should keep the kitchen free of excessive heat, steam, condensation, odors, smoke, and fumes
- Windows and doors should prevent the entrance of dust, dirt, and pests
- Use of fans is limited to areas where the fans will not blow directly across food products
- Handwashing sinks must be provided in the food preparation area and all toilet areas; in addition, access to a handwashing sink is recommended near service areas
- Drains should be provided where water might need to be drained
- Air gaps or other approved plumbing devices should be used to prevent backflow
- Building and equipment should be kept cleaned and in good repair

Ergonomics and Worker Fatigue

Ergonomics focuses on designing or arranging equipment, the building, and the methods of working so that the employee activities are done in the safest, most efficient, and productive manner possible. Ergonomics has become more important as the labor shortage has become more critical. In addition, school nutrition directors, as the *Trusted Advisors*, appreciate the efficiency of having the right tools and a well-designed work environment. Unfortunately, school nutrition assistants are sometimes in poor work environments that can be caused by:

- High temperatures/high humidity
- Lighting
  - Too little, too much glare
  - Too little contrast
  - Unnatural food or skin
- Noise
  - Too loud
  - Sharp impact (dish washing, pot/pan washing)
- Position
  - Stooped or bent related to the height of work surfaces
  - Standing too long
  - Repeated major body changes in lifting
  - Heavy physical exertion
- Mental/emotional "conflicts"
  - Unfamiliar tasks
  - Lack of knowledge about the task
  - Disliked tasks
  - Careful attention to detail
  - Rushing to meet deadlines

One of the most important ergonomic considerations is related to the height of a work area. School nutrition assistants spend many hours on their feet, but the ergonomic concern is not so much related to their feet, but instead to the muscles of their back which may be strained from the long time periods spent standing, bending, or reaching objects. Therefore, work tables should be at the correct height for the staff member working at that location. The general rule of thumb is that the work table height should be 4" below elbow height. To minimize the need to reach too long a distance, the work table be set up so that tools or food are within 24-36" of the center of the employee's waistline.

Employee Safety

Schools and school nutrition programs should be designed with numerous safety issues in mind for both employees and for students. For remodeling, special safety issues may apply, such as lead and asbestos management. Other examples of safety issues that may be considered in building, remodeling, or reconstruction may include:

- Campus security and violence prevention
- Fire safety
- Emergency preparedness
- Indoor air quality (related to molds or allergens)
- Chemical safety

- Prevention of injuries
- Traffic and pedestrian safety

Security

Security must be considered when designing school nutrition program areas. Theft, terrorism, shootings, and other violent acts such as fights do happen and there is much that can be done to maximize security and minimize theft. Suggestions are:

- The school nutrition director/manager should be able to see storage and loading areas from their office
- Back doors should be kept locked and a buzzer/intercom provided on the receiving door
- The number of doors into all storage areas should be limited
- Locks in different areas should not be part of a master system
- The location of electrical breaker boxes should not be in dry storage areas
- Locks should be provided on all windows
- Separate rooms should be provided for plumbing, mechanical, and electrical equipment

Esthetics

Design priorities are different for the "back of the house" (production area) areas versus "front of the house" (serving line, dining room or cafeteria) areas. For example, in the "back of the house" efficiency is key. It influences labor cost and employee fatigue. Less important is the esthetics – the pleasantness and comfort of the working environment.

On the other hand, when considering design issues for the "front of the house", esthetics become important in meeting customer expectations, while efficiency is important, it is not the only major design issue. In addition, serving areas, dining rooms, and cafeterias need to be durable to withstand student use. Color choices are more critical, as well as design themes, or trendy styles of service.

Noise Control

Kitchens and dining rooms should be located in convenient locations for the school, but there are two concerns with noise. First, noise is produced in the kitchen and travels into the dining area. Second, noise is produced in the kitchen and dining area that affects adjacent classrooms and other related academic facilities. Three ways to control noise include:

- Controlling noise at its source. This can be accomplished by selecting different equipment so that less noise is produced, such as a quieter fan, or by lining the equipment with rubber mats underneath or with foam
- Isolating the source of noise
  - locate compressors outside the kitchen
- Using building materials or layouts that help to absorb or break up the noise which has been created

More specifically, to minimize noise, school nutrition directors might consider the following suggestions:

- Use sound-absorbent materials such as acoustical ceiling tiles, sound-absorbent pin-up boards in dining areas, and even cloth covered blinds over large areas of plate glass
  - Materials must be easily cleanable and meet sanitation codes for that area

- Insulate walls/ceilings to reduce the level of noise traveling from the kitchen and/or dining area to other areas
- Separate dining areas from the serving and dish return area
- Use chairs with noise resisting feet (glides) to lessen noise of moving furniture
- Use disposable trays/utensils
- Use a low level of music as background to mask other noise and make the cafeteria more enjoyable for students

ADA Issues

Accessibility is a current design issue that school nutrition directors, as *Trusted Advisors*, must understand. Among U.S. school children age 6-14 years old, approximately one in eight children have some type of disability, or approximately 5 million students. Schools are responsible for compliance with three pieces of legislation in regards to disability guidelines. There are the Americans with Disabilities Act (ADA) of 1990, Section 504 of the Rehabilitation Act and the Individuals with Disabilities Education Act. The purposes of these pieces of legislation for newly constructed or altered portions of existing buildings are to provide clear and comprehensive guidelines for:

- Eliminating discrimination against individuals with disabilities
- Providing enforceable standards addressing elimination of this discrimination
- Complying with accessibility guidelines

ADA guidelines are extensive and encompass the kitchen and dining room or cafeteria (as well as the rest of the school). For schools, special design considerations may include:

- Building signage
- Ramps
- Parking spaces
- Alarms with visible signals
- Accessible public telephones
- Heights of bathroom and water fountain equipment
- Widths of doorways
- Speed and timing of automatic door openings
- Doorknobs
- Playground equipment
- Paths to playground equipment

Three categories of ADA design exist and are defined below:

- Accessible Design – meets minimum requirements of state, local, and model building codes; most accessible features are permanently fixed in place and noticeable
- Adaptable Design – is readily adjusted or capable of being easily and immediately adjusted to individual needs or preferences
- Universal Design – items that are usable by most children regardless of their level of ability or disability; many accessible and adaptable features are universally usable

Guidelines are age specific to accommodate children's different size requirements as compared to adults. For example, adult standards are used for children age 12 years and older. For younger aged children, smaller dimensions are based on their age range. Specific examples are given below for children age 12 years and older, but local building code regulations should be checked:

- Doors
  - Doorways shall have a minimum clear opening of 32" (815 mm) with the door open 90 degrees, measured between the face of the door and the opposite stop
- Aisles
  - Minimum width for single wheelchair passage shall be 32" (815 mm) at a point and 36" (915 mm) continuously
  - Space required for a wheelchair to make a 180-degree turn is a clear space of 60" (1525 mm) diameter or a T-shaped space
  - Minimum clear width of an accessible route shall be 36" (915 mm) except at doors
- Slopes
  - Changes in level up to ¼" (6 mm) may be vertical and without edge treatment
  - Changes in level between ¼" and ½" (6 mm and 13 mm) shall be beveled with a slope no greater than 1:2
  - Changes in level greater than ½" (13 mm) require a ramp
- Flooring
  - If carpet or carpet tile is used, it shall be securely attached; have a firm cushion, pad, or backing, or no cushion or pad; and have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. The maximum pile thickness shall be ½" (13 mm)
- Seating
  - Seating for people in wheelchairs should provide knee spaces at least 27" (685 mm) high, 30" (760 mm) wide, and 19" (485 mm) deep
  - Tops of accessible tables and counters shall be from 28-34" (710 mm to 865 mm) above the floor
- Bathrooms
  - The height of water closets shall be 17-19" (430 mm to 485 mm), measured to the top of the toilet seat
  - Toilet paper dispensers shall be installed within reach and between 14-19" (355 mm to 485 mm) above floor
  - Grab bars shall be mounted 18-27" (455 mm to 685 mm) above floor
  - The centerline of water closets shall be 12-18" maximum (305 mm to 455 mm) from the side wall
  - Minimum depth for stalls shall be 59" (1500 mm)
- Hand washing facilities
  - Lever handles with extended handles or spouts are most easily used
  - Sink rims and counter heights should be no higher than 34" (865 mm) above the floor with a clearance of at least 29" (735 mm) from the floor to the bottom of the sink or counter
  - Hot water/drain pipes under sinks shall be insulated or configured to protect against contact
  - Handles shall have a shape that is easy to grasp with one hand and does not require tight grasping, pinching, or twisting of the wrist to operate, such as levers, U-shaped handles or push-type mechanisms
  - Hardware shall be mounted no higher than 48" (1220 mm) above floor
- Door thresholds
  - Thresholds at doorways shall not exceed ¾" (19 mm) in height for exterior sliding doors or ½" (13 mm) for other types of doors

For facilities that are used primarily by children under 12 years, minimum and maximum reach guidelines are lower and are given in the chart below. Numerous additional guidelines are also given such as soap dispensers, hand dryers, cafeteria tables, faucets, and water fountains.

Forward or Side Reach*	Children 3-4 Years	Children 5-8 Years	Children 9-12 Years
Minimum (low)	20" (510 mm)	18" (455 mm)	16" (405 mm)
Maximum (high)	36" (915 mm)	40" (1015 mm)	44" (1120 mm)

* *Information provided from http://www.usdoj.gov/crt/ada/archive/kid-nprm.txt*

Individual situations may require particular consideration. For example, in "back of the house" areas, although aisle space is generally 36", a more desirable aisle space may be 42". In some cases, 48" of aisle space may be necessary, particularly in storage areas in the kitchen area for employees. On the other hand, too much aisle space is almost as bad as too little. The goal is to strike the right balance between workability, accessibility, and efficiency.

Planning for Controlling Operating and Maintenance Costs

Energy use in a school nutrition program is significant. School nutrition directors, as the *Trusted Advisors*, understand the importance of energy efficient choices whether the expenses are covered by the school district or the school nutrition program. It has been suggested that energy efficiency might improve as much as 20% by making careful choices. Planning and controlling energy costs, however, takes a concerted effort. It requires:

- Focus on efficiency and energy conservation
- Selection of energy efficiency equipment and building designs
- Involvement by all school nutrition staff to incorporate energy conservation practices

The first decision faced by the school nutrition director is the energy source for kitchen equipment. The choice of electricity versus gas or perhaps both is important because one will have to live with this decision for a long time. There are advantages and disadvantages to both. The advantages for electric versus gas range tops are given below as an example:

- Gas ranges
  - Better control of cooking temperatures since an almost infinite range of flame settings is possible
  - Instant on/off power
  - Cheaper operating costs that may be as much as 7-10 times less expensive
  - Greater moisture content
- Electric ranges
  - Longer retention of cooking temperatures even after the heat has been turned off so that pans stay warm longer
  - No open flames
  - New technology options of halogen, infrared, and induction cooking which are not available with gas. This is discussed further in the chapter on ranges and ovens.
  - Fewer ventilation requirements
  - Smaller space requirements (no gas flue)
  - No dependency on fossil fuels

Controlling operating costs is really only possible if actual operating costs are known. The way to begin this process of understanding operating costs is through an energy audit. Some utility companies may be willing to assist with this process by performing an energy audit at the request of the school nutrition director. There are two kinds of energy audits:

- Walk-through audit
- Analysis audit

Walk-through audits may be free of charge. The utility company will send a representative to inspect the property, look at equipment, ask questions about the program, and recommend improvements. Some of their recommendations may cost money (for example, adding insulation, changing or buying a new piece of equipment, etc.), but the school nutrition director can decide which suggestions to implement.

On the other hand, there is usually a charge for an analysis audit. An analysis audit is much more involved and provides detailed information about the lighting, heating, and cooling systems, as well as the equipment. Recommendations are also more detailed and may include:

- Structural changes to the building
- Replacing or retrofitting of equipment
- Appropriate electric use rates for the school.

Another way to collect information about operating costs is to conduct a self-audit. Some schools may involve the entire school system in this audit. Involving more employees and multiple departments, such as the maintenance staff, increases the number of innovative suggestions for saving energy. Some energy saving tips for school nutrition programs include:

- Cooking in the largest volume possible
- Cooking at lower temperatures
- Running dish machines only with full loads
- Limiting the length of time that equipment is preheated
- Keeping equipment clean
- Providing routine preventative maintenance on equipment
- Reducing use of energy during peak demand times
- Insulating water heaters
- Using more energy efficient pieces of equipment or cooking technologies
- Purchasing walk-in freezers and refrigerators as a single unit, allowing cold air from the freezer to be released into the refrigerator compartment when the freezer door is open
- Turning off lights when the room is not in use
- Using energy efficient lighting

General Principles of Work Centers, the Flow of Work, and Material Handling

The goal of any school nutrition program layout is to have an efficient system of work that minimizes material handling. An efficient layout takes into account:

- Motions required
- Distances traveled
- Type of equipment required
- Quality and quantity of food required

- Cost of operation
- Time scheduling
- Spatial requirements
- Multiple equipment use
- Ergonomics
- Safety of the school nutrition staff

The three parts of a layout are:

- Work center – The basic unit in a layout where a group of closely related tasks are performed by one or more school nutrition assistants (for example, the dish room, the salad preparation area,)
  - Guidelines for space allocation are set up for work centers based on particular tasks
  - Reach should not be beyond what is comfortable
  - Standard guides are that a staff member of medium size (about 5'6" or 1.68 m) is allocated 15 sq. ft. (1.39 m^2) measuring 2.5 ft. deep (76 cm) by 6 ft. long (182 cm)
  - Work centers should be as compact and self-sufficient as possible, but flexibility is desirable because work centers sometimes have to serve more than one function (for example, a salad preparation area may later be used for sandwich preparation)
  - Mobile equipment may provide needed flexibility for multiple work centers
  - Consider interrelationships of work centers and dual use of equipment (particularly mobile equipment, such as mixers or meat slicers that might be placed on carts) to keep equipment costs low
- Work sections – Work centers are organized into work sections for one type of activity
  - Work sections should provide for an efficient flow of work
  - Effective flow of work follows a logical sequence of operations so that food travels in a forward direction from receiving to storage, preparation, holding, service, and dishwashing with a minimum of crisscrossing and backtracking
- Total layout composed of work centers and sections

The two common types of work flow design are:

- Straight-line flow plan, also called an assembly-line flow, is used when food moves continuously in one direction
  - This flow plan is most suitable when standardized menu items are prepared in large quantities, such as in central kitchens
  - Although this system is termed a straight-line flow, the actual shape of the layout may be a circle, parallel, U-shaped, L-shaped, or a straight line
- Functional flow plan, also called a process plan, is characterized by the organization of food production areas into departments
  - This system is more suitable for production of smaller quantities of a wider variety of foods

No matter which work flow system is used, both plans are designed around six basic rules to maximize efficiency.

1. Food should move in a direct path with minimal crisscrossing or backtracking
2. Minimal expenditure of nutrition assistant time and energy should be required
3. Materials should be stored for minimal lengths of time during preparation and service
4. Nutrition assistants and food should travel minimal distances

5. Food and equipment should require minimal handling
6. Maximum utilization of space and equipment is desirable

More specific guidelines for school nutrition programs are described as principles of material handling. They are listed below as:

- Storing food and equipment near first use
  - A pot to be filled with water should be stored near the sink
  - Baking supplies should be stored in the baking area
  - Reach-in refrigerators should keep food supplies at convenient locations
- Planning for economy of motion
  - Frequently used tools should be stored more conveniently and less used tools should be stored farther away
  - Bowls or tools should not be stored so that other items have to be moved to reach them
- Not wasting space
  - Shelf height and depth should be designed for items needing to be stored
  - Adjustable shelving is preferable
- Minimizing handling and storage
  - Carts allow products to be efficiently moved
- Organizing storerooms to minimize searching for products
  - Most frequently used items and largest volume products should be stored between the height of the knees and shoulders
  - Items stored in front should be similar to those that are stored in back.
- Using ergonomic handling
  - Lifting and handling of heavy items should be done by using equipment
  - Handling guidelines should take into account not only the object's weight, but also the horizontal and vertical distance it must be moved, the turning motion required, how frequently the task has to be done, and the type of grip or grasp required to handle the item
  - Limits for maximum loads vary. Some recommendations are to carry no more than 35-50 pounds (16-23 kg) at a time

Types of Foodservice Preparation Systems

Traditional System

This is also referred to as a conventional system, self-contained or on-site kitchen. In this system, food is prepared and served at the same location. According to NFSMI research, approximately 70% of schools in the United States use this type of system. Some reasons why this might be the case include that:

- Each school is more flexible in what it can do
- Changes in menus can be made more easily
- Food is fresher because it is prepared on site
- The kitchen may be available for other groups and/or functions after school hours

Disadvantages to traditional systems within a school district with multiple schools are the duplications of:

- Services
- Space
- Equipment

Satellite System

In a satellite system, food is prepared at one location (central kitchen or another school) and then transported (cold, frozen, or hot) to another location (satellite) for serving. This can be accomplished by one of two methods:

- Bulk food method – The food from the central kitchen is transported in bulk food containers to be portioned and plated at the satellite school
- Pre-plated method – The food from the central kitchen is portioned and pre-plated before transporting to the satellite school

Many variables must be considered in a satellite system. Food quality and sanitation are key concerns. To make a satellite system work, good central management is of the utmost importance. Therefore, there are strengths and challenges to this system. Strengths of the satellite system include:

- Only one kitchen is required for many delivery sites
- Greater employee productivity will usually result because employees at the central kitchen will usually prepare food "assembly line" style
- Standardized quality control
- Good portion control if food is pre-plated

Challenges of the satellite system include:

- Higher transportation costs
- Need for special transport delivery equipment since food must be held at a safe temperature during delivery
- More complicated menu planning to accommodate multiple schools' needs or preferences
- Loss of food quality and nutritional value if holding and delivery times are long
- Greater food waste
- Need for larger and more expensive central kitchen
- More nutrition assistants required at the central kitchen
- Problems at satellite schools when any problems occur at the central kitchen, such as unexpected gas or power disruptions or breakdown of delivery vehicles

Types of Service Systems

Today's students may participate in the school nutrition program through a wide variety of service options. For all school nutrition programs, the central focus is on the customer, and his or her preferences drive the menu. In turn, the menu drives the service system within the restraints of school scheduling. In addition, the state agency and USDA requirements must be followed regarding point of sale meal counts. Types of service systems include:

- Traditional systems where students "queue-up" in an organized manner and are served by nutrition assistants
- Scatter or scramble systems where students are allowed to freely move from counter to counter to make food selections

- Combination systems in which students will line up for some foods to be served by nutrition assistants, and simply "pick up" other items
- Self-serve systems where students select and serve themselves

Examples include:

- Specialty bars
  - Counters may be heated or refrigerated or a combination of both depending on the food offered
  - Bars featuring salad, taco salad, sandwiches, baked potatoes with toppings, fruits and cheese, cereals with fruit toppings, desserts with toppings
  - When designing specialty bars, the arrangement and equipment needs to be as flexible as possible to allow for changes in the menu
- Salad bars
  - Refrigerated self-serve counters that offer such items as meats or meat substitutes, vegetables, fruits, and breads
- Food courts provide various specialty stations such as burger and fry bar, salad bar, main dish bar, and pizza bar
- Kiosks/mobile carts provide meal service to students in the dining area or approved areas of the school campus
- Vending areas in which students select and serve themselves from machines that provide reimbursable food options

Things to think about

- The students' perception of the dining room affects the way they feel and behave and thus affects if and what they eat
- Differentiated areas are suggested for large dining areas serving over 500 students, providing a more friendly arrangement and avoiding an institutional look
- The line to return dirty dishes should not cross any other traffic paths, such as serving lines, or entrance or exit points to the cafeteria
- Placing garbage cans in the dining area is not recommended
- Providing display areas for menus, seasonal decorations, educational materials, or student art projects can enhance the appearance of the dining room
- Acoustics in a large space is important consideration
- Floor, wall, and ceiling choices come in a variety of options; examples include:
  - Floors – quarry tile, terrazzo, commercial grade sheet vinyl, possibly – carpet (although this is clearly a higher maintenance choice, it may help to deaden sound)
  - Walls – glazed brick/block, ceramic tile, sealed concrete or block, washable painted gypsum board
  - Ceiling – vinyl clad acoustical tile that meets the local health code
- Natural lighting is very important in this space
- Windows should not be placed less than 6"-1' above the floor to avoid breakage
- Doors entering the school nutrition area should open in a direction to avoid accidents
- Consider durability, maintenance, and security when planning the cafeteria

Speed of each of the service methods will vary. Actual speed of service may be different in every school, but are generalized in the table shown below. Although the data are not recent, comparisons of speed among these service methods would not be expected to be different today. For example, speed lines and scramble methods would still be expected to be the fastest. Some methods, such as the kiosks, and the food court, are not shown in the table, but would also be expected to have some of the fastest serving rates.

Serving Rates in Students Per Minute*	
Type of Service	
Serving Window:	
Where orders are filled	3 per minute
Where filled trays are picked up	14-20 per minute
Traditional (straight line) where employees serve everything	7-12 per minute
Speed Line**	20-28 per minute
Scramble	20 per minute
Self Serve	10 per minute

* *Source: Adapted from School Nutrition Facility Planning Guide, California Department of Education, Sacramento, CA 1992*

** *Service is available on both sides in a speed line. Two cashiers will be needed to maintain a speed of 28 students per minutes*

Space Allocation

Space allocation involves strategic planning. Enough space is required for functional efficiency and future needs, without having excess space which adds to building, operating, and maintenance costs. Adequacy of space is dependent on many factors. Typical issues to consider:

- Number of students served
- Maximum number of students in one serving period
- Menu items
- System for food purchasing, storage (refrigeration, freezer, dry), and preparation
- Service system and period
- Space needs for cleaning equipment and supplies
- Employee space (office, lockers, restroom)
- Building codes for space allocation

Square footage estimates should be used with caution. Actual requirements will differ with each school nutrition program. The chart shown below gives a starting point of estimates for each functional area.

Square Footage (Sf) Requirements for All Spaces*						
Storage Area	Meals Served Per Day (SF)					
	200	201-400	401-600	601-800	801-1200	1201-1500
Receiving	40-50	50-60	60-75	75-85	85-100	100-125
Can Wash/Dry	50	50-75	75-100	100-125	125-150	150-160
Toilets/Locker	100	200	200	200	225	250
Janitor/Chemical	50	50-60	60-75	75-85	85-100	100-125
Offices	50	50-80	80-100	100-120	120-150	150-160
Dry	200	200-300	300-400	400-500	500-600	600-700
Refrigeration.	130	130-200	200-300	300-400	400-600	600-750
Prep/Cooking	500	500-600	600-700	700-800	800-1000	1000-1250
Pot/Pan Washing	75	75-85	85-100	100-110	110-125	125-150
Holding/Serving	250	250-400	400-800	800-1200	1200-1400	1400-1800
Dining	800	800-1600	1600-2400	2400-3200	3200-3600	3600-4500
Dish/Tray Washing	100	100-150	150-200	200-250	250-350	350-400

* *Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Dining Room Space

Appropriate space allocation in the dining room or cafeteria is critical. Clear differences exist from one type of school to another. For example, space allocation would be different for pre-kindergarten to middle schools, which in turn, will also be different as compared to high schools. Styles of service, table shapes/lengths, table arrangements, aisle spaces, and the amount of time that children are allowed to eat will also make a difference. In addition, dining rooms or cafeterias in schools may be used for additional functions. Because of this, the commonly cited estimates (between 8-12 square feet of cafeteria space per student) should again be used with caution. Suggested table sizes are given below, but vary with the age or size of the children.

Suggested Table Sizes*	
Number of children that can be seated	Size of the table
2 persons	24″ x 30/36″
4 persons	30″ x 30″
4 persons	24/30″ x 48″
6 persons	30″ x 72″
8 persons	30″ x 96″
10 persons	30″ x 120″

* *Source: Katsigris, C., Thomas, C. (1999). Design and Equipment for Restaurants and Foodservice. John Wiley and Sons, Inc.: New York.*

Dry Food and Paper Goods Storage

Dry food and paper goods storage should provide a clean, secure, vermin-proof room for the storage of cans, jars, and sacks. General guidelines include:

- Dry storage should be accessible from the receiving area without having to cross the food preparation area
- Dry storage should be adjacent to the preparation area and the coolers and freezers to minimize the distance of bringing supplies to the preparation area
- Dry storage should be located to be visible from the school nutrition program manager's office to minimize danger of theft
- Storage area should be sized according to the frequency of deliveries and inventory needs
- Deliveries of USDA donated foods should be taken into consideration
- Storage of mobile carts and racks should be provided
- Space should be planned by shelving square footage
  - A rule of thumb is to provide approximately 1 sq. ft. of shelf or pallet space for each student meal
  - Schools serving over 250 meals, the addition of 1 sq. ft. of space for each ten meals per day should be considered for paper storage
  - See the table on square footage requirements for additional ideas for estimating space needs
- Larger storage areas may help keep delivery costs low due to frequency of deliveries and bulk purchasing

Things to Think About

- Aisles should be large enough for hand trucks and carts – 36" minimum, 42"-48" are desirable
- Storeroom doors should be 42" wide
- Storeroom door locks should be keyed separately from the school master system
- Storeroom doors should be of solid construction and heavy duty
- Exterior walls of the storeroom should be insulated as well as any pipes going through the storeroom
- View windows into the storeroom may discourage theft but need to be coordinated carefully with shelving placement
- Windows may also be a security concern
- Dunnage racks or pallets maximize linear storage space by stacking items
- Floors, walls, and ceiling materials should be selected for durability, easy cleaning, and local health code requirements; examples include:
  - Floors – quarry tile, commercial grade sheet vinyl, sealed concrete
  - Walls – glazed brick/block, ceramic tile, sealed concrete or block, washable paint covered gypsum board
  - Ceilings – vinyl clad acoustical tile

Square Footage Estimates (Based on the Number of Meals Served Per Day) *						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Dry Storage	200	200-300	300-400	400-500	500-600	600-700

** Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Refrigerated Storage (refrigerators and freezers)

Adequate refrigeration should be provided for both bulk product storage (walk-ins), as well as reach-in or work center refrigerators. General guidelines include:

- Refrigerated storage should be accessible from the receiving area and adjacent to the preparation area without having to cross the food preparation area
- Refrigerated storage should be sized according to the frequency of deliveries and inventory needs
- Refrigerated storage should be sized to accommodate donated USDA commodities
- Refrigerated space should be planned by shelving square footage
  - Approximately 1 sq. ft. of refrigerator/freezer shelf space for each student meal
  - Consider space needs for the upcoming future
  - Plan space for dunnage racks

Things to Think About

- Even though it is not as desirable, for additions and renovations, walk-in coolers and freezers can be located outside when interior space is not available, but should open into the interior building
- Adequate space should be considered for future growth and different buying habits
- Aisles of walk-in coolers and freezers should be large enough for hand trucks and carts (36" – 48")
- Walk-in refrigerator and freezer floors should allow free movement of hand trucks and carts from adjacent kitchen
- Dunnage rack space should be included
- Consider planning refrigerator units side by side or back to back for energy efficiency

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Refrigeration/ Freezers	130	130-200	200-300	300-400	400-600	600-750

** Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Preparation

Food preparation is the heart of the kitchen and planning for this area should revolve around the menu. Productivity is influenced by the flow of work, the equipment, and its placement. In addition, kitchens should be designed to enhance their visual appeal and facilitate their cleaning and maintenance. They should be located so they are convenient to food storage, holding, and serving areas.

In addition, the school nutrition director, as the *Trusted Advisor*, understands that the overall design and placement of equipment should be flexible enough to allow for a changing menu. Considerations in planning the food preparation area include:

- Preparation space can be determined accurately only by making a functional layout
- Preparation area size and shape is determined by equipment selection
- Preparation area should be sized appropriately to prevent wasted space or tool little space
- Rectangular kitchens are usually best with a ratio of length to sides of about 3 to 2
- Exceeding a 2 to 1 ratio of length to sides usually requires considerably more walking and square footage
- Space for the parking of portable carts and racks is needed at each work station
- Placement of structural columns should be carefully considered to avoid wasted space

Things to Think About

- Adequate aisle space is needed for movement of portable carts: 36" minimum – 42" is desirable when one person is working. Provide 48"(minimum) – 54"(desirable) when two people will work back-to-back
- Aisle widths should allow free movement of related carts or racks
- Each staff member needs a working space
- All corners of work surfaces should be coved for ease of cleaning (minimum ¼" up to a 5/8"-3/4" radius is desirable)
- Sufficient landing space is needed for food being removed from the cooking equipment
- No traffic flow should go through the cooking area to prevent danger of burns and spills
- Acoustical effect of finishes and materials should be considered when making selections
- Colors of walls and floors may affect staff morale
- Materials that will rust or corrode should be avoided
- Stainless steel is a durable material for use in preparation areas
- Floor, wall, and ceiling choices include:
  - Floors – quarry tile, commercial grade sheet vinyl
  - Walls – glazed brick/block, ceramic tile, washable painted block
  - Ceilings – vinyl clad acoustical tile or other material that meets the local health code
- Natural lighting is an important component of a well-designed, user friendly preparation area
  - Windows should be located and sized for the sill to clear any proposed equipment
  - Interior window sills may be sloped to prevent the accumulation of items on sills
- Equipment placement should take into account what appliances are facing each other across the aisle
  - Example: when two ovens are placed across from each other, the aisle space must then accommodate the oven doors opening into the space from both sides of the aisle
- Double aisle width should be 36-52" (with 48" standard)
- Main aisles of traffic areas should be 48-72" in width

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Prep/ cooking	500	500-600	600-700	700-800	800-1000	1000-1250

** Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Holding and Serving

Holding is the area where food is kept hot or cold after preparation. Food on the serving line is replenished from this area. There should be good visibility from cooking areas to serving lines so employees can easily see when food needs replenishing. Serving is the space where food is served to the student and includes areas for display of both hot and cold foods, space for cashiers, and space for student flow. Considerations in planning these areas include:

- Food holding area should be between the cooking and serving areas
- Food holding area should be convenient to the serving counters
- Food holding area should not be located adjacent to the student traffic flow/serving line
- Adequate space should be provided to load and unload food from the heated and refrigerated pass-through holding equipment
- Serving area should be adjacent to kitchen and food holding areas
- Counter(s) in the serving areas should be arranged for staff to move freely through the students to replenish food from the holding equipment
- Adequate space should be provided for students to either queue-up or move freely through the serving system space
  - A "scramble" or "scatter" type system will require more square footage since students are not restricted to a line within the serving area

Things to Think About

- A pass-through counter in the holding area is convenient for returning empty serving pans to the kitchen
- All aisles in the serving area should be a minimum of 36" wide
- Possible floor, wall, and ceiling materials include:
  - Floors – quarry tile, commercial grade sheet vinyl
  - Walls – glazed brick/block, ceramic tile, washable painted block
    - For the serving area, be careful to pick materials that are more durable to withstand the possibility of student abuse
  - Ceilings – vinyl clad acoustical tile or other material that meets the local health code

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Hold/ Serving	250	250-400	400-800	800-1200	1200-1400	1400-1800

* *Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Pot and Pan Washing

Pot and pan washing should be out of the preparation and cooking areas, but convenient to both. A good location is usually near or in the dishwashing area since this is a "wet" operation. In addition, it should be close to the serving, preparation, and cooking areas for convenience in returning soiled pans. This area, however, can also be noisy so consideration should be given to locating this area where it does not interfere with areas where noise would be a problem. Additional considerations include:

- This area should have space for parking of portable pot/pan racks
- "Soiled" and "clean" areas should be kept separate to avoid cross-contamination
- Generous aisles are needed to allow for portable equipment to be moved through the area
- Wall, ceiling, and floor colors should be cheerful and light to improve the work space

Things to Think About

- This is a "wet" area so all materials should be selected with that in mind
- Materials that will rust or corrode should be avoided
- Stainless steel is usually less expensive over an extended period of time
- Avoid materials that will not withstand constant abuse from grease, soaps, harsh chemicals, and extreme heat
- Examples of materials for floors, walls, and ceilings include:
  - Floors – quarry tile; rubber floor mats may also be helpful in wet floor areas
  - Walls – glazed brick/block, ceramic tile, washable painted block
  - Ceilings – vinyl clad acoustical tile or other material that meets the local health code

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Pot/Pan Washing	75	75-85	85-100	100-110	110-125	125-150

* *Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Dish/Tray Washing

Proper dish and tray washing is critical in a sanitary school nutrition program. Although some schools may use disposables, the need for dishwashing still exists in all operations as pots, pans, serving utensils, etc. will still need to be cleaned. In operations where an emergency has happened and the dish machine is not functioning and proper cleaning cannot be done any other way, health

departments will actually recommend that the operation either use disposables or close temporarily until the dish machine is repaired. Proper dishwashing is very critical to food safety. Dishwashing areas include the three following sections: dish and tray washing, a return area for dishes/trays, and a trash disposal area. The dish/tray washing area should allow for a continuous return of dishes/trays, efficient disposal of waste, and ease in washing and returning clean items to use.

Things to Think About

- Area should be adjacent to the dining area and be located near the dining exit, allowing students to freely drop their dish/tray at a return window
- Traffic flow is important
- Return window should be located near the dining room exit without creating cross traffic with the dining room entrance and students entering and leaving the serving area
- Dish/tray washing should be out of the preparation and cooking areas and convenient to return dishes and trays to the kitchen and serving areas
- Type and size of dish machine should determine the size and shape of the dish/tray washing room
- Area should be provided for the parking of portable dish/tray/flatware equipment
- Area should be designated for flatware sorting
- Dish/tray washing area exit should be located in the "clean" area so that clean items do not have to pass through the "soiled" area of the room
- Dish return window should be located near the dining room exit and at the beginning of the soiled dish table
- Dish return window should be a minimum of 36" wide to allow two students to use it at the same time
- Sill height of dish return window should be 1" higher than the dish table to retain spillage from the dish table
- Surfaces should withstand abuse from food, grease, soaps, harsh chemicals and extreme heat
- Surfaces should be selected to minimize noise
- Splash protection should be provided on the dining room wall surface of the tray return window
- Examples of materials for floors, walls, and ceilings include:
  - Floors – quarry tile
  - Walls – glazed brick/block, ceramic tile, sealed concrete or block
  - Ceilings – vinyl clad acoustical tile or other material that meets the local health code

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Dish/Tray Washing	100	100-150	150-200	200-250	250-350	350-400

** Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Receiving and Waste Disposal

The receiving area should be large enough and in a location that allows deliveries to run as smoothly as possible. These features are even more important during disruptive times such as mealtime. Receiving is the service entrance to the kitchen. It begins at the back door where food and non-food products are delivered from trucks and includes the interior space for checking orders, as well as the can washing area, dumpster area, and loading dock, if one exist.

Things to Think About

- Schools are being built without loading docks
  - Minimizes trucks backing up
  - Minimizes food carried up the steps when dock level is not suitable for the truck
  - Minimizes removal of food from side door
  - Minimizes delay when dock is in use
- School building loading dock issues to consider:
  - Loading dock size should be a minimum of 8' deep
  - Length should be determined by the number of trucks expected at any one time multiplied by the width of these trucks (usually 10-15' per truck)
  - Rule of thumb is to provide space for two trucks for schools serving 300 or less meals per day
  - Delivery trucks should have easy access to loading dock and garbage trucks to the dumpster area, but trucks should not block traffic or back up in areas with children while making deliveries or picking up trash
  - Loading dock should be covered to provide adequate weather protection
  - Roof should be higher than the top of the tallest truck
  - Loading dock floor level should be same level as the kitchen to facilitate the delivery of equipment, food, and supplies
  - Loading dock should be 3-3 ½' above grade to allow for easy unloading of deliveries, unless not possible then one at grade level will be sufficient
  - Concrete steps should be used for a raised dock
  - Steps should be placed away from trucks to avoid truck damage
  - Loading dock should have bumper pads to provide building protection
- The back door to the kitchen should be at least 42" wide to allow passage of equipment and supplies
- Double doors with no center post are useful in moving large cartons and equipment
- An 8' high door will allow equipment to move through without the need to remove compressors and other attachments
- Interior space should be provided for checking in supplies
- The back door to the kitchen should have a bell for use when the door is locked
- A window in the back door is useful unless security and break-ins are a concern
- Peep-holes are recommended in the back door when a window is not an option
- Kick plates should be provided on both sides of the back door
- Hand trucks and portable carts will be used and stored in this area
- Corner protection for walls will reduce damage
- All surfaces in the interior receiving and waste disposal areas should be cleanable and extremely durable
- These areas take a lot of abuse from trucks and hand carts
- Surfaces for this area include sealed concrete or sealed block, and glazed brick/block/tile

- All surfaces in the exterior areas of receiving, such as the loading dock, dumpster area, and the drive, should be finished surfaces that are graded to drain and minimize standing water
- Preferred surfaces for exterior areas are concrete or asphalt, but gravel may also be used if allowed by the local health code

Toilets and Lockers

The toilet and locker area is provided for employee use. Separate facilities may be provided for men and women or one unisex area may be all that is needed. This area includes the locker area with space for benches, a notice board, and the toilet area.

Thinks to Think About

- This area should be located adjacent to the kitchen and near serving areas.
- Codes specify that toilet areas shall not open directly into kitchen areas, so a small vestibule or hallway is usually provided that can be enlarged to serve as the employee locker area
- Some health codes allow lockers to be located in dry storage rooms, but one's local health code should be checked for specific regulations
- Lockers located in storerooms may be a security issue
- If lockers are located in dry storage rooms, they must be large enough to enclose all employee belongings, including coats, boots, umbrellas, etc. to minimize the possibility of contamination to food products
- Locker rooms cannot be used for storage of food products or supplies for the school nutrition program
- As these areas need careful and frequent cleaning, the materials used for floors, walls, and ceilings should reflect this concern; choices include:
  - Floors – quarry tile
  - Walls – glazed brick/block, ceramic tile, sealed block or concrete, washable painted gypsum board
  - Ceilings – vinyl clad acoustical tile or other material that meets the local health code

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Toilets/ Lockers	100	200	200	200	225	250

** Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Office

Office areas are generally provided for the school nutrition program manager and other school nutrition staff, depending on the size of the school. These areas may include a record storage area, the inventory clerk space, a computer area, and the manager's office.

Things to Think About

- The school nutrition manager's office should be a separate room

- The office should be a comfortable work environment and sufficient in size to accommodate all the equipment and supplies needed to perform tasks
- Today's offices may need computers with internet access, phone line(s), and a printer or other equipment, in addition to desk and filing space
- The office should be located to give the school nutrition manager the best view possible of the kitchen operations and allow a good view of receiving, storage, and all food preparation/cooking areas without having to stand up to view them
- Standard floor, wall, and ceiling area materials for the kitchen spaces may be used in this location
- Exterior windows are recommended in offices because they minimize lighting and provide a natural light source, although security issues should be considered

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Offices	50	50-80	80-100	100-120	120-150	150-160

** Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

Cleaning Supplies and Cleaning Equipment Storage

This area houses cleaning supplies in case lots, bulk packages, and broken case lots on shelving and pallets or dunnage racks. Cleaning equipment storage includes space for a mop rack, mop sink or curbed drain area, and perhaps a washer/dryer and laundry counter.

Things to Think About

- Cleaning supplies and equipment should ideally be kept in a separate room or closet area so that toxic chemicals and contamination can be kept away from food and other supplies
- If a separate room or closet is not available and storage of these occurs in a dry storage room, the possibility of unsafe conditions is clearly greater as cleaning supplies and equipment can never be stored above or near food and other supplies
- Soap and chemical storage should be convenient to pot washing and dish washing
- Paper goods storage should be combined with food storage, and not the cleaning supply and cleaning equipment storage area
- The size of storage should be decided according to the delivery schedule and inventory needs
- Aisles in soap and chemical storage should be large enough for hand trucks and carts (36" minimum, with 42-48" desirable)
- Doors should have locks to prevent theft
- Dunnage racks should be sized according to the linear storage space
- Finishes should be durable and impervious to chemical spills and water
- Choices for floors, walls, and ceilings include:
  - Floors – quarry tile, sealed concrete, or commercial grade sheet vinyl
  - Walls – glazed brick/block, sealed concrete or block, ceramic tile, and in areas that will not be exposed to splashing of water – washable painted gypsum board
  - Ceilings – vinyl clad acoustical tile or other material that meets the local health code

Square Footage Estimates (Based on the Number of Meals Served Per Day)*						
Area	200 Meals	201-400	401-600	601-800	801-1200	1201-1500
Cleaning Supplies/ Equipment	50	50-60	60-75	75-85	85-100	100-125

** Adapted from The New Design Handbook for School Food Service, NFSMI, The University of Mississippi, 1997.*

SUMMARY

Sound policies on esthetics, noise control, sanitation, ergonomics, and safety are important to quality decisions in the project planning process. The importance of security and designing in compliance with the American with Disabilities Act (ADA) has increased in importance in recent years and should be clear priorities in school nutrition facilities, both kitchen and dining room.

Planning for efficient layouts takes into account the time-in-motion, distances traveled, the type of equipment required to meet menu needs, and the relationship of the equipment location to the work involved. The three parts of the layout are the work center, work sections, and the total layout of all work centers and sections. The design of work flow is also important and can be a straight-line flow, which is most useful when standardized menu items are prepared in large quantities, or a functional flow, which is more suitable for production of smaller quantities of a wider variety of foods.

Planning for controlling operating and maintenance costs may improve energy efficiency by as much as 20% in school nutrition operations. It requires a focus on energy conservation, careful selection of equipment, and motivation to follow an energy conservation system. Self-audits may help to identify energy efficient needs and practices.

Most school nutrition operations use a traditional food preparation system rather than a satellite system of preparation. Dining room service systems vary widely. As discussed, service systems could be a traditional, scatter or scramble system, self-service, food courts, kiosks, mobile units/carts, and/or vending. All types of systems, however, must meet state agency and USDA requirements regarding point-of-sale systems. Space allocation in the dining room is different for pre-kindergarten to middle schools to high schools, but is often estimated to be an average of 8-12 square feet per student.

Each functional area in the "back of the house" (food production area/kitchen) has its own design requirements. For example, dry food and paper good storage should be located so that it has proper security and is accessible from the receiving area without crossing the food preparation area. Refrigerated storage should be accessible to receiving and adjacent to the food preparation area. The size and shape of the food preparation area will be determined by actual equipment placement, but should include work stations for portable carts and racks. Other areas also have specific ideal locations for efficient work flow.

Chapter Five References

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CHAPTER SIX

Principles of Equipment Selection

CHAPTER HIGHLIGHTS

Introduction

- School nutrition directors, as the *Trusted Advisors*, understand the primary importance of the menu in equipment selection

Factors to Consider when Purchasing Equipment

- Equipment purchasing occurs at four time periods:
  - When kitchens are being built
  - During renovation
  - When menu changes occur
  - When equipment needs replacing
- Equipment lifetimes vary, but are longer when preventive maintenance occurs
- Planning ahead to replace equipment on a given schedule will lead to effective decision making
- Long term planning supports installing future utility and service needs at the time of new construction or renovation

Menu

- The menu is the single most important consideration in equipment selection

Need

- Priorities may be classified as essential, highly useful, or moderately useful
- Use of convenience versus scratch foods is based on:
  - Product cost
  - Equipment cost
  - Raw materials cost
  - Utilities cost
  - Labor cost
  - Product quality
  - Preparation time
  - Service style

Size and Capacity

- Decision is based on:
  - Menu
  - Portion sizes
  - Level of student customer participation
  - Number of students served in a given time
  - Age of the students

CHAPTER HIGHLIGHTS *(continued)*

Cost

- Alternatives to purchasing new equipment include:
  - Purchasing convenience foods
  - Simplifying the menu

Performance

- Performance of the equipment is best understood if it is seen in operation at a trade show, display room, or actual kitchen

Warranties and Extended Warranties

- Common types include parts warranty, labor warranty, carry in warranty, and extended service contracts/warranties

Satisfaction of Specific Needs

- School nutrition programs are not identical and equipment purchases should not be identical
- School nutrition directors as the *Trusted Advisors* should personally evaluate all information for better decision making

Safety and Sanitation

- Safety and sanitation are important for the health and well-being of the school nutrition staff and customers

Appearance and Design

- School nutrition directors should evaluate student customer preferences for speed of service or types of seating

Principles of Equipment Selection

Introduction

School nutrition directors, as the *Trusted Advisor*, understand the primary importance of the menu in making any equipment selections. They also most clearly understand the unique requirements for their nutrition program. For example, elementary schools in Georgia may have different menus and equipment needs than high schools in North Dakota, satellite schools will use fewer pieces of equipment than schools which prepare their own food, and schools with 5,000 students will purchase larger capacity equipment than schools with 600 students.

In general however, equipment selection will be based on consideration of need, size and capacity of equipment, cost, performance, warranties and extended warranties, satisfaction of specific needs, safety, sanitation, appearance, and design. These and other concerns unique to the school make equipment selection an important and complex decision. Even after equipment has been selected, it is important that equipment needs are carefully considered during the construction process. Although unforeseen changes may be needed during construction, frequent site visits during construction are valuable in making sure that construction standards are maintained so problems do not arise during the installation of equipment.

Factors to Consider in All Equipment Purchases

Purchasing of equipment can be divided into primarily four time periods. They are:

1. When new kitchens are being built
2. When expansion is occurring (size or menu related)
3. When the menu has changed dramatically (for example, from the use of scratch to convenience foods)
4. When equipment replacement is needed

Replacement may be necessary because equipment has become high maintenance, is obsolete, is the wrong capacity (over or under), or because there is a need for more automation. This is particularly true as the equipment becomes older. Replacement planning for foodservice equipment is part of a long range strategic plan that school nutrition directors as the *Trusted Advisors* need to understand.

Among the benefits of such planning is the forecasting of capital expenditures. It is an important step in the development of good budgeting practices. Replacement planning schedules should be established for each school, analyzed on a total school system basis, and reviewed annually. During the review, maintenance and repair costs should be analyzed to determine if the repair cost is worth the value of the equipment. There are three factors to consider while developing a replacement planning schedule:

- The expected life of the equipment
- The expected repair costs
- Maintenance costs

The life expectancy of a piece of equipment varies. For example, equipment made from stainless steel may last about five years longer than equipment made from less durable/expensive materials.

Regular or preventive maintenance of the equipment will extend the life expectancy of a piece of equipment. Some properly maintained pieces of equipment have been known to last twice as long as equipment that does not receive routine maintenance and appropriate use. In addition, the life expectancy of equipment is also affected by the volume of food produced and the original quality of the equipment purchased.

Therefore, years of use provided by a piece of equipment will vary with each kitchen – textbooks that give tables listing equipment lifetimes are really only estimates. What is certain, however, is that well treated equipment will last longer. Some of the more durable types of equipment may actually last 20-25 years or more.

School nutrition directors need to incorporate long term planning for future equipment needs. Deciding exactly when a piece of equipment might be purchased or replaced, and estimating what piece of equipment might best meet future needs are not easy tasks. The decision to replace a particular piece of equipment is often made when repair costs justify the need of a new piece of equipment. Strategically planning equipment purchases will likely lead to a better decision, either in adding a new piece of equipment to the school nutrition operation or replacement of an outdated piece. When repair cost begin to rise on a piece of equipment, the school nutrition director as the *Trusted Advisor* should ask the following questions of the service people responsible for repair or maintenance:

- How long will this repair likely last?
- Is there any problem getting needed parts for this piece of equipment in the future or is it becoming obsolete?
- How much longer do you think this machine will efficiently operate?

Planning for the future also takes into account growth in the size of the school. In terms of growth, it is generally not wise to purchase more or larger equipment than what would meet projected needs. The potential impact of purchasing more or larger equipment than is needed to meet operational needs include:

- Equipment dollars being spent at an inconvenient time
- Technology changes that may make the equipment obsolete
- Changes in menu and customer needs
- Changes that occurred to future projections
- Added labor costs for cleaning and maintenance
- Higher utility costs associated with using equipment at partial capacity

Future needs for utility and service installations (electrical, sewer, plumbing, etc.) should always be considered, however. Installations done at the time of original construction or extensive remodeling are almost always cheaper and more easily done than later when walls and other structures might need to be moved or altered. Therefore, it is wise to consider those future needs at the time of new construction or renovation. In doing so, school nutrition director as a *Trusted Advisor* will plan the space and utility/service needs for future equipment. Following this approach would prevent over-purchasing when the need is not there.

Equipment selection can be complicated and requires the expertise of the school nutrition director, as the *Trusted Advisor.* Numerous factors influence the equipment selection decision, such as the following:

- Menu
- Need
- Size and capacity
- Cost
- Performance
- Warranties and extended warranties
- Satisfaction of specific needs
- Safety and sanitation
- Appearance and design

Menu

Equipment needs will be influenced by many factors. Most importantly, they are influenced by the menu. In fact, the single most important consideration in equipment selection is the menu. Because of the menu, kitchen equipment needs will vary tremendously. There are huge differences for example, in the equipment selected for kitchens in which all preparation of food is done from scratch as compared to kitchens that simply reheat or rethermalize frozen pre-prepared products. Even kitchens that do one or the other of these types of preparation may have differences in selection of kitchen equipment. A "cookie cutter" approach to determining one's own kitchen equipment needs from a so-called model kitchen is never a good idea. For example, some school nutrition program directors choose convection ovens to rethermalize their products, while others may select combi-ovens or microwaves or any of a number of other oven types.

Need

The needs of the operation should be determined carefully and prioritized. The priority of these needs is important and may differ for every school nutrition program. A piece of equipment may be needed to:

- Improve food quality
- Produce a larger quantity of food
- Reduce utility costs
- Decrease production time
- Produce specialty menu items

The priority may be categorized as essential, highly useful, or moderately useful. Better equipment choices are made when these priorities are clearly defined. Renovations are more effective when these priorities are considered. School nutrition directors can easily make themselves the equipment experts in these decisions. They are the *Trusted Advisor* and know the operation better than anyone else.

Many schools, in fact, have made decisions to use more convenience products which are carefully chosen to achieve the quality standards that they want. The choice of convenience foods versus foods that are made from raw materials creates very different equipment needs. When decisions about equipment needs involve a choice between convenience or processed products and foods that are made from raw materials, the choice is generally based on exploring certain issues. The issues include:.

- Cost of processed products as compared to the cost of the equipment, raw materials, utility costs, and labor needed to prepare that food

- Quality of the processed product as compared to the food prepared "from scratch"
- Time or service with a processed product as compared to food prepared "from scratch"

Size and Capacity

When determining equipment volume requirements and speed of service, there are numerous considerations, such as:

- Menu
- Portion sizes
- Student participation in the school meals program
- Number of students being served at a given time

The appropriate equipment to purchase also depends on the overall size of the school, age of the students served, and growth projections. Obviously, in the dining room, service equipment, and tables are sized based on the age of the students. The age of the students also affect kitchen equipment selection. For example, if smaller portions are used for younger students, then volume preparation needs will be different.

Cost

Of course, one of the prime considerations in the selection of equipment is cost. Being fiscally responsible is important for school nutrition directors. The first decision to make in replacing equipment, therefore, may be to determine whether a new piece of equipment is the best option. Cost of ownership is, of course, more than the purchase price. School nutrition directors, as the *Trusted Advisors*, evaluate the warranties and the costs related to possible repairs as well. Part of this includes checking to see who is authorized to repair a piece of equipment, should repairs be necessary. School nutrition directors have sometimes been forced to pay factory-authorized service personnel for their travel time up to two hours or more each way to repair a piece of equipment. If an authorized repair person is not nearby, school nutrition directors should ask whether the manufacturer will train local technicians that fix other equipment.

Performance

Proper performance of the equipment is most easily understood when the equipment has been viewed in operation. For example, does the slicer make a clean cut or is the food bruised or smashed? If the equipment is mobile, do the wheels move easily or is it difficult to push? Is the oven easy to operate or are the computerized controls so complicated that it is challenging to program the equipment? Is the chopper easy to disassemble and clean or is it so complicated that the school nutrition assistants will avoid having to use the equipment or thoroughly clean it when it has been used?

Cost of the equipment is often (although not always) correlated with its performance. Reliable brands of equipment with high quality performance, for example, are likely to be more expensive. School nutrition directors, whenever possible, should view the operation of equipment at trade shows, display rooms, or in actual school nutrition operations to determine if the added price is worth the added performance.

Warranties and Extended Warranties

School nutrition directors should understand what is covered with a warranty and the kinds of warranties available. Warranties vary from manufacturer to manufacturer. Warranties should be analyzed just like a feature of the piece of equipment and may become a deciding factor in purchasing the equipment. It is important to remember, however, that warranties never cover abuse or misuse of a piece of equipment. Common types of warranties include the following:

- Parts warranty – covers repairs and/or replacement, but may or may not cover labor or freight charges
- Labor warranty – covers labor costs to make repairs or replacements, but there may be ceilings or maximum allowable amounts of costs
- Carry in warranty – includes parts and labor if the equipment is delivered to the service location
- Extended service contracts or warranties – covers the cost of repairs/replacements beyond the standard warranty for an additional charge
  - Range of coverage of these varies tremendously, typically they are available for one to five years beyond the standard warranty and must be requested/begun when the equipment is purchased

Some standard conditions and limitations covered in a warranty include:

- Period of time new products are warranted is from the date of original installation or purchase date
  - It is important to know which date because some equipment may be stored for a period of time before it is actually ready to put into operation after construction is completed
- The liability of the manufacturer
- Normal labor charges incurred in repair or replacement with a certain mileage limitation; 50 or 100 miles round trip is usual
- Full parts or limited parts
- Parts and labor
- Listing of parts whose warranty period varies from the standard as stated in the original condition
- A no-obligation statement to warrant the equipment and the specifics such as misapplication, mishandling, misuse, and modification

Warranties have expanded in recent years and are often available as extended warranties, for example, 12 months beyond the original equipment warranty. For a high maintenance or repair piece of equipment, extended warranties may be like buying insurance. Whether they are cost efficient in the case of a particular school nutrition program, should be most carefully considered. Some questions to consider in deciding on the value of an extended warranty include:

- Is the equipment a high maintenance item
- Are the controls and electronics of the equipment sophisticated
- Would specially trained technicians be required to service the equipment
- What is the price of an authorized service agency call
- How many miles is the installation site from the authorized service agency

Satisfaction of Specific Needs

Selection of equipment for a school nutrition program is in one sense, a personal decision. The school nutrition director must carefully consider the needs of the operation and not rely on other so-called "model" kitchen plans. Manufacturer's statements should also be considered carefully in light of one's own operation. School nutrition directors are the most knowledgeable expert in their own operation and should gather information in order to make informed decisions when purchasing equipment.

Safety and Sanitation

Safety and sanitation issues should be considered for all equipment purchases. Safe equipment should be made of non-toxic materials that will withstand normal wear and tear and thorough cleaning. All sharp edges and moving parts should be guarded to prevent anyone from being caught, cut, or injured in any way. Equipment should also be constructed to avoid scalding and burning from heated surfaces, water or food, or condensation. Utilities and their connections to the equipment should also be protected to avoid accidental injury. Finally, mobile equipment should have wheel locks.

Appearance and Design

Finally, an attractive and functional design contributes to the efficiency and utility of both the kitchen and the dining room. This issue may be complicated. In the serving line for example, speedy service may be essential, but the impression of speed in the cafeteria may decrease meal participation. Student customers may want a place to relax or gather with friends. School nutrition directors should evaluate their student customer preferences for:

- Appearance of the dining room or cafeteria
- Speedy service
- Plentiful seating
- Multiple seating choices (indoor and outdoor)

SUMMARY

Equipment selection involves the careful consideration of many factors. School nutrition directors, as the *Trusted Advisors*, are advised to gather information about these factors in order to make informed choices. Of all the factors to be considered, the menu is the single most important consideration in equipment selection. Numerous other considerations include need, size and capacity, cost, performance, warranties and extended warranties, satisfaction of specific needs, safety and sanitation, and appearance and design.

Schools should be very cautious of repeating the exact equipment purchases of other schools as individual kitchen needs will vary. Equipment size and capacity needs will also vary with the individual school. Size and capacity will be determined by the menu, portion sizes, level of student customer participation, age of the students, and the number of students served at a given time.

Performance of the equipment and satisfaction of specific needs are somewhat less tangible and more difficult to evaluate. Performance of the equipment is best understood if it is seen in operation at a trade show, display room, or actual kitchen. Other considerations include the expected safety and sanitation of the equipment during use. This is essential for both nutrition assistants as well as the customers. The issue of appearance and design is another consideration that impacts both school nutrition staff and customers.

Finally, planning for equipment replacement and flexibility allows for a seamless transition even when changes are necessary. Planning ahead will also lead to better equipment decision making without the added pressure of an "emergency decision". To help keep equipment running most efficiently and without the need for repairs, regular routine maintenance is essential. In addition, it will extend the life of the equipment. Planning ahead does not include purchasing larger equipment than what is projected for the immediate future as it will increase labor and utility costs and may not even be required in the future, however, future utility and service connections should always be installed.

CHAPTER SEVEN

Getting Ready to Bid

CHAPTER HIGHLIGHTS

Introduction

- School nutrition directors, as the *Trusted Advisors*, are responsible for fully understanding the purchasing process

Ethical Concerns

- Unethical practices include:
  - Providing one supplier's cost information to another supplier prior to supplier selection
  - Accepting gifts, cash, free trips, or entertainment
  - Showing preference to suppliers because of:
    - Pressure from management
    - A long-term business relationship
    - Political connections

The Regulatory Environment

- A realistic goal for the *Trusted Advisor* is to understand the basic purpose of local, state, and federal laws related to equipment purchasing, and to know where to go for additional information when necessary
- Antitrust legislation includes:
  - The Sherman Act of 1890
  - The Clayton Act of 1914
  - The Federal Trade Commission Act of 1914
  - The Robinson-Patman Act of 1936
- A written procurement plan is an important part of the documentation needed during purchasing

Specifications

- Contain a detailed description of the equipment
- Specifications should be:
  - Simple, but exact
  - Easily identifiable with common terms
  - Reasonable
  - Capable of being met by several bidders
  - Clear and understandable
- Types of specifications include:
  - Qualified product list
  - Performance specifications
  - Brand specifications

CHAPTER HIGHLIGHTS *(continued)*

- Items to include:
  - General description
  - Utility requirements
  - Plumbing requirements
  - Mechanical requirements
  - Size or capacity requirements
  - Freight and delivery specifications
  - Installation requirements
  - Special instructions
- Pitfalls of writing specifications include:
  - Using old specifications
  - Letting salespeople write the specifications
  - Poor coordination of electrical and mechanical requirements
  - Accepting an inferior substitution
  - Not specifying a high enough quality level

Critical Path Planning

- Describes a plan set up to time the movement of supplies and equipment to coincide with the needs of the school nutrition program

Analysis of the Market and Evaluation of Vendors

- Market analysis will determine names of vendors, their location, types of equipment sold by the vendors, and their history of sales to the school
- Vendors will be reviewed for:
  - Equipment/product lines
  - Physical facilities
  - Delivery
  - Financial history
  - Service levels
  - Accounting practices
  - Performance at and following pre-bid conferences
  - Manufacturing quality standards

The Purchase System

- Requires two basic decision:
  - Appropriate purchase method
  - The pricing method
- Four purchase procedures are RFQ, IFB, RFP, and noncompetitive negotiation
- The small purchase procedure may be used for simple purchases that do not exceed the allowable dollar amount

CHAPTER HIGHLIGHTS *(continued)*

- The two basic pricing methods for purchasing equipment are line item awards or bottom-line awards

The Bid Document

- Is the statement of the terms and conditions of equipment purchase and is a legally binding contract

Getting Ready to Bid

Introduction

The actual purchasing process is very critical to ensuring that the school nutrition program receives the equipment that they need and desire. Everything begins with the menu and the determination of what products are necessary for the menu. Once these have been determined, purchasing the equipment is a multi-step process that school nutrition directors, as the *Trusted Advisors*, should fully understand in order to obtain the equipment they want. The steps in the purchasing process are the following:

- Plan menus
- Determine products necessary to produce menus
- Estimate the quantities of products needed
- Determine type of equipment needed to produce the products
- Determine product movement policies in order to determine size of equipment needed
- Develop the critical path plan
- Develop equipment specifications
- Document the purchasing process
- Analyze the market and evaluate vendors
- Determine the purchasing system
- Issue request for prices
- Evaluate responses
- Make vendor selection
- Place orders
- Receive the equipment
- Install the equipment
- Train nutrition assistants in the use of equipment
- Prepare meals

This process is similar to the steps used in purchasing food products. It is more complicated in that it includes knowledge about equipment and how it is used to prepare the food. In addition, school nutrition directors should understand how to avoid unethical situations, the regulatory environment, specifications, critical path planning, the market and vendors in the market, the purchase system in schools, and the bid document. Learning as much as possible about school foodservice equipment and fully understanding the needs of their school nutrition program is a key responsibility of the school nutrition director, as the *Trusted Advisor.*

Ethical Concerns

It pays to be a savvy consumer because not everyone in the industry maintains ethical standards. In spite of the federal regulation's efforts to foster substantial competition among a significant number of companies, price-fixing and bid-rigging still occur. A working knowledge of the law will help avoid these practices. The amount of money spent and the need for open competition make it essential that the school nutrition director, as the *Trusted Advisor*, adheres to the highest ethical standards. Whenever school nutrition directors feel that there is a question related to ethics, they should understand that taxpayers expect ethical behavior from public sector employees. There are numerous ethical concerns regarding the bidding process that should be addressed by all involved

in the purchasing process. The following ethical concerns represent an overview of actions that should be avoided:

- Giving the intent and appearance of unethical or compromising practice in relationships, actions, and communications
- Providing one supplier's cost information to another supplier prior to supplier selection
- Accepting gifts, cash, loans, credit, free trips, or entertainment from a supplier
- Showing preference to suppliers because of pressure from administration, long-term business relationship, and/or political connections
- Obtaining proprietary information from one supplier and sharing it with a competing supplier
- Maintaining any personal business or professional activity that would create a conflict between personal interests and the interests of the employer
- Allowing personality to enter into purchasing decisions

The Regulatory Environment

The regulatory environment is a crucial, but complex area involving numerous laws. A realistic goal is to understand the basic purpose of local, state, and federal laws related to equipment purchasing, and to know where to go for additional information when necessary.

State laws must be followed in purchasing equipment for schools. State agencies can direct school nutrition directors to the specifics of their state laws. The federal regulations for school purchasing are given in Volume 7, Code of Federal Regulations. School nutrition directors should following these regulations for both food and equipment purchasing. Examples of the regulations include:

- Comply with federal, state, and local laws and regulations
- Maintain a contract administration system which ensures that contractors perform in accordance with the terms, conditions, and specifications of their contracts, or purchase orders
- Maintain a written code of standards of conduct governing the performance of employees engaged in the award and administration of contracts
- Review procurements to avoid purchase of unnecessary or duplicative items
- Consolidate or break out procurements for more economical purchasing
- Analyze lease versus purchase alternatives (including state or local intergovernmental agreements for common goods and services) to determine the most economical approach, when appropriate
- Make awards only to responsible contractors, including a review of contractor integrity, compliance with public policy, record of past performance, and financial and technical resources
- Conduct procurements in a manner that prohibits the use of statutorily or administratively imposed in-state or local geographical preferences in the evaluation of bids or proposals
- Write selection procedures for procurement transactions that will:
  - Not unduly restrict competition
  - Identify all bidder requirements
  - Ensure that all pre-qualified lists of persons, firms, or products which are used in acquiring goods and services are current

- Include enough qualified sources to ensure maximum open and free competition
- Avoid precluding potential bidders from qualifying during the solicitation period
- Conduct all procurement transactions in a manner providing full and open competition and avoid practices, such as:
  - Placing unreasonable requirements on firms to qualify to do business
  - Requiring unnecessary experience and excessive bonding
  - Using non-competitive pricing practices between firms or between affiliated companies
  - Giving noncompetitive awards to consultants that are on retainer contracts
  - Allowing organizational conflicts of interest
  - Specifying only a brand name product instead of allowing an "equal" product to be offered
  - Performing any arbitrary action in the procurement process
- Respond in accordance with good administrative practice and sound business judgment, for the settlement of all contractual and administrative issues arising out of procurements, such as source evaluation, protests, disputes, and claims
- Maintain appropriate documentation, such as:
  - Rationale for the method of procurement
  - Selection of contract type
  - Contractor selection/rejection
  - The basis for the contract price

Antitrust legislation has been enacted on the federal and state levels. The antitrust laws include the Sherman Act of 1890; the Clayton Act of 1914; the Federal Trade Commission Act of 1914; and the Robinson-Patman Act of 1936, an amendment to the Clayton Act. These are summarized in the table below. When these laws are effectively and responsibly enforced, they can save school districts millions of dollars a year in illegal overcharges. Violations of antitrust laws often result in higher prices for inferior products and services. For complete information on the regulations, visit http://www.nara.gov

Federal Antitrust Legislation*		
Legislation	Date	Essence of Legislation
Sherman Act	1890	This Act outlaws all contracts, combinations, and conspiracies that unreasonably restrain interstate trade. This includes agreements among competitors to fix prices, rig bids, and allocate consumers. The Sherman Act also makes it a crime to monopolize any part of interstate commerce. An unlawful monopoly is when only one firm provides a product or service and it has become the only supplier, not because its product or service is superior to others but by conduct that suppresses competition. The Act is not violated simply because one firm's vigorous competition and lower prices take sales from its less efficient competitors. Sherman Act violations are punished as criminal felonies.

Clayton Act	1914	This Act is a civil statute which carries no criminal penalties. It prohibits mergers or acquisitions that are likely to lessen competition. A key provision of the Clayton Act authorizes private parties to sue for triple damages when they have been harmed by violations of either the Sherman or Clayton Acts.
Federal Trade Commission (FTC) Act	1914	This Act prohibits unfair methods of competition in interstate commerce, but carries no criminal penalties. Even if a particular practice does not violate the Sherman, Clayton or Robinson-Patman Act, it may still violate the FTC Act. The FTC Act is used to prevent violations of both the specific antitrust laws and the public policy expressed in those laws.
Robinson-Patman Act	1936	This Act prohibits certain discriminatory prices, services, and allowances in dealings between merchants. Under certain circumstances, the Act prohibits a seller from granting lower prices to favored buyers, whether the price discrimination is instigated by the seller or forced upon the seller by the buyers. The Act does not make all price discrimination illegal. Certain defenses are provided (discounts to meet competitor's lower prices, for example). The Act imposes criminal sanctions for certain practices and for sales at unreasonably low prices if the purpose is to destroy competition.

* *Taken from A Guide for Purchasing Foodservice Equipment, NFSMI, The University of Mississippi, 1998.*

Indictments have alerted school purchasers to the importance of the antitrust laws. Price-fixing and bid-rigging conspiracies are, by their nature, secret and therefore difficult to detect. Law enforcement officials rely on complaints and information from consumers and competitors to identify violations.

Price-fixing and bid-rigging schemes generally occur where there is inadequate competition. More sellers mean more competition and usually better prices. School purchasers should be alert to the warning signs of price-fixing and bid-rigging, as noted below. The legal staff for the school district should be consulted if any of the following warning signals are observed:

- Evidence that two sellers of similar products have agreed to price their products a certain way, to sell only a certain amount of their product, or to sell only in certain areas or to certain customers
- Large price changes involving more than one seller of similar products of different brands, particularly if the price changes are of equal amount and occur at the same time
- A seller stating, "We can't sell to you; according to our agreement, so-and-so (the seller's competitor) is the only firm that can sell to you"
- Fewer competitors than normal submitting bids on a project or product
- Competitors submitting identical bids
- The same company consistently coming in as the low bidder and getting contracts for a certain service or a particular area
- Bidders appearing to win bids on a fixed rotation

- An unusual and unexplainable large dollar difference between the winning bid and all other bids
- The same bidder coming in substantially higher on some bids than on others, with no logical cost reason to explain the difference

The Procurement Plan and the Need for Documentation

School nutrition directors, as *Trusted Advisors*, understand the importance of a written procurement plan as a part of the documentation required during equipment purchasing. The procurement plan details the procedures of the school/school district in regards to the purchase of food or equipment in compliance with local, state, and federal regulations. In addition to the need for documentation, the procurement plan is also important because it helps to clarify the procurement practices for everyone involved in the equipment purchase. The procurement plan will generally include:

- Procedures for determining when formal purchasing procedures are required
- Formal purchasing procedures, such as:
  - Invitation for Sealed Bid (IFB)
  - Request for Proposal (RFP)
- Small purchase procedures
- Emergency purchase procedures
- Responsibilities and process used for all purchases
- Record keeping and documentation
- Code of conduct
- Conflict resolution
- Public access to procurement information

Specifications

The specification is a statement that contains a detailed description or enumerates particulars of a piece of equipment. The importance of writing precise and detailed specifications becomes overwhelmingly clear if one has ever thought they were purchasing one size or type or quality of equipment and ended up with a piece of equipment that was very different than what was expected. A specification will include all the technical details and requirements that the purchaser has in mind for a particular piece of equipment. The specification will:

- Clarify what is wanted for a particular piece of equipment
- Describe to the distributor and manufacturer about what is wanted for a particular piece of equipment
- Identify for those receiving the particular piece of equipment what should be delivered

There is no magic guideline for the proper length of a specification. Specifications will vary from a few lines for a "known" piece of equipment that one wants to buy by model number from a particular manufacturer to numerous pages for more generically written specifications which are detailed so that many manufacturers may bid on the equipment. More generically written specifications will usually result in lower equipment prices.

It is important for school nutrition directors operating as *Trusted Advisors* to understand the terms that manufacturers use in writing specifications. The difference between an option and an accessory is one example. An option is a variance from the standard production model and will

increase the purchase price. A desired option must be specified in the specification. An option may not be added later. An accessory is also a variance, but may be purchased at a later date. As a more specific example, an extra depth convection oven is an option; however cooking racks are an accessory. In addition, the words "shall, will, should, and may" have different meanings:

- Shall is used to express a binding requirement, in others words, this refers to a requirement
- Will is used to express a declaration of purpose on the part of the purchaser or to express a future tense
- Should or may are used to express a non-mandatory provision

A specification should be developed to identify minimum requirements, allow for a competitive bid, and provide for an equitable award at the lowest possible cost. To assure that the specification meets these criteria, the following may be used as a checklist. When writing a specification, keep it:

- Simple, but exact
- Easily identifiable with common terms used in the marketplace
- Reasonable as unnecessary precision is expensive and restrictive
- Capable of being met by several bidders for the sake of competition
- Clear and understandable

Equipment specifications may seem to be written in another language, but a great deal of information is available to assist with the development process. Information may be obtained from:

- Manufacturers' catalogs which are now typically available on-line at the manufacturers' Web site
- Sales literature
- Equipment testing laboratories
- Manufacturers' representatives and dealer salespeople
- Trade journals
- World wide web

Manufacturers' specification sheets or "cut sheets" are the means by which manufacturers describe their equipment and document important engineering information. The Foodservice Consultant Society International (FCSI) and the North American Food Equipment Manufacturing (NAFEM) associations have developed recommended guidelines for these catalog specification sheets which manufacturers typically use to format their specifications. In addition, manufacturers comply with Construction Specifications International (CSI) which is a system of cataloging bid specifications in the construction industry. Manufacturers' specification sheets provide detailed information on a front and back page. The front page gives product information that includes:

- Equipment type
- Model number
- Capacity
- Description of construction materials and finishes
- Construction and design characteristics
- Performance characteristics
- Description of controls
- List of standard features
- Description of safety features
- List of optional features available at extra cost
- Laboratory certification and approval symbols (UL, NSF, CSA, AGA)

- Special notes regarding any geographic limitation like altitude, humidity, temperature
- CSI section number
- Date printed

The back page provides detailed engineering information which includes:

- Model number
- Drawings to scale in English and metric dimensions
- Plan view, elevation/sections views
- Location of utility connections on plan and elevations
- Computerized Assisted Design (CAD) symbols
- Dimensions – interior, exterior, service, ventilation, air circulation, and clearances
- Net and shipment (crated) weights
- Crated dimensions – door clearances for building access
- Data concerning utilities – gas, steam, water, electric, and ventilation
- Miscellaneous information – variations, accessories, options, availability of colors, and finishes
- Date printed/written
- Manufacturer's address, phone number, and fax number

Once equipment information has been gathered, the next step is to write specifications. This is an important responsibility and is the hardest function in the purchasing process. It is wise to utilize members of the project team and others to help provide and collect information for the development of the school nutrition program's specifications. Such a group might consist of the:

- Local school nutrition program personnel
- Architect
- Board members/other administrators
- Foodservice consultant
- Manufacturer's representatives
- Equipment dealers
- Service agencies
- Other professional colleagues

It is the school nutrition director's responsibility as a *Trusted Advisor* to analyze and develop the information to create the school nutrition program's unique and final specifications. The federal regulations clearly state that the school nutrition director must develop the actual specifications used in the invitation for bid (IFB).

Types of Specifications

There are several types of specifications which will be needed at one time or another. Specifications take many forms, each having specific respective benefits. Listed below are the various types.

Qualified Product List

A qualified products list (QPL) identifies various brands that have met specific criteria. Bidding is limited to those manufacturers whose products are on the list. The purpose of this type of specification is to determine, in advance, those products that meet the established criteria. The evaluation of these bids is greatly simplified. Awards may only be made for products on the QPL. A bidder who submits a bid for a product not on the QPL is not responsive, i.e. does not follow bidding requirements. Any questions from manufacturers whose products are evaluated as unacceptable can be handled before the bids are issued. Developing a QPL is time consuming, but the benefits at the time of bidding are worth the effort.

When using a QPL, the specifications should state that the products on the QPL have been tested and have met the stated specifications. In addition, when a QPL is adopted, manufacturers that are affected should be notified and told all requirements necessary for their items of equipment to qualify for the list. The QPL should be updated frequently.

Design Specifications

Design specifications detail the characteristics that an item must possess to meet the school nutrition program's specific requirements. Some specifications are so detailed that they also may describe how the product is to be manufactured. Design specifications are not as applicable for purchasing items designed by a manufacturer. The tendency to specify equipment with exact characteristics can be too restrictive and cost prohibitive. This is the case when dealing with patented products. For items that are neither patented nor custom made, a modified design specification can meet the criteria of a good specification by describing only essential features. This allows bidders more flexibility when establishing their bid prices.

Performance Specifications

Performance specifications describe the performance requirements that a product has to meet. The end result becomes the priority consideration. The manufacturer is given latitude in how the requirement is to be accomplished. Performance specifications encourage innovation and ingenuity. Tests or criteria are developed to measure an item's ability to perform as required. One example of a performance specification might be that an oven must be able to bake a certain volume of rolls, evenly brown on all racks, in a specified number of minutes. Specifications can include both design and performance features used as prerequisites in developing a qualified products list. One reason why writing foodservice equipment specifications is so challenging is that there are so many different types of equipment, each requiring different parts to the specification.

Brand Specifications

Brand name specifications cite a brand name, a model number, and other descriptions that identify a specific product of a manufacturer. Brand names should be used as an example of the desired quality level but not used to restrict the bid only to those brands. It is understood that items equaling or surpassing the quality level are also acceptable. It is better to use more than one brand name if possible. It is essential to include specific information that clearly identifies the level of quality and performance expected. It is appropriate to name the salient characteristics to be used in determining bid responsiveness. Brand names alone generally do not constitute adequate specifications because:

- Objectivity may be lessened in the process of awarding the bid
- Equality of opportunity among bidders may be reduced
- Competition may be eliminated

Items to Include in a Specification

General Description

Begin with the commonly used name and quantity required for the item. Include the type, size, style, and model. Any additional information regarding the types of materials that the equipment is to be made from (stainless steel, for example) should be included if other alternatives are possible. A description of the desired quality or grade is vital in the specification and should include what inspections and performance tests will be done on the equipment. Certification requirements (such as UL, NSF, international, etc.) should also be listed.

Drawings or diagrams may also be necessary, particularly for custom pieces of equipment. Keep in mind, however, that whenever standard pieces of equipment are available they should be purchased as they will be less expensive than custom. At times though, the utility of a custom piece of equipment may make the equipment worth the added price.

If a decision has already been made that a specific piece of equipment from a particular manufacturer is the one that is needed, then the name of the desired manufacturer, and the manufacturer's model number for the item will need to be listed.

Some buyers will use the phrase, "or prior approved alternate that meets or exceeds the specifications in capacity, utilities and benefits." Other buyers feel so strongly that the potential for a misunderstanding of the terms "meets or exceeds" is so great that they make it a policy to never use this statement. If such a statement is used or is required by one's school district to allow for competitive bidding, details of the requirements and exceptions should be specified. The example below developed by the Federal Department of Justice, Bureau of Prisons may be considered and/or modified.

> The bidder must state clearly in the bid any exceptions or deviations to these specifications and shall submit for evaluation evidence that the exception or deviation is equal or superior to the specifications. Requests for deviations after award has been made will be denied. Should the equipment furnished under the specification be found not to comply with the specification at the time of final inspection, the contractor shall be notified and given ten days in which to bring the equipment into full compliance. Payment will therefore be withheld even though the equipment may of necessity be put into operation until compliance is achieved.

If one is not specifying a particular equipment model, the description of the piece of equipment is critical. Useful information can be obtained from manufacturer's specification sheets (also called cut sheets), but one should be careful of what is chosen from the manufacturer's cut sheets for the school nutrition program's equipment specification. Cut sheets will list standard features for every model number. In this case, there is no need to list features that are standard since the model number includes those features. One can simply write "with all standard features" after the model number.

Then, the add-on "accessories" or "extra features" are selected. Cut sheets should be read carefully as manufacturers do not always include as standard what one might think would be a "standard feature." After selecting the "extras", detailed descriptions should be given for those extras, such as colors, sizes, and finishes.

Example:
One (1) each convection oven; ABC Range Company Model Number I 23-456-A or approved alternate that meets or exceeds the specifications in capacity, utilities and benefits. Provide with all standard features and the following:

a. Four (4) 25" high stainless steel legs with adjustable stainless steel feet
b. Stainless steel left and right sides
c. Oven control package "E"

Utility Requirements

Electrical requirements are an essential part of the specification. This information appears on the manufacturer's literature. Specifications should list the voltage, cycles (60 cycle current is standard in the U.S.), and phase, as well as the electrical load. The electrical load will be in Amperes (Amps), Watts, Kilowatts, or Horsepower. It is important to make certain when selecting voltages that the area of the school where the item will be used has that voltage and phase available for use.

Example:
Electrical Requirements: 120 volt 60 cycle single phase @ 6.0 Amps

Any steam requirements will also need to be listed in the specification. This information will appear in the manufacturer's literature. The literature will list the sizes of the connections and the steam pressure required. Steam pressure is shown in pounds per square inch (psi). Special pressure reducing valves (PRV) and water condensate valves may also be required and should be specified. Building steam should be checked to make sure that it is potable (approved to be sanitary) if the equipment's steam will be contacting food and that there is an ample supply of steam to meet operational requirements. It is best to consult with experts before attempting to write specifications for direct connected steam equipment.

Plumbing Requirements

Plumbing requirements are also needed for equipment specifications and are again listed in the manufacturer's literature. The specification should include any hot water, cold water, drain(s), or gas requirements for the item. The gas consumption of the equipment should be listed as well as the gas connection size. The consumption will be shown on the literature as Btu/HR. Again, the area of the school where the item will be used should be checked to make certain that it has the water, drains, and/or gas available for use.

Example:
Plumbing Requirements: 3/4" Gas @ 60,000 Btu/HR

Mechanical Requirements

Mechanical requirements of equipment are those requiring ductwork connections for the purpose of venting. This would include equipment items like dishwasher condensate hoods or cooking equipment exhaust hoods. The duct connection size will appear on the specification along with

the suggested air to be exhausted or supplied to the equipment. The exhaust or supply will be noted as cubic feet per minute (CFM) and static pressure (SP). Static pressure is the amount of air resistance the equipment has and will be noted in inches, i.e., 10" x 30" duct connection for 3,200 CFM @ 3/4" S.P. It is advisable to consult with experts before attempting to write specifications for equipment with mechanical requirements. Ductwork and fans will require other contractors to be involved. Any special instructions to the bidders should also be included, such as "Deliver, uncrate and set in place ready for the final connections by others".

Size or Capacity Requirements

Equipment size or capacity should be considered carefully. Information is often available from manufacturers, but their data generally will not include loading or unloading time. In addition, equipment capacity is a complex issue. For example, a mixing bowl may hold 20 quarts, but when 12 quarts of liquid are being whipped in the bowl, more capacity is needed. In fact, a 20 quart bowl would be needed for whipping 5 quarts of cream. It is therefore best to consider manufacturers' estimates as guidance only.

Equipment size needs should be calculated using a "recipe" method including information about the number of portions required, the size of the portions, the equipment capacity, and time constraints. The following steps may be used in this computation:

1. Select the representative menus and list the equipment to be used
2. Determine the number to be served and the portion size
3. Multiply the number of portions times the portion size
4. Determine peak serving demands and the portions (weight or volume) needed at that time
5. Determine batch cooking times and the quantity per cooking cycle per piece of equipment, compile information on quantities and time required for processing the food item in the equipment (the equipment load capacity)
6. Divide equipment load capacity into the number of servings to get the batch size
7. Calculate the size and number of pieces of equipment needed to produce the quantity of food required to meet the maximum demand

Freight and Delivery Specifications

Freight and delivery requirements should be given as specifically as possible, including who will pay for the delivery and installation. If this is not done, then the company delivering the equipment could simply "dump" the piece of equipment at the back door. This would be the worst possible situation, however, it could occur. One example of a better description of the delivery expectation may be "set in position designed on the plan and anchored to the floor". In addition, delivery requirements may include the start-up needs, such as:

- Adjustment
- Initial oiling, if necessary
- Demonstration
- Clean up at the time of delivery as there can be huge crates or wooden boxes from the packaging
- Specific date(s) and time for delivery
- Early arrival storage and who will pay for the storage
- Late arrival issues and potential costs incurred

Freight charges and ownership of the equipment until the time it arrives at the school also needs to be detailed and understood before a purchase decision is made. One foodservice operation described a situation where they purchased an oven which was delivered to the back loading dock of the facility where it was to be installed. Unfortunately, the oven was stolen from the back dock before the oven could be installed. Therefore, consider the ownership issue in this example. This highlights the importance of knowing when ownership occurs. Terms used in contracts that detail where the ownership of the equipment might change hands and who will pay for the freight charges are described as:

- Free (or freight) on Board (F.O.B.) Origin – the ownership changes at the manufacturer/factory to the school/purchaser
- F.O.B. Destination – the ownership does not change until the equipment is delivered to the school foodservice
- Freight prepaid – seller pays the freight
- Freight collect and allowed – buyer (school district) pays the freight charges, but deducts charges from the seller's invoice for goods

To avoid unnecessary headaches, it is recommended that equipment be shipped to the dealer location. In that way, responsibility is placed on the dealer to receive the equipment, check it, and then deliver it to the school site at the defined date and time. If delivery is made directly to the school, facilities must be adequate to receive the equipment from the truck and there must be adequate personnel to unload the equipment. If there is a loading dock, it should be specified that the delivery is made on a truck with a lift gate. Often with new construction or an extensive renovation project, the general contractor receives the equipment.

Installation Requirements

The installation requirements that should be included in the equipment specification may be different for each piece of equipment in the bid. It is important to make sure the details of this part of the process are included in the bid. To avoid any misunderstanding, it is essential to make certain that the responsibilities for the various aspects of the installation process are clearly defined.

No matter who is responsible for installing the equipment, it is a good practice to request installation manual(s) from manufacturers before writing the specifications. The detailed information in the manual verifies the requirements, confirms the fit, promotes fair bidding, and enables the school nutrition director, contractor, or architect to make a preliminary review.

Installation requirements for new construction and renovation projects are fairly standard and usually are coordinated by the general contractor. Replacing or adding new equipment, however, may present unexpected obstacles that need to be considered, prior to purchase. Coordination of the installation of replacement or new equipment purchases will typically be the responsibility of the school nutrition director or designee. If the successful bidder is to assume the responsibility for any aspect of the installation process, detailed requirements should be included in the specification. The following list of questions is helpful in identifying the bidder requirements for installation.

- Who will install the equipment
- Who will pay for the installation
- Are installation charges included in the price of the equipment or will there be additional charges
- Who will receive, uncrate, and set the equipment in place

- Who will remove crates and other debris
- Who will make final utility connections
- Who will remove the existing equipment
- Who will relocate old equipment to a new location
- Who will disconnect the utilities from the existing equipment (water, electric, gas, steam, drains, and ventilation)
- Who will apply for permits, if required
- Who will install, replace, or adjust fire protection for the equipment
- Will there be obstructions in moving equipment into the facility and how will these be handled (doorways, 90° turns, stairs, etc.)

The installation requirements written in a specification will depend on the needs of the school nutrition program and the piece of equipment being purchased. Generally, equipment installation in a specification is listed as:

- Counter-mounted equipment on 4" legs, sealed to counter, or portable
- Floor-mounted equipment on 6" legs, casters, or sealed to floor
- Equipment not on casters or not portable shall be sealed to the wall and/or adjoining equipment, or spaced to facilitate cleaning
- Portable equipment and equipment installed on casters shall be installed with flexible utility lines and/or quick-disconnected couplings

In addition, the specifications should state that the equipment must be installed so as to permit all exposed areas of the equipment and adjacent surfaces to be accessible for cleaning. If an item of equipment is not portable, is not installed on casters, or is not otherwise easily moved, the specification should state that it shall be (1) sealed to adjoining surfaces with an approved sealant or metal flashing, or (2) provided with sufficient space between and behind the equipment to allow easy access. Recommended spacing requirements for food equipment include the following:

- Provided access is available from both ends of the equipment and the equipment length is 4' or less, the equipment shall be spaced at least 6" from walls
- Provided access is available from both ends of the equipment and the equipment length is over 4' but less than 8', the equipment shall be spaced at least 12" from walls and other equipment
- A minimum of 6" of space shall be provided between items of equipment to allow access for cleaning
- Additional space may be required for large equipment when 6" is not adequate to provide access for cleaning
- When the distance between the top of a walk-in cooler/freezer or canopy hood and the ceiling is 24" or less, an approved enclosure shall be required
- Obstruction of the access opening between and/or behind equipment by a chase or rigid utility connection may require additional spacing

Special Instructions

Standard bidding procedures may be included in the specification so that bidders will be aware of procedural requirements. Bidding procedures are discussed in more detail in Chapter Eight. In case of bidder questions regarding these procedures, contact information for the author of the specifications may also be included.

Sometimes, qualifications of the bidder may also be requested. This may be particularly important for smaller or unknown dealers.When the school district buys directly from the manufacturer, the following questions should first be asked. Answers will probably come from school maintenance staff, school nutrition managers, and the equipment salesperson.

- Who will track down late or missing equipment
- Who will schedule the delivery and who will receive the equipment
- Who is responsible if the equipment arrives damaged
- Does the voltage and phase match the electrical service at the school
- Is the equipment properly fused
- If it is "plug-in" equipment, does the plug shape match the plug available
- Are the gas lines in the right location and are they adequate
- Will gas, water, or steam pressure regulators be required
- Are water filters or line strainers required
- Does the equipment meet the state and local plumbing, electrical, mechanical, fire and health codes
- Who will uncrate the equipment and set it in place
- Will the equipment fit through the doors or openings at the school
- Will special lifting equipment be required to get the equipment in the building
- Is there proper clearance between equipment items as some controls are heat sensitive and must have "breathing" clearance to operate properly
- Can the equipment be serviced after it has been set in place
- Who will service the equipment and how far away are they
- Is any service included in price
- Are spare parts available in case of a break-down
- Are special tools required to accomplish the installation
- Who will calibrate the thermostats or controls
- Does the equipment require special lubrication before operation
- Will the new equipment require a fire protection system
- Who will initiate the warranty
- Are there hidden packing materials that must be removed before hook-up
- Who will clean and sanitize the equipment before initial usage
- Who will install "loose" parts or accessories such as vacuum breakers, solenoid valves, water flow controls and starters
- Who will demonstrate the proper operation and maintenance of the equipment

Specification Reminders

The most common errors in equipment purchasing are likely to be those where some part of the equipment needed is not detailed enough or is left out of the specification. The following reminders may help to minimize such problems from occurring:

- Quantities needed of each piece of equipment
- Required delivery dates (specify a range of dates)
- Provision for on-site adjustments by equipment supplier
- Required on-site demonstrations or training
- Seals of approval required on equipment (UL, NSF, AGA, etc.)
- Sizes and capacities of each piece of equipment
- Warranty requirements (minimum of one year)

- Heavy duty (not restaurant weight) equipment specified
- Availability of replacement parts for the life of the equipment
- Service needs, including parts (for example, all equipment shall be available within a reasonable distance from installation site in order to assure repair and restoration of operation within 48 hours after the manufacturer's designated service agency has been notified of breakdown)
- Special features are specified, finishes and options.
- Electrical requirements such as voltage, cord sets, and amperage
- Water, gas, and waste requirements
- Operational and parts manual are provided (it is recommended that one copy go to the school with the equipment and that two additional copies of the manual go to the district school nutrition office)
- Consistent standards – make sure all models specified are indeed equal
- Avoidance of fabricated equipment if a standard piece of equipment can serve the same purpose
- Avoidance of painted finishes when possible
- Stainless steel is the material of choice for most equipment (14 gauge for sinks, table tops, shelves, 16 gauge for side and top panels of equipment)
- Choice of simplest equipment possible to get the job done
- Locking casters, when possible, allow easy cleaning and movement for repair and service
- HVAC equipment shop drawings indicate exhaust requirements, make-up air requirements to hood and heat given off by refrigeration equipment
- Plumbing equipment shop drawings indicate gas flow rate, inlet gas pressure, drain sizes, and water pressure requirements

Pitfalls of Writing Specifications

Because the preparation of school nutrition program equipment specifications can be a daunting task, it is important to understand what can go wrong if this important task is not correctly performed. There are five problems or pitfalls which sometimes occur in school nutrition programs.

- Using old specifications
  - A common approach is to find old specification or guidelines from previous projects and use these as a "reference." This is a good place to begin, but confirm equipment needs before using "as-is". No school nutrition program is like any other and equipment can become obsolete. The best that old specifications can do is offer a rough guideline of what should be covered.
- Letting salespeople write the specifications
  - Salespeople are a great source for equipment information. After all, who knows equipment better than they do? But remember, their job is to sell equipment. They do not release the architect or school nutrition director from making comparisons and gathering information on the best equipment available to do the job needed. Similarly, although there is useful information on the manufacturer Web sites, the Web sites are also intended to market the products for sell.
- Poor coordination of electrical and mechanical requirements
  - Equipment has been bought and paid for that could not be installed because it was gas and the kitchen was all-electric. In addition, equipment has been purchased that could not be used because the plumbing lines were too small. Be careful about

coordinating electrical and mechanical requirements of the equipment on the project. This is especially true for renovations and additions. Also, when equipment is being provided directly by a vender with no contractor involved, the structural supports or load capacity of the structure should be verified by a registered structural engineer.

- Accepting an inferior substitution
  - When using proprietary specifications, the equipment specified should all be equal in terms of features provided and quality of fabrication. This is a difficult thing to assess. Every manufacturer makes a slightly different piece of equipment. The least expensive piece of equipment will be provided, so do not specify it unless it truly is what is needed. Make sure the description of the equipment provided in the specification is complete because it will be far less difficult to determine whether an offered substitute is really equal in all aspects. Remember, the architect and school nutrition director have the final say as to whether equipment offered "as equal" meets the criteria because they have established the specifications.
- Not specifying a high enough quality level
  - Specify the highest quality the budget will allow. Always specify heavy duty not restaurant weight equipment. Restaurant weight equipment is only one step above home appliance weight. Always seek the best quality equipment the school nutrition program can afford.

Critical Path Planning

Critical path planning is a term used to describe a plan that is developed to time the movement of supplies and equipment to coincide with the needs of the school nutrition program. Critical path planning begins with the "end in mind". In other words, the critical path plan is based on the calendar date upon which the school will need to be in operation with the equipment. When this date has been selected, the tasks that need to be accomplished by this date can also be set up in the proper sequence and time frame so that the critical path can be followed to meet the school's goal. Examples of tasks that might be scheduled in the critical path include:

- Menu planning to know your production needs
- Development of the product list and descriptions
- Determination of the type of equipment needed to produce the products
- Estimation of quantities needed and product movement policies in order to determine the size of equipment needed
- Equipment research
- Development of equipment list and specifications
- Notification of purchasing department to schedule pre-bid conference with interested bidders/vendors
- Scheduling of pre-bid conference by purchasing department
- Mailing of draft equipment list to vendors
- Pre-bid conference
- Screening from pre-bid conference
- Draft instructions and equipment list to purchasing department
- Draft documents to be mailed to potential vendors
- Final pre-bid conference
- Modification of equipment list, if needed

- Transmit revised equipment list to purchasing department
- Issuing of price requests by purchasing department or school district designee, following state purchasing laws
- Bid opening by school district designee

Critical path planning allows the school nutrition director and the school purchaser to keep the process organized and within guidelines established by state purchasing laws . Purchasing is not part of the daily routine, so it is easy to forget a task at the appropriate time. Critical path planning is also essential because delays in one area can result in additional delays in others, resulting in a much later completion date. Critical times must be realistic for accomplishing the task. Bidders, for example, must be able to deliver and install equipment within the dates established by the specification. The construction schedule should help determine appropriate dates. Even so, it is best to allow a minimum of three weeks from complete installation of equipment until the first day of meal service. The bottom line is to be ready for the unexpected. This includes having an alternate plan for preparing and serving meals if construction is delayed.

Analysis of the Market and Evaluation of Vendors

School nutrition directors should analyze the market and evaluate the vendors. First, the school nutrition director will need to determine who manufactures, sells, ships, delivers, and installs the equipment to be purchased. Information that needs to be gathered will include:

- Names of vendors
- Vendors' warehouse location
- Types of equipment sold by the vendors
- Vendors' history of sales to the school/school district

Careful evaluation is critical if a district needs to disqualify a vendor and should be done using pre-determined vendor criteria. Review of vendors is typically based on:

- Equipment/product lines
- Physical facilities
- Delivery
- Financial history
- Service levels
- Accounting practices
- Performance at and following pre-bid conferences
- Manufacturing quality standards

Effective communication with vendors is essential. Pre-bid conferences, for example, may help to eliminate confusion for both parties and prevent mistakes later. In addition, sending a school/school district profile to all vendors will help improve communication with vendors and help vendors know how to work with the school. The profile should be short and easy-to-read. The profile offers:

- Contact information
- Statistics about the district
- School nutrition program information (breakfast, lunch, catering, summer food programs, supplemental sales)
- Food production and delivery requirements
- Request for prices

- Facts about how equipment will be evaluated
- Sales call policy
- Special requirements for equipment.

The Purchase System

Federal and state procurement regulations/laws should be considered for all decision making about equipment purchases. Equipment purchasing for the school nutrition program will require two basic decisions: 1) the appropriate purchase method and 2) the pricing mechanism.
When schools are deciding on the appropriate purchase method, there are four basic purchase procedures. They are:

- Small purchase procedure or request for quotation (RFQ)
- Competitive sealed bids (IFB)
- Request for proposals (RFP) competitive proposals
- Noncompetitive negotiation

Purchase Methods

Small Purchase Procedure or Request for Quotation (RFQ)

The small purchase procedure is used for simple and informal purchases that do not exceed the allowable dollar amount. Small schools also use this method but, though allowed, it does not yield the most cost effective pricing. Small purchase prices often are quoted over the phone or by a sales person. The purchaser must record the price quoted and maintain open and free competition when using the small purchase method.

Invitation for Sealed Bid (IFB)

Sealed bids are the standard when the only variable is the price of a product being purchased. Because the award goes to the lowest responsible bidder who meets the terms and conditions, an IFB requires clear, concise specifications. Bids are accepted or rejected on a pass/fail basis. No negotiation of price or terms is permitted. An IFB is normally used to acquire products and non-technical services.

Most school districts have standard contract language for sealed bids. This standard language is often called the boilerplate. The usual sections of a sealed bid document are:

- Section I – Transmittal page and signature page.
  - The Certification Statement related to debarment or suspension should be included in this section. If this statement is not available, it may be obtained from the State Agency.
- Section II – Standard terms and conditions, such as:
  - Correction of mistakes
  - Collusion
  - Unit price prevailing
  - Adherence to specifications

- Section III – Special instructions, such as:
  - Extensions
  - Brands approved
  - How to offer alternate brands or substitutions
  - Responsibility criteria set at minimums for elements critical to successful bidder performance
  - How to demonstrate bidder compliance with criteria
- Section IV – Specifications and pricing information form, to include:
  - Specifications for equipment to be purchased
  - Pricing information form developed by the school nutrition district staff, that contains:
    - Equipment item name that corresponds with the specification (completed by the school nutrition program)
    - Quantity to be purchased (completed by the school nutrition program)
    - Space for the bidder to insert:
      - Unit price
      - Extended price
      - Contact information for the party who will be responsible for the equipment start-up
      - Contact information for the party who will be responsible for the equipment use and care demonstrations
      - Contact information for the factory authorized service agent who is authorized by the equipment manufacturer to service the equipment during the warranty period
- Section V – Billing address and delivery locations
- Section VI – Potential bidders

Request for Proposal (RFP)

A request for proposal is the standard method when purchasing the product or service requires evaluating several subjective criteria along with the price and is commonly used for purchasing equipment or for equipment maintenance contracts. An RFP allows evaluation of other variables besides cost. To develop a request for proposal, variables should be identified and assigned a point value relative to their worth. Budget/cost is a critical variable that should get more than 50% of the total points.

A two-step process is recommended to evaluate responses to an RFP. The first step is negotiating variables in the technical proposals. The second step is negotiating the price. The RFP instructions should indicate how proposals are selected for negotiation. Because the budget/cost portion of the RFP evaluation is objective, it is an appropriate way to select vendors for negotiation. The instructions might read, "The two vendors offering the lowest budget/cost proposals will be selected for negotiations." An example of RFP criteria for an equipment maintenance contract is shown below.

Selection Criteria	Maximum points	Points for this response
Years company has been in foodservice equipment maintenance business	10	
Years experience of technical staff	5	
Brands of equipment owned by school district compared to bidder's factory authorized service	10	
Time required to get parts for equipment not covered by factory authorized service	5	
Response time on emergency calls	10	
Membership in Commercial Food Equipment Service Association, Inc. (CFESA)	5	
Budget – routine maintenance bottom line	20	
Budget – hourly rate for emergency service	15	
Budget – percentage discount off manufacturer's list price for replacement parts	20	
Total Points	100	

An RFP selection committee should be used to evaluate proposals. Each individual on the committee should score their responses separately and the scores are then averaged. Alternatively, another approach would be to rank RFP panel scores or discard the high and low score to negate the effect of a panel member who gives very high or very low scores.

Negotiation begins with the two vendors who offered the most favorable budget/cost proposal. The school district might undertake negotiation when the response for one of the selection criteria was unacceptable, for example, the proposed response time for emergency calls was too long. The two vendors are then allowed to offer revised budget/cost proposals, and evaluation of the proposals is then completed. Further information is provided on RFP and the complete purchase system in *First Choice, A Purchasing Systems Manual for School Foodservice* by NFSMI.

Noncompetitive Negotiation

Noncompetitive negotiation can be used only when one of the following conditions occurs:

- After conducting a request for prices, competition is deemed inadequate, such as when only one bidder responds to an IFB
- An emergency exists where a competitive procurement method would take too long
- The federal grantor agency (USDA) authorizes noncompetitive negotiation

Pricing Methods

School nutrition directors will also need to determine the most appropriate pricing method for the equipment items being purchased and indicate the selected pricing method in the IFB/RFP documents. If the pricing method changes, it is important for a new IFB/RFP must be issued. There are two basic pricing methods for purchasing equipment:

- Line item awards – the price offered on each product is considered independently. This allows potential vendors to pick and choose items on which to offer a price
- Bottom-line awards (also called all-or-nothing awards) – the prices offered on products are considered as a group. This method requires a price quote on all items, but is attractive to vendors because it guarantees an increased size of award. Products may also be grouped for bottom-line awards. The distributors available in the specific market influence how products are grouped.

Small Equipment Considerations

School districts generally use bottom-line awards when they purchase equipment for a new school. When districts purchase small equipment on a bottom-line bid award, they can receive one delivery and complete this task for the year. This is often the most cost effective way for a school or school district to purchase small equipment. Placing orders for small equipment throughout the school year lowers the volume of any one order, thereby increasing the cost. Sealed bid methods may be used with a request for firm prices for a one-or two-week period in order to decrease school paper work and the vendor's risk of cost increases.

State contracts may also often be available for certain items and they should be used when they are available. Finally, purchasing cooperatives are used by some schools, particularly small school districts to obtain cost savings when buying small equipment.

The Bid Document

Once all decisions have been made for equipment specifications, critical path needs, and the purchase system, the bid document is completed. The bid document is the statement of the terms and conditions of the equipment needed for the purchase and is a legally binding contract. It is important to have the school board attorney review and approve this document prior to bidding. It is also recommended to involve the state agency representative overseeing the school nutrition program. Bid documents will include detailed information about the bidding procedure, general instructions for such areas as correction of mistakes, pricing, terms, payment schedule, billing, delivery, guarantees, defaults and delays, bidder qualifications, and required documentation, as well as special instructions for that piece of equipment. An example is provided at the end of this chapter which also includes general boilerplate information.

SUMMARY

Once the bid document is finished, the school nutrition director, as the *Trusted Advisor*, and the planning team have completed the extremely valuable and perhaps most difficult steps of equipment purchasing. The next steps which complete the process are covered in the next chapter and include handling bids, placing orders, receiving, installation, and nutrition assistant training. Although this first half of the process may seem difficult and lengthy, the benefits of well-written procurement plans, specifications, and bid documents make the second half of the equipment purchasing process easier and more effective.

The school nutrition director's purchasing responsibilities as part of the planning team vary with the size of the school and its procurement needs. One responsibility of the school nutrition program director is to have a general knowledge of legal aspects of purchasing and seek out the advice of the school system's legal staff on matters related to procurement purchases. In addition, the school nutrition director should be aware of community and political issues and demonstrate compliance with federal, state, and local regulations. School nutrition directors must also be fiscally responsible. Most importantly, the school nutrition director, as the *Trusted Advisor*, plays a key role in gathering information about foodservice equipment and in determining the needs of the school nutrition program. This detailed information is essential in the writing of the specifications. Numerous other decisions are required, such as the type of purchasing method and the pricing mechanism.

Documentation is an important part of the procurement process and should be done from the beginning of the process to the end by the school nutrition director. Record keeping includes keeping copies of the documents issued to solicit price bids; the public announcement soliciting bidders; responses from vendors; the cost analysis; and signed award documents.

Finally, school nutrition directors are charged with providing maximum open and free competition. It is important to be a savvy consumer because not everyone in the industry maintains ethical standards. Price-fixing and bid-rigging are illegal and should be guarded against. Other ethical concerns regarding the bidding process are numerous and are the responsibility of all persons involved in the purchasing process, including the school nutrition director.

Solicitation/Invitation for Bid

(Taken from *A Guide for Purchasing Foodservice Equipment*, NFSMI, The University of Mississippi, 1998.)

It is the purpose and intent of this invitation to secure bids on the items specified on the sheets attached. Your written bid must be submitted in a sealed envelope to _____ (BOARD OF EDUCATION), _____ (NAME OF PERSON TO RECEIVE BIDS), _____ (ADDRESS). _____ (BOARD OF EDUCATION) reserves the right to reject any and all bids, in whole or in part and/or to accept the bids that in its judgment will be in the best interest of the program. No bid will be allowed to be withdrawn for any reason after _____ (DATE).

Prices bid shall be firm (or escalating) for the period between _____ (DATE) and _____ (DATE) and shall include all charges for packing and transporting to the individual centers at the addresses on the attached sheet. Prices will not include Federal Excise Tax or State Sales Tax.

In the event that the successful bidder(s) are unable to perform as required, the successful bidder(s) shall be responsible for the securing of items or services from an alternate vendor and pay that vendor any additional costs involved in supplying the items.

The successful bidder or bidders must:

1. Comply with all "Equal Employment Opportunity" regulations _____ (specify), and complete the certification regarding debarment, suspension.
2. Meet regulations relating to energy efficiency which are contained in the State Energy Conservation Plan _____ (specify)
3. Allow access by duly authorized representatives of the School Food Authority, State Agency, United School Food Authority States Department of Agriculture or Comptroller General to any books, documents, papers and records which are directly pertinent to this contract.
4. Maintain all required records for three years after final payment and after all other pending matters are closed. (Some states require a longer period of retention.)

In the event that the successful bidder(s) are unable to furnish the brand which was indicated in their bid, delivery may not be made until the _____ (TITLE OF PERSON(S)) has been contacted and an alternate approved.

All items shall be subject to inspection after arrival at the destination. If any items are found to be defective or otherwise not in conformity with the specification, such items will be rejected. It will be the responsibility of the vendor to defray any cost involved in the delivery and return of rejected articles.

The successful bidder(s) shall be paid in payments or in full, upon submission if an itemized invoices with the prices stipulated herein for the items delivered and accepted.
Any discounts are to be noted on the bid sheets and reflected on the invoices. Invoices should be sent to _____ (NAME) at _____ (ADDRESS).

If any potential bidder is in doubt as to the true meaning of this Invitation for Bid, he/she may submit a request for an interpretation to _____ (NAME) _____ (ADDRESS)
_____ (TELEPHONE NUMBER).

Any interpretation will be made by addendum and a copy mailed to each person receiving an Invitation for Bid. The Board of Education will not be responsible for any other explanation or interpretation of such documents which anyone presumes to make on behalf of the Board of Education.

Vendors shall not submit a bid for the contract if a conflict of interest, real or apparent, would be involved. Conflicts of interest arise when any of the following has a financial or other interest in the firm:

a. An employee, officer, or agent of _____ (BOARD OF EDUCATION)
b. Any member of the immediate family of the above named persons
c. The partner of any of the above named persons
d. Any officer, employee or agent of the vendor prepared specifications, work orders, bid or contract provisions for this acquisition

Attachment: Certification of Debarment/Suspension (Federal Form Number _____)

SUBMITTED BY_____ TITLE _____
COMPANY NAME _____ DATE _____
ADDRESS _____
TELEPHONE NUMBER _____

Request for Quotations

It is the purpose of _____ (BOARD OF EDUCATION) to secure quotes for the items specified on the attached sheets. Quotes will be taken on _____ of each _____ (DAY OF WEEK) _____ (WEEKLY, BIWEEKLY, MONTHLY, ETC.) at _____ (TIME OF DAY) _____ (ADDRESS).

The Board of Education reserves the right to reject any and all quotes in whole, or in part, and/or to accept the quotations that in its judgment will be in the best interest of the school nutrition program.

Prices quoted shall include charges for transporting any or all items in varying quantities to _____ (EACH SCHOOL, CENTRAL WAREHOUSE, ETC.)

Prices quoted will not include Federal Excise Tax or Sales Tax. Any discounts to be given must be specifically stated on the quotation sheet.

Response to the quotations will be given orally with a written confirmation upon request.

Any proposed alternates to the specifications listed must be approved by _____ (TITLE OF PERSON(S)) five days prior to the quotation.

An example of the alternate may be required to establish quality.

All items will be inspected upon arrival. If any articles are found defective or otherwise not in conformity with the specifications, the sponsor shall have the right reject such items. It will be the responsibility of the vendor to defray any cost involved in the delivery and return of rejected items.

Invoices should be sent to _____ (DISTRICT SCHOOL NUTRITION OFFICE, ETC.)

All quotations are firm for the period of _____ (DATE).

SUBMITTED BY _____
COMPANY NAME _____
ADDRESS _____
TELEPHONE NUMBER _____
SIGNATURE _____
TITLE _____
DATE _____

CONTRACT SECTION I - INVITATION FOR BID

TO: Date Issued: _____

ATTENTION: BID DEPARTMENT Bid Number _____

TELEPHONE: _____

Items:	Foodservice Equipment as indicated in Section IV
Type of Contract:	BOTTOM LINE FOR ONE TIME DELIVERY
Delivery Date:	
Bid Opening:	DATE: _____ TIME: _____
Mail Bids to:	Hand deliver all sections or mail to: _____ _____ _____ NOTE: ENVELOPE SHOULD BE SEALED AND PLAINLY MARKED IN ACCORDANCE WITH GENERAL INSTRUCTIONS.
Contacts:	If you have any questions concerning this invitation for bid, Please phone _____ _____

I, we, propose to furnish and deliver the items as listed according to your specifications and quantities at the indicated prices.

This Bid consists of INVITATION, GENERAL AND SPECIAL INSTRUCTIONS, AND SPECIFICATIONS. We understand that a company officer's signature is required, and unless this has been done, our "bid" will be considered incomplete and rejected therefore.

I, we, the undersigned, do hereby understand and accept the instructions and conditions under which this quotation is being submitted.

Addenda: The undersigned hereby acknowledges receipt of Addenda No. _____ and the incorporation of same in the proposal.

COMPANY NAME _____

ADDRESS _____

CITY/STATE/ZIP _____

TELEPHONE NUMBER _____

FAX NUMBER _____

SIGNATURE _____

TITLE _____

CERTIFICATE OF RESPONSIBILITY NO. _____

DATE _____

II GENERAL INSTRUCTIONS

Sealed, written bids will be received by the _____ (SCHOOL DISTRICT) at the time and place specified on the Invitation for Bid. Neither dating of bid form nor placing in mail by this date will meet requirements. Bid must be received on or before date and time stated. The _____ (SCHOOL DISTRICT) reserves the right to reject any and all bids and to waive any and all formalities. While it is the intention of the _____ (SCHOOL DISTRICT) to purchase all items listed, the right is reserved to omit any item necessary to bring the total cost within budget provisions.

1. ***Correction of Mistakes:*** All entries must be in ink or typewritten. No erasures or corrective fluid permitted. Mistakes may be crossed out and correction inserted adjacent. Corrections must be initialed in ink by person signing bid.

2. ***Signature on Invitation Required:*** "Invitation for Bid" shall be signed with the firm or corporate name and by an officer.

3. ***Return Instructions:*** Bidders must use the Bid form without alterations. Bids must be submitted sealed in an envelope, with the address of the school district on the outside of the envelope, company name and bid number, and bid opening date as they appear on the invitation. Pages on which there are no items to complete may be detached, and only those pages which contain entries or signature need be returned. Unsealed bids will be deemed unresponsive and rejected.

4. ***Pricing:*** Unit price will prevail in case of conflict between unit and total price. Unit price shall include total for equipment plus all accessories as per specifications.

5. ***Terms:*** All items listed are to be charged to the _____ (SCHOOL NAME AND COMPLETE ADDRESS). Invoice date to be determined by the date of delivery unless otherwise agreed.

6. ***Payment Schedule:*** Three options: Board of Trustees should indicate by an "X" the option chosen.
   - ☐ A. The school district will issue separate purchase orders for each item and will make payment within 10 working days following the next regularly scheduled Board meeting after delivery.
   - ☐ B. The school district will issue separate purchase orders by building location and will make payment within 10 working days following the next regularly scheduled Board meeting after installation.
   - ☐ C. The school district will issue one purchase order for the entire amount of this bid and will make payment within 10 working days following the next regularly scheduled Board meeting after all work covered by purchase order is completed.

7. ***Do Not Combine Items:*** Bid on each item separately. Prices must be stated in units specified herein. Each item must be considered separately and not in combination with other items.

8. ***Delivery Prepaid:*** It is understood that the bidder agrees to deliver prepaid to location as indicated in specification. All costs for delivery, drayage or freight for the packing or unpacking of said articles are to be borne by the bidder.

9. Complying with Specifications: All materials furnished must be subject to inspection and approval by the school district after delivery. The right is reserved to reject and return at the risk and expense of the dealer such portion of any shipment which may be defective or fail to comply with specifications without invalidating the remainder of the order. If rejected, it will be held for disposition at the expense and risk of the dealer. Dealers will be requested to replace that defective portion of an order according to the specifications without additional cost to the _____ (SCHOOL DISTRICT).

10. Guarantee: Each bidder, by presenting a bid under these specifications, binds himself to make positive that all goods are fully up to the standards set by the specifications. Should it be discovered within a reasonable period of time from date of contract that such goods or services are up to standard, _____ (SCHOOL DISTRICT) shall have the right to have such goods or services replaced by others conforming to the standard requirements and the entire expense shall be borne by the bidder.

11. Correctness of Bids: Bids shall be verified before submission, as quotations cannot be withdrawn after public opening. No bid can be corrected after being opened. The _____ (SCHOOL DISTRICT) will not be responsible for errors or omissions on bids.

12. Delivery Schedule: The successful bidder shall deliver the articles named in the specifications by delivery date as specified on the Invitation for Bid. Upon failure of the successful bidder to deliver all of the items ordered within the time set or allowed, the successful bidder will be considered in default.

13. Default and Delays: In case of default of the successful bidder, the _____ (SCHOOL DISTRICT) reserves the right to terminate the purchase order or contract and to purchase similar supplies, services, furniture, furnishing, or equipment on the open market. The bidder will be charged with any cost occasioned by the _____ (SCHOOL DISTRICT) whether said cost is same as originally accepted or in excess of the original contract.

14. Bidder Qualifications: Before any contract can be awarded, a bidder must be deemed qualified, in the judgment of school district officials, to perform as required, herein. A bid will be rejected if a bidder fails to meet any one of the following qualifications or supply any of the required documentation.

A. Product Line:
The bidder must demonstrate that it can provide all of the items on the bid list within the time frames specified in the Invitation for Bid.

Required Documentation:

1. The bidder must submit written documentation, such as inventory records, identifying the items that are to be delivered within (insert days for example: seven (7) working days) of bid award that are currently in inventory. Bidder must submit a signed statement certifying these items are not subject to prior sale.
2. For all other items, bidder must submit written documentation from the manufacturer, on manufacturer letterhead, that items will be delivered to bidder within (insert days; for example: twenty (20) working days) of bidder's order.

B. Financial Ability To Perform:
The bidder must demonstrate to school district officials that he/she has the financial ability to supply items to the school district as required.

Required Documentation:

1. Bidder must supply letters from all manufacturers/suppliers that will be used by bidder to service the contract that the bidder is in good standing with the manufacturer/supplier. Letters must be on the manufacturer's/supplier's letterhead and signed by an authorized representative of the manufacturer/supplier and dated after the date of publication of this Invitation for Bid.

C. Reliability:
The bidder must demonstrate a record of successful prior service. For bidders with less than one year of experience, the bidder must demonstrate the ability to perform.

Required Documentation:

1. All bidders must complete the Attachment _____ to the bid by listing all contracts exceeding (enter dollar amount for example: $25,000 in aggregate during the past three (3) years) and that the bidder is in default or has not defaulted on the contract. Bidder will not meet the standard if bidder has been determined to be in default on any public entity contract exceeding $25,000 in aggregate within the last three (3) years by a court of competent jurisdiction or recognized administrative appeal or hearings board, whether or not monetary damages were awarded. Bidder will not meet the standard if the bidder has defaulted on more than one nonpublic contract valued at more than $15,000 during the past year.
2. Bidders with more than one year of experience must supply letters of satisfactory performance for contracts completed within the last twelve (12) months that are equal to or greater in value than the bidder's price for this invitation from 50 percent of the customers of such contracts, but not more than five (5) public entity customers and not more than five (5), commercial customers. These letters must be on the public entity's or commercial customer's letterhead and signed by the contracting official or designated representative.
3. Bidders with less than one year of experience must supply letters of satisfactory performance from all public entity's customers and letters from fifty (50) percent, but no more than five (5), commercial customers. These letters must be on the public entity's or commercial customer's letterhead and signed by the contracting official or designated representative.

D. Accounting Practices:
Responsible bidder shall possess the experience and ability to perform the necessary service for a complete and workmanlike installation of foodservice equipment.

Required Documentation:

1. Identification of the personnel by name and title who is to coordinate with other trades the proper equipment installation, including years of experience, technical and manufacturer training courses and certification received within the last three years.

2. Copies of warranty service authorization on manufacturer letterhead or via manufacturer certificates. Warranty authorizations/certificates must be currently valid. Authorizations or certificates which do not identify bidder's current eligibility are not acceptable.

Bidder must include dimensioned mechanical/electrical rough-in drawing. Bidder must provide on-site demonstration of equipment operation, service, and maintenance within (insert days) after completion of installation.

15. Standard Contract Conditions

A. This contract shall be governed in all respects as to validity, construction, capacity, performance, or otherwise, by the laws of the State.
B. Contractors providing services under this Invitation to Bid herein assure the school district that they are conforming to the provisions of the Civil Rights Act of 1964, as amended.
C. State Sales and Use Tax Certificate of Exemption form will be issued upon request. Sales tax shall be included in prices where applicable.
D. Deliveries against this contract must be free of excise or transportation taxes, except when a tax is part of a price and school districts are not exempt from such levies. Excise tax exemption registration number may be used when required.
E. Contractor shall comply with applicable Federal, State, and local laws and regulations pertaining to wages, hours and conditions of employment. In connection with contractor's performance of work under this Agreement, contractor agrees not to discriminate against any employee(s) or applicant(s) for employment because of age, race, religious creed, sex, national origin or handicap.
F. Modifications, additions or changes to the terms and conditions of the Invitation to Bid may be a cause for rejection of a bid. Bidders are requested to submit all bids on the school district's official forms. Bids submitted on company forms may be rejected.
G. The contractor agrees to retain all books, records and other documents relative to this agreement for three (3) years after final payment. The district, its authorized agents, and/or State/Federal representatives shall have full access to and the right to examine any of said materials during said period.
H. By his signature on the face of this document, a bidder certified that his bid is made without prior understanding, agreement, or connection with any corporation, firm or person submitting a bid for the same materials, supplies or equipment, and is in all respects fair and without collusion or fraud. The bidder certified that he understands that collusive bidding is a violation of Federal law and can result in fines, prison sentences, civil damage awards. He further agrees to abide by all conditions of this bid and certifies that he is authorized to sign this bid for the bidder.
I. Prohibition against conflicts of interest, gratuities, and kickbacks.

"Any employee or any official of the school district, elective or appointive, who shall take, receive or offer to take or receive, either directly or indirectly, any rebate, percentage of contract, money or other things of value, as an inducement or intended inducement, in the procurement of business, or the giving of business, for, or to, or from, any person, partnership, firm or corporation, offering, bidding for, or in open market seeking to makes sales to the school district shall be deemed guilty of a felony and upon conviction, such person or persons shall be subject to punishment or a fine in accord with State and/or Federal laws."

16. Fiscal Funding: If the purchase orders for the items covered by this proposal have not been issued by June 30 of the current fiscal year, it should be understood that purchases in the next fiscal year are conditional on receipt of Federal and/or State funds. In the event of the discontinuance or a decrease in Federal and/or State funds, the Board of Trustees reserves the right to decrease the quantities and/or delete items.

III. SPECIAL INSTRUCTIONS

1. Start-Up: The bidder shall indicate in the Section IV Pricing Information Form (developed by the school nutrition district staff) the name of company, agent, address, and phone number of the party responsible for checking operation of equipment after final installation. If installation by party other than bidder, the school district shall be responsible for notifying specified agent that equipment is ready for start-up inspection. All start-up inspections should be completed within 10 working days of notification. Failure to provide this information will be considered reason for rejection of bid. A written report of results of start-up check shall be provided to the school district by agent listed in the Section IV Pricing Information Form.

2. Demonstration: All equipment with moveable parts shall be demonstrated to school district staff responsible for operation and care of equipment. Bidder shall indicate in the Section IV Pricing Information Form the name of company, agent, address, and phone number of party responsible for demonstration. If the agent is not an employee of the bidder, a letter shall be attached indicating willingness to provide demonstration. The school district shall be responsible for notifying agent that equipment has been installed and start-up check has been completed. Demonstration shall be provided within 10 working days of notification. Demonstration shall be conducted at a time agreeable to the school district at the site of actual equipment installation. Failure to provide this information will be considered reason for rejection of bid.

3. Dealer Warranty: In addition to the manufacturers' warranty the successful bidder shall guarantee for a period of one (1) year all items and equipment furnished under this bid. The warranty shall begin on the date the owner has accepted the start-up report or the owner has notified the successful bidder that start-up is complete. The conditions of the warranty shall be as follows:

A. Non-Refrigerated Equipment
   1. Start-up and calibration
   2. All parts that are integral with the equipment when purchased and all loose parts furnished with the equipment
   3. All labor and mileage
   4. If at any time during the warranty period, the equipment fails to function due to problems not related to the equipment, the dealer will charge the owner for the service call
   5. Any parts or function of the equipment that fails to perform due to misuse or abuse voids the warranty and the dealer will charge the owner; owner must perform routine cleaning procedures

B. Refrigerated Equipment
   1. All of the above, plus: five (5) year compressor warranty.

4. Factory Authorized Service Agents: The bidder shall indicate in the Section IV Pricing Information Form the name, address, and phone number of a factory authorized service agency for each item specified. The factory authorized service agency shall be located within 250 miles of installation site. Providing this information is in addition to the dealer service required in No.3 above. A written statement from the manufacturer shall be attached to the bid indicating that this agent "is authorized to service its equipment. Factory authorized service agents shall abide by the code of ethics of the Commercial Food Equipment Service Association (CFESA). Failure to provide this information will be considered reason for rejection of bid.

5. Codes: All equipment must be constructed and installed in accordance with the National Sanitation Foundation International Code. All equipment must be listed and approved, where applicable, for UL, AGA, and ASME requirements and all other requirements as specified by local building codes, plumbing codes, fire codes, and all other state and local codes. All foodservice equipment must bear the applicable seals.

6. Manuals: The Board of Trustees shall be provided three (3) copies of use/care manuals and illustrated parts list for all equipment with moveable parts. These manuals shall be provided within 10 days of installation.

7. Removal of Existing Equipment: Two options – _____ (SCHOOL DISTRICT) should indicate by an "X" the option chosen.

☐ A. Successful bidder will be responsible for disconnecting existing equipment as follows:

_____

In addition, successful bidder shall disconnect and reconnect any existing equipment which must be temporarily moved for installation of new equipment.

☐ B. Board of Trustees will be responsible for disconnection and removal of existing equipment prior to scheduled installation date for new equipment.

8. Assembly: All equipment is to be uncrated, assembled, set in place, and made ready for final connections. All debris accumulated with the delivery of equipment shall be removed. Foodservice equipment is to be cleaned and turned over in first class condition.

9. Installation: Two options – _____ (SCHOOL DISTRICT) should indicate by an "X" the option chosen.

☐ A. Bidder shall be responsible for all electrical, gas, and plumbing connections. All installations shall be completed by an appropriate professional. _____ (SCHOOL DISTRICT) will provide appropriate utilities within six feet of installation location.

☐ B. _____ (SCHOOL DISTRICT) will be responsible for all electrical, gas and plumbing connections.

10. Pre-Approved Brand: If bidder bids an "or equal" brand, proof of equality must be submitted 10 days prior to bid opening. Any and all variances in construction, design, performance, and accessories from the item specified must be submitted in writing to contact person listed in "Invitation for Bid." This information shall be submitted in addition to manufacturer's cut sheet. Failure to obtain prior approval will result in rejection of bid. Addenda shall be issued by _____ (SCHOOL DISTRICT) to all pre-qualified bidders stating specification number, item name, and alternate brand and model number approved. This addendum shall be issued five days prior to bid opening.

11. Specifications: Written description in the specification will prevail in case of conflict between written description and model number.

12. Alternate Bids: Bidders shall submit only one (1) bid per item specified.

13. On-site Visits and Field Measurements: Three options – _____ (SCHOOL DISTRICT) should indicate by an "X" the option chosen.

- ☐ A. When an on-site visit is indicated in specifications, bidder shall complete on-site visit prior to date of bid opening. Bidder shall attach to bid a signed statement from the contact person listed in "Invitation for Bid" affirming that on-site visit was complete.
- ☐ B. The successful bidder shall be responsible for taking all field dimensions which affect the equipment and installation thereof. At the time of taking field measurements, the successful bidder shall report to the contact person named in "Invitation for Bid" any conditions which will prevent him/her from the execution of his/her work as outlined in specifications and installation instructions.
- ☐ C. The school district assures the successful bidder that equipment can be delivered to installation site with no changes to existing entrances. The school district assumes full responsibility for any cost associated with removal and replacement of framing on entrances in order to deliver and set in place equipment, and the cost of additional mileage and labor as a result of failure of the Board of Trustees to meet the requirements of this paragraph.

14. Customer Fabricated Equipment: Equipment shall be fabricated by a foodservice equipment fabricator who has the plan, personnel, and engineering facilities to properly design, detail, and manufacture high quality equipment. The bidder shall, by his signature on "Invitation for Bid", indicate the equipment is to be fabricated by bidder personnel. If fabrication is to be subcontracted, bidder shall attach to bid submittal letter giving name and address of fabrication subcontractor.

Successful bidder shall submit shop drawings for custom fabricated equipment. Drawings shall be at a minimum 1/8" scale and include a plan view and front, rear, and side elevations. All drawing shall be fully dimensioned and all parts labeled as to materials and methods of construction. Shop drawings shall be approved by contact person listed on "Invitation for Bid" prior to start of fabrication.

Boilerplate

(Taken from A *Guide for Purchasing Foodservice Equipment*, NFSMI, The University of Mississippi, 1998.)

PART 1 GENERAL

1.01 Related Documents

A. Drawings, bidding requirements, contract forms and condition of the contract, including the Instructions to Bidders, General Conditions, Supplementary Conditions, and Division-01 Specification Sections, apply to work of this section.

1.02 Scope of Work

A. Provide all work as specified in this section and indicated on Contract Drawings.
B. All referenced manufacturer's requirements and specifications, and nationally recognized and accepted standards, and specifications shall be the latest addition unless specified otherwise and shall be used as they are applicable for products and craftsmanship incorporated in the Contract Drawings and this section only.

1.03 Quality Assurance

A. Quality shall mean the meticulous attention to the detail of installation and workmanship necessary for the assemblage of products in the highest grade of excellence by skilled craftsmen of the trade.
B. Equipment manufactured and fabricated shall be new, of the highest quality, perfect, and without flaws. To the extent available and practicable, standard stock models have been specified. This contractor shall provide the latest model at time of delivery.
C. All equipment shall be provided with accessories (gauges, safety valves, thermostats, etc.) as required by and installed in full compliance with the current rules and regulations of the local and state health authorities in which the project is located.
D. Utility connections have been set for the equipment indicated and specified. If manufacturers require additional or different utility services and connections, these additional or different utility service and connections shall be provided, paid for, and completely coordinated under this section.

1.04 Codes

A. All codes, regulations, interpretations, and rulings of enforcing agencies which govern any part of the work of this section shall be considered a part of the governing regulations. No extra charge will be paid for the providing of items or furnishing work which is required by the regulations even though such may not be specifically called for on the drawings or in the specifications. Should a conflict occur between these codes and equipment specified, the code takes precedence. Notification of the code variance shall be made to the architect.

1.05 Standards

A. Unless otherwise called for, comply with the following standards as applicable to the manufacturer, fabrication, and installation of the work in this section.
   1. NSFI Standards: Comply with National Sanitation Foundation International (NSFI) standards and criteria, and provide NSFI certification mark on each manufactured item and on items of custom fabricated work.

2. UL Standards: For electrical components and assemblies, provide either UL labeled products or, where no labeling service is available, "recognized markings" to indicate listing in the UL "recognized component index".
3. UL Standards: For exhaust system and fire control.
4. AGA Approval: For all gas fired equipment.
5. NFPA Standards: Comply with NFPA No. 96 for exhaust systems.
6. ASME Code: Comply with ASME Boiler Code requirements for steam generating equipment, kettles, and steamers.
7. National Electrical Code: Comply with N.E.C. for electrical wiring and devices included with foodservice equipment.
8. State and local codes and requirements.

1 .06 Related Work by Separate Contractors

A. Concrete platforms, bases, depressions, and openings in the walls.
B. All waste water, vents, gas, ducts, heating, ventilation, and air conditioning, steam, and condensate return lines, also the final connection to the foodservice equipment herein contained.
C. Conduit, wiring, breakers, and connections to the foodservice equipment herein contained.

1.07 Submittals

A. Within thirty (30) days after award of contract (before equipment is purchased) this contractor shall submit five (5) brochures of approval.
   1. One (1) piece of manufacturer's literature on each item contained in these specifications.
   2. One (1) separate type written sheet on each item containing model numbers, specifications, accessory numbers, sizes, mechanical, and electrical connections. All the items specified herein and arranged in numerical order.
   3. Provide the name and phone number of the authorized service agent for each piece of equipment.
B. In addition to brochures, this contractor SHALL also submit manufacturer's detailed shop drawings for all built-to specification equipment, (i.e., exhaust hoods, walk-ins, dishwashers, etc.).
   1. Submittal shall be a reverse reading paper sepia and two (2) sets of bluelines or five (5) sets of bluelines.
   2. Submittal shall show details of sections at minimum 1 ½" = l' -0", and plan and elevation at minimum ¾" = 1'=0".
   3. Submittal shall include complete specification of all hardware, materials, and quality of workmanship.
C. This contractor SHALL NOT redraw and submit equipment layout, mechanical, electrical, duct, depression, fabrication, or any other engineering drawings already detailed in these contract drawings in order to submit any revisions to fabrication details. Fabrication drawings shall be submitted as follows:
   1. One (1) reverse reading sepia and two (2) sets of bluelines or five (5) sets of bluelines.
   2. Each submittal using this format shall have title block, sheet numbers, logos, and dates replaced with equipment manufacturer's title block information.
   3. Revisions shall be made to these sepias with complete specifications attached for all substitutions.

1.08 Nameplates

A. Nameplates shall be provided on each "buy-out" product identifying the product manufacturer, model number, serial number, and other identifying information for use in warranties and securing replacement parts.
B. The nameplates may be on the back or bottom of small and portable equipment but on heavy, permanently installed equipment, the nameplate shall be visible without searching. Electrical equipment shall have plates giving electrical characteristics.
C. Nameplates shall fit snugly against the surface of the equipment, shall be no larger than necessary, shall be free of rough edges, and shall be attached in such a manner that it will not interfere with the sanitation of the equipment.

PART 2 - PRODUCTS

2.01 Mechanical Appurtenances Under This Section of the Specifications

A. Except as noted, otherwise specified, all faucets and hose bibbs shall be as manufacturer by the T & S Brass & Bronze Company, Fisher Faucets, or Chicago Faucets. Deck type faucets shall be model no. B-201 with lock down feature, back splash type faucets shall be model no. B-231-CC. Both faucets shall have a 12" swing spout and a model B-199 aerator. NOTE: above model numbers refer to T & S, others must match.
B. Where standard faucets are specified in this section, said faucets shall conform to paragraph A above unless otherwise noted.
C. Provide rotary handle, quick opening wastes with 4" long tailpieces and connected rear overflows on each sink compartment unless otherwise specified.
D. All equipment operation valves shall be installed at the job in an accessible location for the operator of the equipment.
E. Provide vacuum breakers with foodservice equipment where required by governing regulations, including locations where water outlets are equipped for hose attachment.
F. A shut-off valve shall be provided and installed by general contractor in the water supply connection to sinks, ice makers, and other pieces of equipment. Where two (2) or more units are connected to a single line and running to a common waste drain or floor drain, an accessible c1eanout plug at the inlet of the line and/or at each 90° turn shall be provided by the general contractor.
G. Where exposed or semi-exposed, provide bright chrome-plated brass or polished stainless steel hardware. Provide copper or brass where not exposed.
H. Pressure vessels shall be inspected by the State Boiler Inspector, and shall receive his/her approval before use. All vessels shall have a pressure relief valve, a pressure reducing valve, temperature, and pressure gauge and shall have the temperature maintained by an automatic thermostat. All steam lines shall be properly insulated to meet or exceed ASHRAE 90-80 requirements and any local code requirements.
I. Verify type, BTU/Hr, specific gravity, and pressure of gas to be used for all gas appliances.
J. Provide as part of this section of these specifications, gas pressure regulator valves and disconnect hoses for all gas operated appliances.

2.02 Electrical Appurtenances Under This Section of the Specifications

A. The contractor shall verify that the voltage on the job corresponds with the equipment drawings and specifications before ordering any electrical equipment. All equipment shall be grounded.

B. Motors 1/3 h.p. and less shall be 120/60/1, a.c.
C. Except where noted otherwise, motors ½ h.p. and over shall be wired for 208/60/3, a.c. Motors shall have thrust type bearings so motors can operate in vertical position, shall be totally enclosed, 55° rise above 40° ambient, continuous duty. Motors shall have low torque starting current characteristics, with NEMA frames.
D. Plugs for 120/60/1 shall be Hubbell, Arrowhart, or P&S safety grip type.
E. Plugs for 208/60/1 or 3 or above, shall match the receptacles specified under Division 16.
F. Receptacles for equipment specified shall be Hubbell, Arrowhart, or P&S grounding type, three pole receptacles to receive plugs called for previously. Units shall be mounted in type "FS" box enclosures with stainless steel face plates and boxes where receptacles are exposed.
G. Thermostats not otherwise specified under individual items shall be as manufactured by Fulton, Powers, or Robert Shaw and shall be provided at all bain maries, coffee urns, dishwashers, hot food tables, counters, and heated cabinets.
H. Controls, thermostats, starters, switches, and contractors furnished under this section of the specifications shall conform to the following:
    1. Units which are an integral part of equipment shall be factory installed. Units which are to be separately mounted other than on equipment structure shall be installed on the job site under Division 16 of these specifications.
    2. Starters for 120/60/1 shall be manual tumbler type, having thermal overload protection, with interchangeable heater elements.
    3. Magnetic starters for 208/60/3 shall be size 1, line voltage type with three thermal overload relays for normal operation by automatic control or 120/60/1 phase push button station. Enclosure shall have overload reset and 120 volt control circuit.
    4. All motors for remote control shall have magnetic starters regardless of horsepower or rating.
    5. Cords and plugs for portable items shall be three wire or four wire type "S" as specified, all rubber cord with one leg grounded to the framework of the equipment. All wiring in or between foodservice equipment shall be run in Sealtite conduit.
I. Lights which are integral parts of equipment such as incandescent lights under protector guards, lights under hoods, etc., shall be provided with bulbs.

2.03 Ventilation Appurtenances Under This Section of the Specifications

A. Coordinate with Division 1500. The hoods and ventilation systems and work by the fabricators of these exhaust systems shall comply with:
    1. Recommendations of the National Fire Protection Association in NFPA No. 96 "Vapor Removal From Cooking Equipment, 1984".
    2. National Sanitation Foundation International recommendations Standard No.2 for foodservice equipment.
    3. Underwriters Laboratories Standard for safety, file 192 "Grease Extractors for Exhaust Ducts UL 710, and file number E34091." Report on component industrial control equipment auxiliary devices.
    4. State and local codes and requirements.

2.04 Fabrication Standards

A. Stainless steel:
   1. Unless specified otherwise, stainless steel shall be USS (U.S. Standard) AISI type 302/304, 18-8 chromium/nickel with a maximum of .08 content of carbon; hardest workable temper, no. 4 directional polish. Stainless steel sheet shall be stretched, leveled, and cold rolled.
   2. Stainless steel tubing and pipe shall be true round unless specified otherwise, seamless, or welded to appear seamless. Welded tubing shall be properly heat treated and quenched, to prevent carbide precipitation.

B. Galvanized steel:
   1. Sheet: ASTM A 526, except ASTM A 527 for extensive forming: ASTM A 525, G90 zinc coating, chemical treatment.
   2. Pipe: ASTM A 53 or ASTM A 120, welded or seamless.
   3. Structural members: ASTM A 124 hot-dipped zinc coating, applied after fabrication.
   4. Where painted finish is indicated, provide mill phosphatized treatment in lieu of chemical treatment.

C. Steel:
   1. Sheet: ASTM A 569 hot rolled carbon steel.
   2. Structural members: hot rolled or cold formed carbon steel.

D. Aluminum:
   1. Sheeting, plating, and extrusions, as indicated, ASTM B 209/B 221; alloy, temper and finish as determined by manufacturer/ fabricator, except 0.40 mil natural anodized finish on exposed work unless another finish is indicated or specified.

E. Sound Deadening:
   1. Underside of metal work surfaces, including tables, drainboards, countertops, sink, and similar units shall have a coating of sound deadening material comprising of a heavy bodied resinous coating filled with granulated cork or other resilient product and compounded for permanent, non-flaking adhesion to metal in a thick coating. The coating shall end 3" from edges which are open for cleaning. Finish with aluminum lacquer.

F. Jointing Products:
   1. Gasket: solid or hollow, but not cellular neoprene or polyvinyl chloride; light gray, minimum of 4 Shore A hardness, self adhesive or prepared for either adhesive application or mechanical anchorage.
   2. Sealant: One part or two part, polyurethane or silicone based, liquid elastomeric sealant, non-solvent release type, mildew resistant, Shore A hardness or 30, except 45 if subject to traffic.

G. Paint and Coatings:
   1. Provide the types of painting and coating materials which, after drying or curing, are suitable for use in conjunction with foodservice, and which are durable, non-toxic, non-dusting, non-flaking, heat resistant, mildew resistant, and comply with governing regulations for foodservice.
   2. Pre-treatment: SSPC-PT2 or PT2, or Federal Specifications TT-C-490 as is best suited for the metal being treated and the paint or coating to be applied.
   3. Primer: Shall be the best suited for the metal to be primed and the paint or coating to be applied and shall be suitable for baking.

H. Field joints shall be located for practical construction and consistent with sizes convenient for shipping and accessibility into the building. All field joints in top shall be carefully sheared with sharp edges removed so they can be tightly butted and drawn together to leave a hairline joint. They shall be constructed as follows:
   1. Two (2) channels shall be welded to the underside of the top of the same material and gauge as called for in top specifications. Channels are 1½" x l" x 1½". One shall set back from the edge; the other shall extend beyond the edge to form a flat surface for aligning the meeting piece.
   2. The underside of the top that overlaps the one (1) channel shall be provided with stud bolts on 2½" centers, and the top surface of the channel shall be perforated to receive same.
   3. The abutting vertical members of the channels shall be perforated and provided with 5/16" bolts on 4" centers. When the bolts in the channel and the studs are drawn tightly, both vertical and horizontal tension shall be provided to hold the top secure and level.
   4. Joints shall be welded, ground smooth, and polished.
   5. A die-formed end capping of the same material as the table top shall be applied to the exterior of the turned up edge on dish tables, sink drainboards, or other fixtures with raised rims to conceal the ends of the channels.

I. Where plumbing is required to pass through an enclosed base of a table or counter, such piping shall be enclosed in a suitable pipe chase with easily removable access panels. These access panels shall be slightly recessed and removable without tools.

J. Where plumbing and supply piping pass through shelves on open base tables, the pipe chases and shelves shall be neatly punched, die-stamped to include knockouts elevated around opening. Flange up for knockouts shall be ½" minimum.

K. Provide all scribe and filler strips, etc. for items recessed or furred. Provide and install escutcheons or panels to completely seal around all openings where pipe, ductwork, or conduit penetrate walls or bottoms of equipment units.

L. Pipe legs supporting equipment, tops, and sinks shall be constructed of 1 5/8" O.D., 16 gauge seamless stainless steel tubing. Furnish each leg with a stainless steel fully enclosed round gusset and an adjustable stainless steel bullet type foot (adjustment being internal). Furnish crossrails between all pipe legs. Cross rails shall be 1 5/8" O.D. of same material as pipe legs and welded to the legs.

M. Tops of work surfaces shall be of 14 gauge stainless steel with a 2" turndown on all exposed sides. Where the top is adjacent to a wall or high adjoining equipment, it shall have a turnup on a ¾" radius of 8 ¾", a 1¼" turn back on 45 degree angle, a 1" horizontal turn back and a ½" turndown toward the floor. Close all ends of backsplashes. Tops shall be constructed as follows:
   1. Fabricate metal work surfaces by forming and welding to provide seamless construction, using welding rods, matching sheet metal, grinding and polishing.
   2. In forming the sheeting, remove burrs from sheared edges of metal work, ease the corners, and smooth to eliminate cutting hazard. Bend sheets of metal at not less than the minimum radius required to avoid grain separation in the metal. Maintain flat, smooth surfaces without damage to finish.
   3. Welds shall be strong, ductile, with excess metal ground off and finished smooth, and polished to match adjacent surface. Welds shall be free of imperfections such as pits, runs, splatters, cracks, etc., and shall have the same color as adjacent sheet surfaces.

4. Field joints may be provided in the top only where necessary and these shall be constructed as hereinbefore specified.

N. Reinforce work surfaces 30" o.c. maximum, both ways with galvanized or stainless steel concealed structural members. Reinforce edges which are not self-reinforced by formed edges. Reinforce metal at locations of hardware, anchorages, cutouts, and accessory attachments, wherever metal is less than 14 gauge or requires mortised application. Conceal reinforcements to the greatest extent possible.

O. Where fasteners are permitted, provide Phillips head, flat, or oval head machine screws. Cap threads with acorn nuts unless fully concealed in unaccessible construction; and provide nuts and lockwashers unless metal for tapping is at least 12 gauge. Match fastener head finish with finish of metal fastened.

P. Where components of fabricated metal work are indicated to be galvanized, and involved welding or machining of metal heavier than 16 gauge, complete the fabrication and provide hot-dip galvanizing of each component after fabrication. Comply with ASTM A123.

Q. Sink Construction:

1. Sinks shall be of 14 gauge stainless steel, all welded construction, with a formed continuous top edge. Drainboards shall be built as an integral part of the sink and have the same top edge and backsplash. Repolish all backsplashes and top to have grain running in the same direction.
2. Where adjacent to a wall, the rear of the sink shall be provided with a backsplash identical to that specified under Paragraph M above.
3. Except where otherwise noted, each sink shall be fitted with a 2" rotary type waste with a chrome plated strainer and a connected rear overflow.
4. Where sinks are set side by side, the cross partitions shall be double wall with air space between them. All interior corners, including the partitions, shall be coved on a minimum of 5/8" radius. Multiple sinks shall be provided with continuous seamless front.
5. Faucets shall be furnished for each sink compartment unless specified differently at multiple sink compartments.

R. Drawer Standards:

1. All drawers shall have a removable drawer pan stamped in one (1) piece with all corners coved. The drawer pans shall be a minimum of 20" x 20" x 5" deep and be constructed of 20 gauge stainless steel.
2. All drawers shall be enclosed on both sides, rear, and bottom with 18 gauge stainless steel, and welded to form one (1) piece vermin proof unit.
3. Provide a double pan, 16 gauge stainless steel drawer face with integral pull for each drawer.
4. When drawers are in a tier of three (3), the bottom drawer shall occupy the balance of the available height with the upper drawers both being 5" deep.
5. All drawers shall be self closing and operate on sanitary antifriction type steel runners with nylon ball bearing rollers.
6. Provide all drawers with padlock hasps as shown on drawings. Padlocks shall be furnished by owner.

S. Cabinet Standards:
   1. Fixtures with enclosed cabinet type bodies shall be constructed of 18 gauge stainless steel. Interior walls shall be of 18 gauge stainless steel. Vertical style channels shall be welded. Access panels shall be lift out type, giving access to chase ways and shall be of minimum 18 gauge stainless steel.
   2. All shelving inside equipment shall be of minimum 18 gauge stainless steel. In specifying number of shelves, the bottom shall be considered as one. All bottom shelves extend forward, turndown flush with the front facing of the cabinet. All interior shelves shall have a 1 ½" turnup at rear and ends with edges beveled and made to hug the interior of the cabinet body. All welding shall be ground smooth and polished.
   3. All sliding doors shall be full height, formed pan shaped with flush facing front and back, braced internally to prevent twisting and shall have sound proofing material internally applied. Exterior faces of door shall be of 18 gauge stainless steel and interior faces of door shall be of 20 gauge stainless steel. Doors to operate on nylon or stainless steel ball bearing rollers running in concealed overhead tracks and having concealed stainless steel guide pins in the sill at the bottom. Doors shall lift out and have a drop at the end of the closing run to hold them closed.
   4. Hinged doors shall be double pan construction. Exterior shall be of 16 gauge stainless steel and interior of 18 gauge stainless steel. Doors shall be flush mounted without overlap. One side of the door shall have a ¼" diameter pin at the top and bottom with nylon bushing to fit into the cabinet body and pivot the door. Provide door with a recessed pull on the exterior and a friction catch on the interior. Door shall have sound deafening material applied to the interior.

T. Abutting joint between equipment items and between items of equipment and wall where less than 3/8" shall be sealed with silicone sealant. Where greater than 3/8", joints shall be filled with stainless steel trim strips.

U. Electrical outlets into items shall be furnished as complete assembly of box, block, plate, and be ready for wiring. Plates shall be stainless steel. Provide a chase way for the conduit and wiring in cabinet base fixtures.

V. Where threads of bolts and screws on the inside of fixtures come in contact with wiping cloth, they shall be capped with a lock washer and acorn nut. Wherever bolts are welded to the underside of trim or tops, the reverse side of the welds shall be polished. Depressions at these points will not be acceptable.

W. Each piece of equipment shall bear a name plate which shall be fastened to the equipment. Each piece of electrical equipment shall bear a plate showing complete electrical characteristics which shall comply in all particulars with the current available at the building.

X. On the tables not adjacent to wall with electric or plumbing connections necessary for operation, provide two (2) flange type feet and bolt to the floor with non-rusting screws and floor anchors.

2.05 Walk-in Refrigerator and Freezer Standards

A. All interior and exterior surfaces, except the floor and ceiling, shall be of .042" thick stucco embossed aluminum unless otherwise specified. All interior ceilings shall be mill baked white polyester finish on galvanized steel.

B. Walls, floors, and ceiling shall be 4" thick unless specified otherwise and insulated with urethane insulation having a "K" factor of 0.13 and capable of holding temperature as low as minus 40 degrees at a 4" wall thickness.

C. Doors:

1. Doors shall have a clear door opening of 34" x 78" high. Doors shall be located in 46" or 69" wide panels. Doors shall be constructed of stainless steel on interior and exterior with tempered glass observation window in coolers to meet or exceed OSHA requirements.
2. Doors shall be offset type having two (2) heavy duty hinges, pull handle, a cylinder lock, a door closer, and safety handle on the interior. All hardware shall have a satin aluminum finish or chrome plated.
    a. Provide on the sides and top, a thermal plastic gasket easily removable. At the bottom edge of the door, furnish an adjustable rubber wiper gasket. Gasket shall be resistant to oil, fats, water, and sunlight.
    b. Doors shall be insulated with 4" of urethane as specified for the walls.
    c. Construction of the door panels shall be identical to that of the walls, and shall include a heavy U-channel type reinforced steel frame around the entire perimeter of the door opening to prevent rocking and twisting. Furnish installed in the frame, an antisweat heater wire, completely encircling the door opening.
    d. Doors to have 3/16" aluminum diamond tread plate on each side, to be 36" high off of floor.
    e. Aisles to have non-skid strips.
3. Adjacent to the opening side of door, approximately 5'-0" above the floor, furnish a heavy duty chrome plated, 5" diameter dial thermometer or a digital readout minimum ½" high. Thermometer shall be flush with the wall and have a recalibration feature.
4. Adjacent to the thermometer, mount a light switch with bull's eye. Switch shall be prewired to lights mounted in the ceiling of the walk-in and to the "J" box on top of the walk-in. Lights shall be wire protected, vapor proof, globe type with 150 watt bulbs. Lighting within walk-ins shall be a minimum of 25 foot candles on an even and equal basis.
5. In the ceiling of each walk-in freezer, furnish an air vent release.
6. Each section of the walls, ceiling, and floor shall have a tongue and groove, urethane edge. Panels shall be joined together by Rotoloc joint fasteners built into the edges of the box. Install on both sides of the tongue, a twin pressure sensitive gasket. Fasteners shall operate by means of a hex wrench. Provide a full compliment of snap in covers for lock holes.

H. All interior corners shall be coved.

2.06 Errors and Omissions

A. It shall be the responsibility of the foodservice equipment bidders to inform the architect of any discrepancies found within these documents to include: written specifications, drawings, or schedules, to allow an opportunity for the consultant to prepare an addendum to correct such discrepancies. Bidding on a known discrepancy with the intention of equipment substitution or price gouging through change orders will not be tolerated.

B. Written itemized specifications shall take precedence.

Sample Fabricated Equipment Specification

ITEM NO. XX - POT WASHING SINK: 1 REQUIRED

a. Fabricate and furnish one ea. pot sink with two drain boards. Requires ½" CW, ½" HW, 2" waste. Bowls to be 26 ½" x 24" x 14" deep. Overall size and shape as shown on plan.

b. Sink constructed entirely of 14 gauge type 18-8 stainless steel with all vertical corners coved on a ¼" radius. The front, bottom, and back to be formed of one sheet with front and back having a ¾" roll. Partitions to be double wall and fully welded in place. Splash to be 8" high with 2 ½" return (10 ½" overall). Ends closed and welded. 1" diameter holes punched in splash for faucet. Two (2) ea. faucets to be Fisher, model no. 3253, heavy duty splash type with 12" swing spout. Supply three each lever handle waste, 2" brass with removable strainer, and rear connected overflow. Each compartment to have die-stamped star in sink bottom for drainage. Sink to be mounted on 1 5/8" O.D. 16 gauge stainless steel legs attached to fully enclosed stainless steel gussets welded to bottom of sink. Each leg to have an adjustable stainless steel bullet foot. To be 14" depth at partitions. Drainboards to be same material and finish as sink with back splash a continuation of sink splash. Front and end rims to be approximately 3" high terminating in a 180° roll on a ¾" radius. The drainboard is to be constructed with a pitch to drain into the sink. Back splash and front rim are not to be pitched, but to continue level. Drainboards to be supported on 1 5/8" O.D. 16 gauge stainless steel legs attached to fully enclosed stainless steel gussets welded to stainless steel channel reinforcing on underside of drainboard. Each leg to have an adjustable stainless steel bullet foot.

c. Splash mounted pot rack to be constructed of 2" x ¼" thick stainless steel flat bar fully welded to 1 5/8" O.D. 16 gauge stainless steel legs, extended thru splash, and secured to sink frame. Unit to be supplied complete with double pointed, sliding pot hooks at 6" on center.

d. Refer to fabrication drawings for details.

CHAPTER EIGHT

Finishing the Equipment Purchasing Process: The Bid Process, Receiving and Installing Equipment, and Training School Nutrition Assistants

CHAPTER HIGHLIGHTS

Introduction

- Follow-through is critical for bidding, receiving, installing, and training

Solicitation of Bids

- The bid process is used to acquire bids from foodservice equipment providers
- The ultimate goal is to ensure open and free competition
- To solicit sealed bids, a public notice of the intended purchase should be posted on bulletin boards at the administrative offices of the school food authority and advertised in the newspaper
- Next, potential bids are provided with and invitation-for-bid (IFB) package

Receiving and Opening Bids

- Bidders provide a written sealed bid
- When bids are received, each one must be:
  - Time-stamped and dated
  - Deposited in a secure area until the designated opening time
- At the designated time, each bid is opened publicly and recorded in the presence of interested parties
- A system of documenting the procurement process should also be established using a standard form to maintain consistency and ease of record keeping

Evaluating the Bids

- The school nutrition director, as the *Trusted Advisor*, values the thorough and objective evaluation of bids
- Each bid must be evaluated using the criteria established in the IFB
- Federal regulations require that the award be made to the lowest price responsible bidder whose bid conforms to the bid document
- Bid review should include price review and an evaluation of bidder responsiveness and responsibility

Placing Orders

- Bid awards must follow contract type described in the IFB
- In larger school districts, purchase orders may be written by a purchasing department, in small schools the school nutrition program directors may be assigned this responsibility

Receiving

- Site preparation will vary according to the type of equipment
- Essentials for receiving include:
  - Competent personnel
  - Tools for checking in equipment

CHAPTER HIGHLIGHTS *(continued)*

  - Tools for uncrating the equipment
  - Communication relating specification and purchase order to delivery
  - Feedback systems for appropriate follow-up
- Equipment must be inspected immediately for damage, first to the crate and then to the equipment itself
- If there are any discrepancies, it should be noted on the freight bill before the carrier leaves
- Crates should be kept in useable condition and not thrown out immediately in case equipment must be returned to the manufacturer
- Manufacturer's data plates should also be checked to make certain that the correct equipment was received

Installation

- Installation is a warranty concern
- Problems resulting from improper installation are not a valid warranty claim

Start-Up

- Start-up service includes on-site inspection to verify correct installation, operation, and any needed re-calibration
- Warranty cards should be returned to the manufacturer
- Final inspections and permits should be obtained from local regulatory agencies

Training

- Use and care demonstrations should include:
  - How to operate equipment safely
  - Use and care manual information
  - Daily care/preventative maintenance
  - Tips on the use and care of the equipment
  - Hands-on training
- Each school nutrition assistant needs to demonstrate competence in the proper use and care of the equipment
- Multiple copies of the use and care manuals should be available

Finishing the Equipment Purchasing Process: The Bid Process, Receiving and Installing Equipment, and Training School Nutrition Assistants

Introduction

Once the bid document has been completed, as described in the previous chapter, the next steps are to solicit bids, receive and evaluate bids, write the purchase orders, and prepare to receive and install equipment. All the hard work of the first part of this process finally becomes the vision that the school nutrition director, as the *Trusted Advisor*, planned for the school nutrition program. These final steps represent the completion of the procurement process and the last major step before the new kitchen or new pieces of equipment are ready to use. Although this part of the process is generally considered to be the most rewarding, much additional work is still needed for this final part of the procurement process.

The key word for this part of the process is follow-through. Once decisions are made of what bid or bids to accept, it is important to thoroughly and accurately complete the receiving and installation steps. Many of the important decisions have already been made, but making certain that all parts of the specification are met and that installation is done correctly is an important responsibility. Follow-through on this responsibility ensures that minimal problems occur with equipment once the equipment is put into use. Even more importantly, however, follow-through ensures that the vision of the school nutrition director, as the *Trusted Advisor*, becomes a reality.

Solicitation of Bids

Solicitation of bids is the process used to acquire bids from foodservice equipment provider. The ultimate goal of the bid process is to ensure open and free competition among a sufficient number of companies so that the bid may be awarded to a company with the desired lowest bid price.

Federal regulations govern the bid process for school nutrition programs because they receive federal funds to operate. Penalties do exist for noncompliance. Regulations are generally available on the USDA or state agency websites. School nutrition directors should check local, state, and federal procurement policies and regulations before soliciting of a bid. It is their responsibility to make sure that all regulations and laws are followed during the bid process. In addition, each school district must follow its state and local procurement plans if they are more restrictive than the federal requirements.

To solicit sealed bids, a public notice of the intended purchase should be posted on bulletin boards at the administrative offices of the school food authority and advertised in the newspaper. Additional state regulations may exist regarding advertising related to its schedule, posting locations, and other specifics viewed as necessary. Public notice should include the following:

- Name of the school district
- Brief description of the equipment
- Date and time of bid opening
- Name of contact person
- Where bid documents can be obtained
- Legal authority

Next, potential bidders should be provided with an invitation-for-bid (IFB) package. The IFB package (as discussed in the last chapter) is a complete set of instructions that should include:

- Detailed product information including specifications and quantity required
- General terms and conditions for doing business with the school district
- Special terms and conditions
- Bonding requirements and bid sureties in fulfillment of required state and local regulations
- Pre-bid conference
- Basis for contract award
- Explanation of how bidders can demonstrate compliance with bid requirements
- Service and warranty provisions
- Delivery and installation instructions
- Cost provisions
- Non-collusion, anti-conflict of interest statement
- Envelope to be used for submission of the sealed bid
- Time and place for formal public opening and recording of bids
- Certification regarding suspension, debarment and voluntary exclusion

Receiving and Opening Bids

Competitive submission of a bid requires the bidder to provide a written sealed bid to the person and location identified. Written terms and pricing are required to ensure both parties understand each other's expectations. It is also recommended that bidders using small purchase procedures provide a written quote to the potential purchaser.

Documentation of the procurement process is particularly important during the receipt of bids. Permanent documentation files should be kept for all equipment purchases. A standard form is typically used to maintain consistency and ease of record keeping. For example, the documentation for small purchases should include the following information for each bid submitted:

- Name of the dealer quoting the price
- Name of the individual quoting the price
- The manufacturer and model number of the equipment offered
- The unit price
- The payment terms
- The expected delivery date
- Duration of the quote

When bids are received, each one must be time-stamped and dated upon receipt. Bids are then deposited in a secure box, safe, or file until the designated opening time. Unsealed bids or bids received after the designated time and date of bid opening are not accepted.

Each bid is opened publicly and recorded in the presence of interested parties. The following information is read aloud for each bid:

- Name of bidder
- Price
- Equipment offered
- Payment terms
- FOB point
- Delivery date

Evaluating the Bids

The school nutrition director, as the *Trusted Advisor*, values the thorough review of bids in this next step of the procurement process. Without an objective review process, comparing bids would be like comparing "apples to oranges". A thorough review process ensures that bids are evaluated equitably and that the most advantageous bid is selected. In other words, bids are compared "apples to apples".

After opening all bids, each bid is evaluated using the criteria established in the IFB. Federal regulations require that the award be made to the lowest price responsible bidder whose bid conforms to the bid document. Part of the authority and obligation of the school nutrition director is to make certain that the process is properly followed by bidders. Part of this obligation requires that bids be rejected that:

- Do not meet IFB requirements
- Are submitted unsealed in sealed bid situations
- Are for items of equipment that do not meet IFB specifications
- Change the terms and conditions of the IFB specifications
- Change the terms and conditions of the IFB
- Are from bidders that are not responsible bidders

Another part of the review process is to make certain that all equipment bids meet the minimum equipment criteria set up in the specifications. This is essential because equipment offered in the bids may appear to differ slightly with each manufacturer and it is important to keep the focus on meeting the criteria set up in the specifications.

After this has been done, bids may then be evaluated for price and other characteristics related to bidder responsiveness and responsibility. This part of the evaluation is done in two phases.

Phase 1 - Determination of the Lowest Bidder's Price

To establish the true lowest bidder's price, the following steps should be followed:

- Compare prices
- Check for clerical errors
- Calculate prompt-payment discount offers, if applicable
- Determine any additional shipping costs
- Calculate the lowest net cost and verify tax exemption

Phase 2 - Determination of the Lowest Bidder's Responsiveness and Responsibility

The next step is to determine if the bidder responded to all of the material terms and conditions of the Invitation for Bid (IFB). This is known as bidder responsiveness. A bidder who has not demonstrated responsibility in the past should not be considered for future contracts. The school nutrition director should consider:

- Bidder integrity
- Compliance with public policy
- Record of past performance
- Financial and technical resources

Bidder responsibility is a serious consideration in acceptance of bids. The IFB should describe the minimum standards expected of a responsible bidder in measurable terms. The measurement of the standards must be Pass/Fail and not provide for negotiation or evaluation. Any deviation from the IFB indicates a non-responsive bidder and the bid may not be considered for the award. Examples of unresponsive bidders include situations where the:

- Delivery schedules vary from the bid requirements
- Bidder makes the school district responsible for determining that alternates conform to the specifications
- Bidder fails to furnish bid bonding requirements and bid sureties
- Bidder fails to complete required certification or the Attachment to the Bid

Placing Orders

Before placing an order, revisit the IFB and contract type. Examples of different contract types include line item award and bottom line award. A line item award would involve the splitting of the award among multiple bidders who each may have the lowest price for a particular piece of equipment. A bottom line award allows the complete contract to go to a single bidder in what might also be viewed as an aggregate awarding of all equipment purchases to one bidder. This decision is made known to all bidders in the IFB.

Finally, the purchase order is placed. In school districts that oversee a sizable procurement plan, there is likely to be a purchasing department which administers purchase orders, contracts, and other purchasing functions. For smaller school districts, the school nutrition director is generally responsible for these functions within the school nutrition program operations. Therefore, a general knowledge of the legal aspects of purchasing is essential. The legal staff of the school system is a valuable resource on legal matters related to procurement procedures. Additional responsibilities for school nutrition directors with direct authority for purchase orders, contracts, or other purchasing functions include:

- Demonstrating compliance with federal, state, and local regulations in the purchasing of school nutrition program equipment
- Being informed about community and political issues. For example, a proposed or current bond may provide funds directly realized by the school nutrition program
- Being fiscally responsible. It is important to provide for ongoing school nutrition program needs within the budget before tapping into additional funds for equipment purchases
- Obtaining approval from the state agency to use nonprofit school nutrition program funds to acquire equipment costing more than a state-determined level

- Completing a cost analysis of the bids received using the same set of specifications and conditions included in the IFB
- Ensuring that the school district maintains records that detail the significant aspects of their purchases. Record keeping required for purchases with nonprofit school nutrition program funds includes:
  - Documents issued to solicit price bids
  - Public announcement soliciting bidders
  - Responses from vendors
  - Cost analysis
  - Signed award documents

Receiving

Preparing the Site

Site preparation for installation of the equipment is a critical step. Ideally this process will be completed and all regulatory inspections passed prior to the receipt of the equipment. Site preparation will vary according to the type of equipment. For example, walk-in refrigerators and freezers have to be constructed and cooking equipment may require hoods to be hung while other pieces of equipment are simply set in place. Each piece of equipment has unique requirements for clearances and utility connections.

Making simple mistakes or overlooking details can negatively impact the efficiency and usability of the equipment. Close attention should be paid to the details of installation to achieve maximum usability of the equipment selected.

One key consideration is the security of the equipment upon arrival. Security is an even greater concern for equipment that is easily moved. One security plan would be to have small pieces of equipment delivered last in new construction.

Additional questions that should have already been answered before receiving equipment include:

- Is there a receiving dock, and if so, will equipment need to be carried up steps into the school
- Does the delivery truck need a gate lift
- Are dollies or hand trucks required
- What is the size and weight of the crate
- What is the height and width measurement of doorways
- Will the new equipment fit through the door/doors
- What is the width of the aisle space in the kitchen
- Will tables and other pieces of equipment need to be moved temporarily
- Has a utility requirement been provided
- Have exhaust requirements been met
- Does water need to be filtered
- Are all permits secured
- Has the installer been notified
- Are all the utilities available that are needed

Receiving the Equipment When It Arrives

Receiving initiates the beginning of the end or the completion phase of the procurement process. This is when the accuracy and completeness of the specifications is ascertained. In schools where the school nutrition director does both purchasing and receiving, the receiving process is simpler than in larger districts where duties are divided by the different roles of responsibility. Communication breakdown can more easily occur when these functions are separated.

The receiving process, is in part, a quality assurance step which will help determine the accuracy and completeness of the specifications. Proper follow-through in receiving ensures that the correct equipment is received. The following questions regarding the receiving process should already have been determined:

- Where will the equipment be shipped to
- Who will deliver the equipment
- Who will unload the equipment
- Who will uncrate the equipment and set it in place
- Who will be responsible for discarding the packing materials left when the equipment was uncrated
- Where will specification information be made available for use when receiving the equipment
- Who will have the responsibility for checking the equipment against the specifications to verify the accuracy of the delivered equipment
- Who will be responsible for confirming that the equipment received is not damaged
- What is the system for reporting equipment receiving problems, if they should occur

Each school district should have a system for communicating the brand and code numbers of products approved during bid or price quote awards and a method for communicating delivery problems when the wrong piece of equipment is received or there is damage. Plans should be made in advance for what to do if there are unexpected delays or damage. It is also important to know a source for replacement parts or total replacement of the equipment, if this is needed.

A well-designed receiving process is important for quality control. Essentials for receiving include:

- Competent and well trained personnel in the receipt of foodservice equipment
- Tools such as a clipboard, small desk, rolling cart, or computer are needed for checking in or receiving the foodservice equipment
- Personnel and resources needed for uncrating the equipment, if applicable
- Communication relating specification and purchase order to delivery
- Feedback systems for appropriate follow-up
- Preparation of the site for installation

During receiving, set procedures must be followed regardless of who is assigned to receive the equipment upon delivery. The foodservice equipment dealer, the school district warehouse personnel, and school personnel must understand and follow the set procedures in order to avoid problems documenting damage, shortage, or warranty claims. In general, receiving personnel will require training in the following areas:

- Inspecting the crates and/or packaging for shipping damage
  - Water, oil, or other stains on the packaging
  - Crushed or dented packaging
  - Packaging which has been taped shut or resealed to cover up damage
- Inspecting the equipment because even if the crate appears in excellent condition, the equipment may still be damaged
- Equipment should be inspected for
  - Dents
  - Scratches
  - Broken or missing pieces
- Reading the package label to determine how accurately the specification and the purchase order were met
  - Purchase order information may include the model number for the specific equipment item
  - The model number is assigned by the manufacturer for a specific equipment item
  - The manufacturer controls model number assignments
  - The model number is the means of identifying the equipment item that was approved under the bid or price quote
- Following district clerical procedures
- Reporting equipment problems

In some cases, school nutrition program equipment is shipped FOB Destination; Freight Prepaid. This means the manufacturer handles claims for damage or shortage. However, any damage or shortage must be noted on the freight bill to initiate the process and to expedite the claim. On occasion, damage occurs during shipping and handling. Inspections should be done immediately at the time of delivery because there are time limitations for filing freight claims. Any discrepancies, such as for damage or shortage, should be noted on the freight bill before the carrier leaves the premises.

Finally, consideration should be given in advance to the impact potential problems may have on the school nutrition program. The receiving process can be smooth or difficult. Even with the best plans, things can go wrong. The school nutrition director, as the *Trusted Advisor*, should make sure there is a plan for unexpected delays. Some of the questions that should have been considered are:

- Who will contact the bidder for further information about delayed equipment deliveries
- If construction delays occur, will equipment need to be stored in a secure area before being installed or will the bidder store until the facility is ready for the equipment delivery
- How will delays affect equipment warranties
- Who pays for costs incurred as a result of either construction or equipment delays
- How will the school nutrition program function if there is a delay

Uncrating the Equipment

Part of receiving equipment as it arrives is uncrating the equipment. The process is actually more challenging than it sounds because crates are generally made from heavily reinforced cardboard or wood. In addition, the crates should be kept in useable condition and not thrown out immediately. Crates might be needed to return any equipment sent in error. If the crate/packing is

thrown away and the equipment needs to be returned to the manufacturer, a new crate may have to be requested from the manufacturer. This will be the task of the responsible party. If the school district is the responsible party, it is recommended that a quick and efficient receiving process occur to prevent problems in discarding the crates/packing.

Once the equipment is carefully uncrated, the manufacturer's data plate is checked to be sure this is the piece of equipment described on the bid document. The data plate may be located almost anywhere on the equipment, as there is no set place for the data plate. The data plate will indicate the following information:

- Manufacturer
- Model number
- Electrical specifications (voltage, cycle, phase)
- Gas specifications (BTU, gas type)
- Steam specifications

If the data plate does not exactly match the specifications, it will probably need to be returned. The equipment dealer or manufacturer's representative should be contacted immediately.

Installation

Once the site has been prepared as specified and the equipment has been received, installation can be scheduled. Specifications should have already determined who is responsible for making the final utility connections and when this will be done. Proper installation is essential for equipment to operate effectively and efficiently. Over 80% of early warranty claims to manufacturers are the direct result of poor installation and environmental problems. This is why the manufacturer provides detailed installation procedures and requirements for site preparation. In fact, proper installation is so important that it is generally recommended that installers visit the site before the actual installation to determine the distance between the equipment and the utility connections, and the wiring, piping, and conduit materials required for the job.

In addition, certain types of equipment have specific instructions regarding clearances. The clearances are determined for operating and maintenance purposes and should be followed. For example, most steam equipment requires air gap drain connections. Manufacturers recommend placement and length of drain pipes to drains. If these instructions are not followed, the equipment can be expected to not function properly.

An additional concern for installation is related to the warranty. Problems resulting from improper installation are not considered a valid warranty claim. A bad installation can destroy a piece of school nutrition program equipment in minutes.

Finally, it is recommended that after installation the school nutrition director or designee needs to tag equipment to its specific location, log in the model, and serial number. The school nutrition director should also retain shop drawings on special order items.

Start-Up

Once all aspects of installation have been completed according to the manufacturer's instructions and the proper power has been connected, the start-up can be arranged. Start-up may be the

responsibility of the installer. Many manufacturers also provide start-up service by the authorized service agency. The person or party that is responsible for start-up should also have been given a copy of the specification. The start-up includes:

- On-site inspection to verify the equipment was installed according to manufacturer's instructions
- On-site inspection to verify the equipment is operating properly
- Re-calibration (if needed) as it may have slipped during shipping and handling (not a warranty item)

After the start-up has been completed, all warranty cards should be returned to the manufacturer. Final inspections should be requested and needed permits acquired at this time with local regulatory agencies.

Training

Use and Care Demonstrations

The final phase of the receiving process is to arrange for a use and care demonstration from the manufacturer's representative. The demonstration should include:

- How to operate the equipment safely
- Introduction to the use and care manuals
- Instructions on daily care and preventative maintenance
- Helpful tips on the use and care that are not in the manual
- Hands-on operation for each participant

The person doing the use and care demonstration should be a qualified trainer representing the manufacturer. The demonstration should not be scheduled until the equipment has been certified for proper connection and start-up is complete. At that time, it is essential that all necessary school nutrition staff as well as all district maintenance staff attend the demonstration. The demonstration may also be video-taped/DVD for use in follow-up training or a training video/DVD provided at the time of training.

School Nutrition Assistant/Technician Competency

Finally, the installation job is not complete until the school nutrition assistants/technicians cook the first meal with the new piece of equipment. To assist with this process, reviewing the use and care videos or DVDs may be helpful. Each staff member needs to demonstrate competence in the proper use and care of the equipment to the school nutrition director. Competency assessment is essential to verify that the school nutrition assistant can operate the equipment properly. One example of a competency assessment checklist is shown below. All school nutrition assistants need to sign the use and care manuals or equivalent document to verify their attendance at the demonstration and document their attendance for liability purposes.

Competency Assessment Checklist

Equipment _____ School nutrition assistant _____

Competency	Date of Initial Training	Date of Competency Verification	Date of Annual Competency Verification
School nutrition assistant demonstrates the correct use of equipment according to the manufacturer's use and care manual.			
School nutrition assistant demonstrates correct safety procedures in the use of equipment.			
School nutrition assistant demonstrates the proper techniques for cleaning and sanitizing equipment as described in the use and care manual.			
School nutrition assistant demonstrates proper preventative maintenance recommended for optimal care of the equipment.			

Comments:

Evaluator: _____
Date: _____

Manuals

Multiple copies of the use and care manuals should be requested in the bid document. One set is for the school nutrition director, one set is for the maintenance department, and the other copies need to be filed for future construction projects. In addition, many manufacturers now make these manuals available on-line. It is important however, to make certain that a paper copy is retained for easy access to the needed information.

SUMMARY

Soliciting bids, evaluating the bids once they are received, and writing purchase orders are important steps in purchasing the equipment that the school nutrition program needs. Receiving initiates the beginning of the end of the procurement process. This is when the accuracy and completeness of the specifications become evident. To determine if damage has occurred during shipping, the equipment should be inspected immediately upon delivery. First the crate is inspected and then the equipment. Finally, to make certain that the correct equipment has been received, the manufacturers' data plates should be checked.

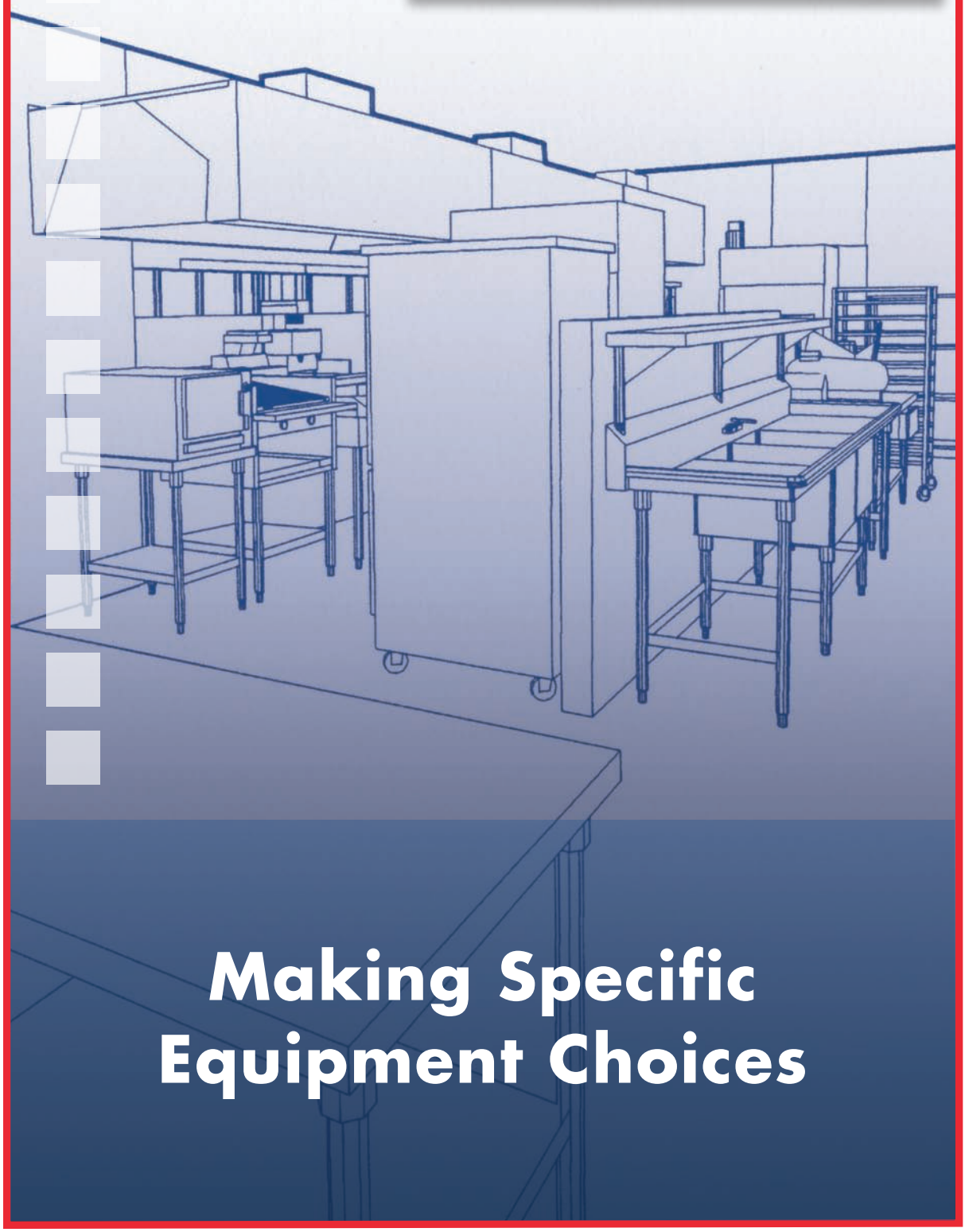
The first step in installation is preparing the site. Preparing the site should not be a problem if the answers to key installation questions have already been answered. An additional concern at this time should also be security for the new equipment to minimize problems with theft or vandalism.

Proper installation is essential as the majority of early warranty claims are the result of poor installation or environmental problems. Once all aspects of installation have been completed according to the manufacturer's instructions and the proper power has been connected, the start-up can be arranged, warranty cards should be returned to the manufacturer and final inspections/ permits should be obtained.

Use and care demonstrations are an essential part of completing the process of putting new equipment into operation. Competency assessment of all school nutrition assistants/technicians that will be using the equipment is critical, as well as documentation that they have completed this process. Finally, multiple copies of the use and care manual should be kept where they provide easy access to the needed information for operation, cleaning, and maintenance of the equipment.

The equipment project is now finally completed and the vision of the school nutrition director, as the *Trusted Advisor,* is reality. Although the amount of work that this requires can only be fully appreciated by those who have participated in the process, the value of school nutrition directors' knowledge and expertise is clear to anyone who has worked with the school nutrition program in kitchen renovations. Their role as *Trusted Advisors* is the key to successful school nutrition program construction projects.

Section Two



Making Specific Equipment Choices

CHAPTER NINE

Food Preparation Equipment

CHAPTER HIGHLIGHTS

Mixers

- Mixers include three general types:
  - Planetary or standard (most commonly used)
  - Spiral (used for high volume dough preparation)
  - Vertical-cutter mixer (for rapid chopping and cutting)
- Mixers range in size from 5 quart to 140 quart models
- Stainless steel bowls are preferred
- Selection of the mixer should be based on its intended use (because of its impact on future repair needs)
- Fewer repairs are generally required for:
  - Fixed speed models (as compared to variable control)
  - Gear transmission models (as compared to belt driven)
- Most common mixer attachments are flat beaters (paddles), wire whips, dough arms or hooks, and pastry knives
- If purchasing a used mixer, make certain that it has a bowl guard (older models may not) or that a retrofit bowl guard kit is available
- If purchasing a larger mixer, consider getting:
  - A bowl dolly or truck for moving heavy bowls on floor models
  - Adaptors for smaller bowls
  - Power lift and tilter
  - Timer
  - Bowl scraper
  - Grinder, dicer, or chopper attachments
  - Greater horsepower

Slicers

- Consider the size of blade as they cannot be retrofit with a larger size
- Smaller manually operated models with 10" knives are ideal where occasional slicing is done, automatic models are time and labor saving, but do require monitoring
- Larger models with 12" knives are best when large volume slicing is done
- Select horsepower needs based on the product to be sliced
- Gear driven motors are better for "tougher" foods
- Determine needs for thickness of slice
- Stainless steel parts are preferred

Food Processors

- Food processors can be used to dice, slice, grate, shred, and julienne food
- Commercial model should always be used, never a home-style unit
- Most durable models will be made from stainless steel

CHAPTER HIGHLIGHTS *(continued)*

- School nutrition directors act as *Trusted Advisors* in decisions about food processors to modify texture to accommodate special needs of the students

Toasters

- Toasters can be either slot or conveyor style
- Slot sizes are smaller for standard size breads and larger for buns, bagels, and Texas-style toast
- Evaluate the crumb trays, as these need to be cleaned frequently
- Consider a shut-off option for when toast might become caught
- Determine the size of toaster to purchase based on peak production needs
- Consider slot toasters for low volume needs, conveyor toasters for large volume

Food Preparation Equipment

Introduction

Food preparation equipment needs will vary with the school menu and with the type of foods that are purchased. If school nutrition programs use more convenience foods, it is obvious that fewer pieces of food preparation equipment, such as mixers or food processors, will be required. If a slicer is needed, a small slicer may be adequate. On the other hand, the use of convenience foods will increase the need for other pieces of equipment, such as refrigeration. School nutrition directors need to consider these choices carefully for their operation. If these *Trusted Advisors* decide to prepare foods from scratch, mixers, vertical cutter mixers, slicers, and food processors are likely be needed.

Mixers

This piece of equipment is defined as a vertical mixer with an overhead motor. There are three general types of mixers. They are planetary, spiral, and vertical-cutter mixers. Planetary mixers are the most commonly used of the three and are used for most of the mixing needs in a school nutrition program.

Standard or planetary mixers are a valuable and versatile piece of equipment because of the variety of attachments. There are numerous manufacturers and models of mixers on the market. Mixers range from table top 5 quart models used for smaller mixing needs to 140 quart floor models geared to high volume institutional use.

Mixer Capacity and Use Information		
Mixer Capacity	Application	Space Location
5 quart	Specialty Mixer	Counter
12 quart	Small-General Purpose Mixer	Counter
20 quart	General Purpose Mixer	Counter or Floor
30 quart	Light/Heavy Duty Mixer	Floor
40 quart	General Purpose Mixer	Floor
60 quart	Pizza Dough Mixer	Floor
80 quart	General Purpose Mixer	Floor
140 quart	Heavy Duty Mixer	Floor

Spiral mixers are different in that the bowl rotates as well as the beater attachment unlike planetary mixers where only the beater rotates. Spiral mixers are generally used just for high volume dough preparation. Spiral mixers are thought to result in better development of doughs (more gentle kneading), and less heating of the product during mixing which prevents too early a fermentation of the yeast.

Vertical-cutter mixers are unique in that they have extremely rapid blade action and are most commonly used for chopping and cutting (similar to a blender) rather than whipping or beating

ingredients. Their greatest advantage is speed as they cut or chop food in one-fourth to one-tenth of the time needed in other machines. Disadvantages of the vertical-cutter mixer include that they are noisier, more difficult to operate as timing is critical, and do not whip very well. Staff members need to be well trained because mixing times are generally so short. If one is not careful, it is possible to make juice out of salad greens.

Vertical-cutter mixes come in both countertop (10, 15, and 20 quart) models and floor mounted (25, 40, 60, 80, and 130 quart) models. Safety features include an interlock device so that the machine cannot be operated unless the bowl and lid are locked into place, and a viewing portal so that the product can be viewed without opening the lid. Pulse control or "jog" buttons help to control the cutting of products that require very little time to prepare.

Purchase Recommendations for Standard/Planetary Mixers

- Mixing bowl size will vary with the type of mixer purchased
  - Recommend purchasing the size required for the largest recipe that will be prepared with the mixer
  - Remember to include possible expansion of the ingredients during mixing (e.g., a 20 quart bowl is needed for mixing 4 quarts of cream)
  - Manufacturers' Web sites often have guides to help with this decision
  - Most commonly used sizes are 20, 30, and 60 quart models
- Purchase stainless steel bowls if you can afford them
  - Tinned bowls eventually have to be retinned and may cause color of some foods, such as mashed potatoes, to darken
  - Stainless steel bowls last longer and school nutrition directors generally find that they are worth the extra expense
  - The expression "pay me now or pay me later" is how some school nutrition directors view the decision of purchasing stainless steel bowls rather than tinned bowls
- Horsepower (HP) varies from 1/6 to 6 HP
  - Purchase more HP (1/2 greater than usual for that size mixer) if preparing heavy doughs, such as breads and bagel mixes
  - Compare manufacturers and models to purchase for your operational needs
- Consider how many speeds you will need for your recipes
  - Three speeds are the most commonly purchased
  - Models are available with 3-9 speeds
- If a larger mixer is purchased and you want to fit smaller bowls, consider getting adapter rings
  - Consider also purchasing smaller mixer attachments
  - It is more common to purchase two different mixers if mixing needs are widely divergent
- Consider the intended use of the mixer in relation to future repair needs. Fewer repairs are generally required for:
  - Fixed speed models (as compared to variable control which operate in the same way that a rheostat used in some light fixtures operates with a continuous number of settings rather than a simple on and off switch)
  - Gear transmission models (as compared to belt driven transmission models)
- Decide carefully on which attachments are necessary for your recipes; the most common mixer attachments are shown in the table below

Types of Mixer Attachments				
Name	Flat Beater (or paddles)	Wire Whip	Dough Hook (or Arms)	Pastry Knife
Attachment				
Consistency of Batter	Medium	Light	Heavy	Heavy
Mixer Speed	Medium	High	Low	Low
Examples of Products	Cakes, icings, vegetables	Eggs whites, frostings	Bread, bagel, pizza doughs	Pastry

- Bowl guards should be standard on any mixer purchased
  - Bowl guards and safety training are important for employee safety when using mixers
  - If using an older model, a retrofit bowl guard kit is available
- If purchasing a floor model mixer, consider purchasing the following:
  - A bowl dolly or truck for moving heavy bowls on floor models
  - Adaptors for smaller bowls
  - Power lift (to raise the bowl to the agitator) and tilter
  - Timer (some have auto shut-offs, some are programmable)
  - Bowl scraper (which minimizes the need for bowl scraping during mixing)
  - Grinder, dicer, or chopper attachments (that are placed on the power take-off hub located on the front of the overhead motor)
  - Greater HP
- Additional attachments include:
  - Bowl splash covers to control the splashing of wet and dry ingredients
  - Bowl extension attachments that increase the height of bowl to minimize whipped ingredients from being thrown from the bowl

Slicers

There are also numerous manufacturers of slicers on the market. Most are designed to slice high volume amounts of meat and cheese quickly and efficiently. Slicers vary in size, depending on the need of the school nutrition program. Smaller manually operated models with 10" knives are ideal for occasional slicing tasks. Larger models with 12" knives are best for large volume slicing tasks. The slicer may be used for:

- Slicing hot or cold meat in uniform thickness
- Slicing cheese in uniform thickness
- Slicing vegetables, using an optional accessory

Most models are operated either manually or automatically. Automatic slicers allow for staff to set the slicing thickness, but perform other tasks at the work station while monitoring the slicing task.

It is important to evaluate how the blade sharpeners operate. Generally, blade sharpeners are built-in. Some are easier to use than others depending on the brand and model. Most slicers should be designed to dismantle for easy cleaning and sanitation.

Advantages of slicers include that they:

- Are labor saving (as compared to slicing by hand)
- Are faster than slicing by hand
- Provide maximum yield with less waste
- Produce more uniform products of consistent thickness

Purchase Recommendations

- Consider purchasing a rolling cart with locking brakes so that the cart does not move while it is being used and can be moved to a variety of locations
- Purchase a slicer that has a lever which allows the slicer to be more easily tilted up for cleaning underneath, preventing the employee from having to lift a heavy dangerous piece of equipment
- Purchase a separate machine for slicing breads if bread slicing is a need, because slicers work best for meats and cheese
- Consider blade size needs carefully, purchasing the largest size needed
- Slicer blades cannot be retrofitted after purchase
- Popular sizes for slicer blades are 10" and 11 ¾"
- Consider horsepower need based on the products to be sliced
- Popular horsepower would be one-third and one-fourth
- Purchase more horsepower when cheese slicing is a frequent task
- Gear driver motor blades are better for "tougher" foods (such as meats and cheeses) which might cause belt slippage with belt-driven motors
- If considering a great deal of uniform slicing, select:
  - Automatic carriage to eliminate the need to be moved by hand
  - Carriage fences to prevent product from slipping
  - Automatic portion control scales (attached to receiving bed)
  - Chute attachments which hold slicing products (such as long vegetables) in place
- Determine needs for thickness of slices
- Most slicers will cut from paper thickness diameter up to ¾"
- Some slicers will cut thickness up to 1 ½ inch
- Evaluate slicing speed when purchasing an automatic slicer
- Slicer speeds may range from 1 slice per minute up to more than 55 per minute
- Evaluate the plug and cord configurations to determine if these are appropriate for the location.
- Buy stainless steel parts if at all possible
- Consider stainless steel as the preferred material for knife blade durability and cleaning
- Decide between separate or attached blade sharpeners
- Consider an infrared lamp for keeping meats hot that are sliced throughout the serving period

Food Processors

There are numerous manufacturers of food processors. Most food processors are compact in design to use less counter space. Food processors are used to modify texture of ingredients, decrease product waste, and to speed up the production or preparation time of some recipe ingredients. In addition, today's food processors can be used to dice, slice, grate, shred, and julienne food. Continuous feed units process food quickly in uniform pieces and assist in labor saving.

Purchase Recommendations

- Use a commercial model, never a home-style unit
- Consider the types of cutting tools or plates needed
- For example, slicing, pulping, grating, or dicing plates
- Consider purchasing a processor made from stainless steel
- Consider portability needs of the food processor
- Evaluate the quality of the products made from the food processor
- Consider textural modification needs of the special needs students

School nutrition directors are *Trusted Advisors* in knowing the best methods to modify the food texture. For example, food processors can be used to help produce meals for special needs children:

- Chopped foods that are in bite-sized pieces (although this may also be accomplished with a knife)
- Ground foods that are soft and small enough to swallow with little or no chewing
- Pureed foods that are smooth in texture and the consistency of mashed potatoes

Toasters

Toasters are often used in school nutrition programs that serve school breakfast. Toasters are occasionally used in school nutrition programs that serve toasted buns, bagels, or Texas-style toast during the lunch meal. Toasters come in two general types, which are slot and conveyor toasters. The slot sizes may be either standard size to accommodate regular slices of bread or large size to accommodate large bread items

Purchase Recommendations

- Evaluate ease of cleaning the crumb trays in the toasters
- Evaluate a shut-off option as a safety feature
- Consider an adjustable heat control feature to adjust for different size bread products
- Consider a feature which allows either one or two sided toasting for more flexibility
- Evaluate peak production needs and purchase accordingly
- Consider slot toasters for low volume needs
- Consider conveyor toasters for larger volume needs
- Assess the energy needs of conveyor toasters

SUMMARY

The three general types of mixers are planetary, spiral, and vertical-cutter mixers with planetary mixers being the most commonly used. Spiral mixers are used for high volume dough preparation and vertical-cutter mixers are used for extremely rapid chopping and cutting of ingredients. Generally, mixers are available in sizes from 5 quart to 140 quart and may be ordered with a variety of attachments, horsepower capabilities, and number of speeds. As a rule, stainless steel bowls are preferred, due to durability. The intended use of the mixer in relation to its future repair needs should also be considered. Fixed speed models (as compared to variable control) and gear transmission models (as compared to belt driven transmissions) are generally considered more reliable. The most common mixer attachments are flat beaters or paddles, wire whips, dough arms or hooks, and pastry knives. Additional attachments might include a grinder, dicer, or chopper.

There are numerous manufacturers of automatic and manual slicers. Most are designed to slice large quantities of meat and cheese, but slicers will vary in size, speed, horsepower, thickness of slices, and added attachments. Slicers should be purchased with the largest blade size needed as slicers cannot be retrofit with larger blades. Most commonly purchased slicer blades are either 10 or 12 inches. Built-in blade sharpeners are one of the more common attachments. Again, gear driven motor blades and stainless steel parts are considered more reliable, particularly if tough foods will be sliced.

Food processors are another common piece of equipment in some schools. Most are compact in design to use less counter space. They may be used to dice, slice, grate, shred, and julienne food and may be particularly useful for textural modification needs of students in the school nutrition program.

Toasters can be either slot (for small volume needs) or conveyor type (for large volume needs). Slot sizes may vary for standard size breads or may be larger for buns and bagels or Texas-style toast. The ability to easily clean crumb trays is an important consideration in purchasing a toaster. The appropriate size of toaster to purchase is generally determined from peak production needs.

CHAPTER TEN

Cooking Equipment: Ovens and Ranges

CHAPTER HIGHLIGHTS

General Guidelines for All Ovens

- General purchasing guidelines include checking door handles, length of preheating time, oven interior size, cleanability, insulation, hinges, number of racks, types of mountings possible
- Basic use includes loading/unloading quickly, following manufacturer's recommendations for venting, avoiding the use of foil, using good quality pans, filling ovens to capacity, preheating for the shortest time possible, cooking at the lowest recommended temperature for roasts and the highest for baked products, and not opening the door during cooking
- School nutrition director's experience elevates them to the valued position of *Trusted Advisor* in knowing which pieces of cooking equipment best meet their operational needs

Convection Ovens (forced air ovens)

- Very common in schools
- Can be gas or electric, but gas will still need electricity for the fan
- Advantages include faster cooking, good browning, efficient use of oven space, compact size, possible cost savings if it replaces the need for two ovens
- Disadvantages include increased cooking losses, thick surface crust or uneven cooking in some foods, blowing of fragile batters, higher purchase price, and greater utility costs
- Purchasing recommendations including checking the size of the oven interior, the slides, preheating time, oven exterior material, insulation, automatic shut-off control for fan
- Best practices include setting the thermostat higher before loading, avoiding over/under loading, not using tall pans, loading/unloading quickly, precooking fragile batter, adding a pan of water when preparing meat, fish, and poultry, shutting off the fan during loading

Conventional Ovens

- Traditional style of oven, often replaced today with a convection oven

Deck Ovens

- Best flexibility is obtained from separate controls for top and bottom
- Recommended oven height will vary with the products being prepared

Reel Ovens

- Only used in very large volume school nutrition programs

Conveyor Ovens

- Used for large volume preparation of pizza or hot sandwiches
- Advantages include consistent product quality, less labor, speed of production

CHAPTER HIGHLIGHTS *(continued)*

- Disadvantages include that it can only be used for thinner foods, and that more maintenance is generally required
- Purchasing considerations number of belt speeds, availability of side doors, different settings for zone cooking, availability of viewing doors

Microwave Ovens

- Combination microwave and infrared, convection, or steam are available
- Both power level and size of microwave should be considered
- Only commercial ovens should be used in school nutrition programs
- Advantages to microwave ovens include faster heating, no need to preheat, energy efficiency, low cost, minimal maintenance, and compact size
- Disadvantages include uneven cooking, hot/cold spots, need for skilled repair, limited use for tenderizing and cooking meat products, lack of browning during cooking, and problems with overcooking of foods

Turbochef® Ovens

- Removes the cold air layer around food to speed up the cooking process
- Available as small countertop units which are stackable

Cook by Light Ovens

- Uses a combination of intense light and infrared energy
- Available as small countertop units which are stackable

Range Tops

- Gas versions are more durable burners, no preheating needed, infinite heat settings, more energy efficient than electric
- Electric versions are slower to heat/cool, less prone to fires from grease spills, require less maintenance and ventilation than gas
- Open cooktops are more energy efficient, less affected by dented and bowed pan bottoms, used more for speedy, intermittent cookery
- Closed cooktops are used to hold several warm stock pots, are more flexible for the size of stock pot used on them, take longer to preheat

Induction Cooktops

- Use a different type of heating method which requires a magnetic metal pan
- Not all magnetic pans heat equally well on an induction cooktop
- They are also energy efficient, easier to clean off, and cooler in the kitchen

Basic Use of Range Tops

- Pots should be larger than the burner
- Gas flames should be adjusted to the bottom of the pan and the color blue
- Pans should make full contact with the range and be kept covered

Cooking Equipment: Ovens and Ranges

Introduction

Cooking equipment represents a huge long-term investment. Types of cooking equipment will vary from one school to another, depending on operational needs. In fact, although traditional cooking methods using ranges and cooktops may still be used in some schools, newer technologies now offer faster and more efficient (although often more expensive) alternatives. The use of convection ovens, for example, is now extremely common in schools. Combi-ovens are now a very common equipment choice because they use steam for cooking and are discussed in the chapter on steam cooking equipment. Healthy methods of food preparation are an important consideration in cooking equipment. Faster cooking technologies and those that prepare food with less fat have become more popular for healthy school environments.

Selection of cooking equipment is one of the most critical decisions because food simply cannot be prepared without proper cooking equipment. Purchase considerations include specific factors for each type of equipment as discussed in this chapter. In addition, overall considerations include the number of years of warranty coverage, what exactly is covered by the warranty, and how easy it might be to get repair service. Examples have occurred where a school has had to pay labor for a two hour drive to the school and a two hour drive back in order to have a service person fix or calibrate an oven. In areas where the local equipment repair company is not a factory authorized service agent or trained on specific name brands, paying this travel time can be a huge cost and an important part of the decision of what equipment to buy.

General Guidelines for All Ovens

Many oven choices are available, including:

- Conventional
- Deck
- Reel or revolving
- Convection
- Conveyor
- Microwave
- Turbochef®, and
- Cook by light (by Flashbake®)

Purchase Recommendations

- Handles on doors should be checked for heat as well-insulated handles can be touched without a potholder
- Consider glass doors which allow food to be viewed without opening the door
- Check preheat times for the shortest among manufacturers
- Check the oven interior size to make certain that it can accommodate the size of pans that will be used
- Be sure that the oven can be easily cleaned
- Confirm the level of insulation
- Evaluate the insulation by brand (at least four inches is preferred)

- Door hinges should be heavy duty, counterbalanced (to stay flat), should open level, and hold up to 220 lb. (90 kg)
- Consider production needs when verifying standard number of oven racks, and order additional oven racks to meet projected needs
- Consider in advance what type of installation will be done, mountings can be:
  - Platform (concrete base)
  - 6" (15 cm) legs for floor
  - 4"(10 cm) legs for countertop equipment
  - Equipment stands
- Plan the delivery as ovens are one of the heavier pieces of equipment
- Ovens require fire suppression equipment, most (but not all) require ventilation

Basic Use

Appropriate use of the ovens would suggest the following practices:

- Load the oven as fast as reasonably possible to minimize heat loss
- Do not add uncooked pans of food to an oven where food is already cooking or uneven cooking will result
- Keep vents closed unless the product should not be exposed to moisture (follow manufacturers' instructions)
- If possible, avoid the use of aluminum foil covers on pans because it may:
  - Limit browning
  - Affect heating efficiency and cooking times
  - Affect moisture loss in the product (unless it is supposed to be used to minimize moisture loss)
  - Get caught in the fan of convection ovens and require a service person to repair
- Keep tables, carts, or racks nearby for easy loading/unloading
- Use good quality pans because:
  - Warped pans may cause uneven cooking
  - Very shiny pans may also cause uneven cooking
  - Aluminum pans will conduct heat better
  - Dull finish pans will also conduct heat better
- Fill ovens to capacity to avoid energy waste
- Cook foods immediately after preheating the oven to minimize energy use
- Cook at the lowest recommended temperature for meat products and cook at the highest recommended temperature for baked products to save energy
- Do not open the door during cooking to maintain product quality and save energy

Newer types of ovens have expanded the choices for school nutrition programs. Some experts have suggested that more changes have occurred in oven designs in the last 20 years than any other kind of kitchen equipment. The school nutrition director's experience elevates them to the valued position of *Trusted Advisor* in knowing which pieces of cooking equipment are best to meet their operational needs.

Convection Ovens

Convection ovens are very commonly used in school nutrition programs for a variety of products including breads, cookies, cakes, pies, meats, seafood, pizza, potatoes, and other products. These ovens offer a cooking chamber with a fan to circulate hot air. Convection ovens are not energy efficient but offer faster more even cooking of products on multiple shelves in the oven, because of the movement of air. These ovens are available as either gas or electric, but gas convection ovens will still require electricity for operating the fan. Gas ovens need to be vented under a hood or through a flue stack. Flue diverters and adaptors are available from the manufacturer.

Convection ovens are available in single, double stacked, and roll-in models. Each cooking chamber of a standard convection oven has 11 rack guides and is often supplied with five racks, although additional racks may be purchased. Roll-in models are designed for larger volume cooking. Roll-in ovens allow a cooking rack of pans to be easily wheeled into the cavity, thereby eliminating the need to manually load the oven, shelf by shelf.

Convection ovens are available in two depths. The standard depth model accommodates 18" x 26" sheet pans in a right to left loading position. The extra deep depth model accommodates 18" x 26" sheet pans in a right to left and/or front to back loading position. Oven capacity will range from 10 to 22 sheet pans, depending on whether the oven is single or double deck (10-11 for single deck and 20-22 for double deck) and the model. The doors may open and close either independently or simultaneously. Doors are offered with glass window panels or solid stainless steel. The decision of what size convection oven to buy will depend on several factors including:

- Quantity of product that needs to be prepared at any given time (shorter meal periods will require food to be prepared faster or in advance)
- Production needs for different products (if it is possible to prepare one product in advance and place it in a warming cabinet before another product is prepared, fewer ovens will be required)
- Number of temperature settings needed for different products (because one can not bake a cake at 325° F (163° C) at the same time that one is cooking pizza at 400° F (204° C)
- Size of sheet pans to be used in the oven (if sheet pans are specifically sized for the oven, this will provide for the most efficient use of space in the oven)

School nutrition directors functioning as a *Trusted Advisor* should therefore evaluate convection oven needs carefully. Mistakes in purchasing the wrong size can be avoided if school nutrition directors plan a production schedule for key pieces of cooking equipment, particularly for convection ovens because they are used so heavily. The production schedule will show a time chart of what is to be prepared in the oven in 15 minute or half hour intervals, how many pans will be in the oven, and at what temperature. School nutrition directors are best able to determine the size of oven (or ovens) needed after this production schedule has been developed. They are *Trusted Advisors* in this very critical decision making process.

Manufacturers also offer various control packages. The control packages range from electronic ignition, mechanical thermostats and dial-type timers to solid state controls that are digitally displayed to computer based controls that are programmable. Coding features are also offered in the control packages such as fan delay, force cool-down fan mode, and moisture injection.

Advantages to convection cooking include:

- Faster cooking
- Good browning
- Efficient use of oven space
- Compact oven size for the quantity that can be produced
- Lower cost if one convection oven can replace multiple conventional ovens

Disadvantages to convection ovens may include:

- Increased cooking losses (decreased yield)
- A thick surface crust may develop on food
- Uneven surface effects on fragile products (due to "wind currents")
- Blowing of fragile batters, meringues (a fire can happen if the batter or meringue is blown into fan)
- More expensive than conventional ovens

Recipes need to be adjusted from conventional oven recipes for use in a convection oven. Oven temperature, length of cooking time, or both may require adjusting. Generally, 25-35% less time is needed for cooking in convection ovens as compared to conventional ovens. Examples of decrease temperature adjustments by food products:

- Cookies 25° F (14° C)
- Casseroles 25° F (14° C)
- Cakes 50° F (28° C)
- Yeast bread 50° F (28° C)
- Meats 50° F (28° C)
- Other yeast products 75° F (42° C)

Purchase Recommendations

- Confirm interior of the oven is large enough to accommodate standard full size pans
- Evaluate the slides that support the pans (8-11 slides are common in an oven) to verify that pans can be pulled out one-half/two-thirds of the way without having the pan tilt or slide out
- Select the oven with a shorter preheating time (15 minutes is common)
- Evaluate the exterior material, as stainless steel is preferred when the oven will be placed near grease producing equipment
- Select finishes with 16-20 gauge, no. 4 finish
- Select insulation that is four inches (10 cm) on the sides and two inches (5 cm) in the door
- Make sure that there is an automatic shut-off for the fan when the door is opened
- For greatest flexibility, make sure that the oven has:
  - The ability to also cook without the fan
  - Cook and hold feature for foods that may be prepared in advance and held for a short period of time before service
  - Quick disconnects and casters so that the oven can be moved out of the way for more thorough cleaning
  - The desired door opening (top or bottom, side/side, etc.)

Best use of the convection oven suggests the following practices:

- Set the thermostat 50-75° F (28-42° C) higher before loading to compensate for temperature loss
- Avoid over/under loading
- Place partial loads on center shelves, keeping pans away from walls as much as possible
- Do not use pans where the food level is much below the top of the pan (this results in a poor cooked color). Cakes or cookies, for example, would never be baked in a four inch depth pan.
- Load/unload quickly
- Load bottom racks first
- Cook meringues and light batters for 7-10 minutes before turning the fan on (consider also that these products may be best done in other ovens)
- For meat, fish, poultry, set a pan of water in the bottom of the oven to prevent excessive moisture loss (or use a combination oven steamer)
- Shut off the fan during loading (unless it has an automatic shut-off)
- Open the door that is not connected to the interlock if the temperature needs to be lowered

Conventional Ovens

Conventional ovens can be used for a wide variety of cooking needs, such as cakes, cookies, meats, or other products. Conventional ovens may be electric or gas (although gas ovens will still need electricity for a timer, lights, or a fan, if these are provided on the oven). Although still used for smaller quantity preparation in some school nutrition programs, the use of convection ovens has replaced conventional ovens in many schools.

Deck Ovens

Deck ovens are an energy efficient choice for large quantity preparation of roasts or bakery products, such as cakes and cookies. Deck ovens are often stacked to increase cooking or baking capacity. Deck ovens can be placed on a stand with pan racks underneath for added flexibility. If ovens are stacked, consideration should be given to the height of the ovens. Ovens that are stacked must be easily reached to make them easy to use and to minimize the possibility of being burned when reaching into the oven.

Both gas and electric deck ovens are possible. Greatest flexibility is provided if the oven has separately controlled elements in the top and bottom of the oven. Gas deck ovens are one of the few pieces of equipment that require no electricity. Appropriate oven height will vary with the product. Typically, ovens are sized using the following guidelines for what is being prepared:

- Roasts use a 12-15" oven height (30.5-78 cm)
- Bakery products use a 4-8" oven height (11.6-23.2 cm)

Reel Ovens

Reel or revolving ovens are not commonly used in school nutrition programs unless the school is very large or in central kitchens. These ovens are used in high volume operations (bakeries for example) and have revolving shelves that operate much like a Ferris wheel to provide even cooking for large batches. Some of these ovens are so large that they are assembled on-site. Strong shelving and shelf stabilizers are important because tipping of the shelves (and the pans on

them) could be a problem resulting in huge product losses and the need to clean the oven (which requires entering the oven) once the oven has cooled.

Conveyor Ovens

Conveyor ovens are a type of oven that uses a moving conveyor belt made of either stainless steel or wire mesh. Although most school nutrition operations will not have a conveyor oven, they might be considered if they serve a large volume of pizza or hot sandwiches. Advantages to conveyor ovens include that they provide a very consistent product quality with very little staff training (the conveyor means that the process is highly automated) and that they need less labor to use (no supervision of the cooking process is required). In addition, conveyor ovens may be faster depending on the type of heating used in the oven (infrared cooking or impinger cooking, for example). Disadvantages are that they are more expensive than some of the other ovens (deck ovens, for example), products generally have to be thinner (2 inches or 5 cm or less) to be able to be cooked in a conveyor oven and that more maintenance is required (because of the moving belt on the conveyor). The four types of conveyor ovens are:

- Impingers
  - A very carefully and accurately directed blast of hot air "impinges" or forcefully hits the food to speed the cooking process
  - Impingers are specifically designed for foods to be prepared in them
  - Impinger ovens, for example, are commonly used for pizzas
- Natural convection (turbulence or free flow)
- Forced convection (directed, controlled flow)
- Infrared (available in electric only, these are very fast, but an expensive type of conveyor oven)

Purchase Recommendations

- Better conveyor ovens allow the operator to adjust the belt for different speeds
- Side doors are useful for shorter cooking times for products such as sandwiches
- For more product cooking options, purchase ovens that have different settings for zone cooking

Twin belts are also available on some ovens so that the belts can be set at two different speeds for different products. Gas conveyor ovens will still require electricity for the moving belt and all conveyor ovens will require ventilation under a hood. Space for the conveyor is also needed as these ovens require a longer space than conventional ovens. Floor models typically need seven feet, although only three feet may be within the oven itself. Countertop models will need four feet. A viewing door so that the product can be seen while it moves through the conveyor may also be helpful.

Microwave Ovens

Microwave ovens have become widely used since they were first introduced in the U.S. in the 1960s. Combination ovens (microwave combined with either infrared, convection, or steam cooking ability) are becoming more common now.

Power level of the microwave is an important consideration and may not be correlated with size of the microwave. In other words, larger microwaves are not necessarily more powerful machines. Examples of microwave power levels and what they may be used for are shown below. If different types of tasks are done, school nutrition directors should either purchase the highest wattage that is required for any of the tasks or consider purchasing different types of microwaves for the different tasks.

- 700 watt for small volume cooking, warming
- 1000 watt for heating precooked foods
- 1400-2700 watt for defrosting and reheating larger quantities of food

Smaller units are somewhat more flexible in that they may use standard plugs (at 120 volts), whereas larger heavy duty microwaves may be 208 or 240 volts. Microwave oven placement is also somewhat more flexible in that they do not need to be placed underneath a cooking hood.

Although many types of microwave ovens are available, microwave ovens produced for home use should never be used in school nutrition programs. Microwave ovens intended for commercial use are more powerful and durable. If home use microwave ovens are used in a school, the ovens will likely burn out in a much shorter time. Even worse, their use might void the equipment warranty and not be allowed by the school's fire insurance policy.

Advantages to microwave oven use include:

- Heating of food is faster
- Cooking does not add heat to the kitchen
- Oven does not need preheating
- Process is energy efficient
- Oven is relatively low cost
- Maintenance costs are lower as compared to other ovens
- Oven is compact
- Same dish can be used for both cooking and serving

Disadvantages to microwave use may include:

- Cooks somewhat unevenly
- Has hot/cold spots
- Requires skilled repair
- Does not allow for tenderization or flavor development in meat products because of the short cooking times
- Does not brown (heat susceptors and combination cooking units improve browning)
- Easily overcooks food

The most common uses of microwave ovens in foodservice operations include:

- Fast thawing
- Warming/heating (not cooking)
- Reheating small portions of food

As quantities get larger, times greatly increase and energy efficiency decreases so this has limited the use of the microwave for other purposes. Some newer options in microwaves that has made their use easier are touch pads, built-in sensors, and heavier duty models. For busy areas,

microwave ovens can be stacked, but location should be considered carefully as they will require space on all sides for venting.

Turbochef® Ovens

Turbochef® ovens are a newer type of cooking option (introduced between 1991 and 1994). They are now being used in some restaurants, including chain restaurants. Turbochef® ovens are different because they suck air out of the bottom of the oven (instead of pushing air to the food) to improve heat transfer between the food and the surrounding air. This removes the cold air layer around the food and greatly speeds up the cooking process. Sandwiches cooked in a Turbochef® oven actually brown and are crisp instead of soggy.

Generally, Turbochef® ovens are small countertop units. They are stackable and programmable. In addition, they are extremely energy efficient because they are only turned "on" at the time foods are being cooked. Although they are more expensive than other ovens, their speed of cooking is a great advantage for preparation of sandwiches and many other foods.

Cook by Light Ovens

Cook by light ovens are also a new introduction to cooking technology. Some of the first ovens (named Flashbake® ovens) were introduced in 1993. Cook by light ovens use a combination of intense light and infrared energy. They use light waves and not microwaves to quickly penetrate food. Cook by light ovens can actually brown food because a computer in the oven is used to balance the two heat sources to cook both the interior and the exterior simultaneously. Cook by light ovens are:

- Programmable
- Generally small stackable countertop units
- Not in need of ventilation hoods
- Energy efficient
- Extremely fast

Range Tops

Range tops used to be a common part of almost all school nutrition programs and may still be important in some schools. They can be used for:

- Sautéing
- Pan frying
- Grilling
- Heating stock pots or sauce pans

Today however, other pieces of cooking equipment such as steamers, convection ovens, or combi-ovens are more commonly used for the cooking needs in many schools. In addition, range tops are used less often because of the growth of convenience or pre-processed foods.

There are numerous manufacturers of gas and electric range tops. Range tops require exhaust ventilation and a fire suppression system so they must be placed underneath hoods and are relatively energy inefficient. Advantages to electric or gas range tops include the following:

Electric

- Burners are somewhat slower to heat or cool (is disadvantage or an advantage depending on how they are used, some staff will turn off the heat and leave the pan warming on the burner for a short time)
- For less skilled staff, burners can be set to different temperatures through the control knobs with no guessing as to the correct temperature
- Some types of electric range tops are available which allow an infinite number of settings

Gas

- Burners are considered more durable than the electric burners
- They require no preheating
- They allow for an infinite range of heat settings

The decision to purchase a gas versus an electric model cooktop is an important decision. In all new construction, an all-electric kitchen might be less costly if the infrastructure needed for gas lines is expensive. On the other hand, in areas where severe storms and loss of power is common during school months, gas equipment might still be able to be used when the power goes out if the gas equipment controls are not electric and if electrically controlled ventilation systems are not required for the equipment to be used safely.

The decision between gas or electric models is also influenced by energy use and expected utility costs. Utility costs will vary across the U.S. so that purchase decisions will need to be based on the geographic area. The electric rates in California, for example, are likely to be higher than in many other geographic areas, and the gas rates in Texas are likely to be lower.

Cooktops can be open (with an exposed burner) or closed (solid sheet of metal). Listed below is a comparison between the two types of cooktops.

Open Cooktops

- Are more energy efficient than closed tops
- Their ability to heat is less affected by bowing, bulging, or dented pan bottoms because the pans will more evenly fit into the ring or grate as compared to the flat surface of a closed cooktop
- Are most likely to be useful for speedy, intermittent cookery

Closed Cooktops

- Hold more pots than open burners
- Are more flexible in that they hold multiple sizes of pans
- Are used for continuous heavy cookery because they will hold several warm stock pots
- Take longer to preheat (for example, ten minutes for gas cooktops and 20-30 minutes for electric models)

Closed cooktops are generally made of cast iron or steel plates which are between ½ to 1 inch thick and put together (depending on the school's needs) in multiples of 12 inch widths and 24 inch depths. Most commonly, they are installed in a group of three with a separate heat control for each of the three portions of the cooktop.

Griddle-type range tops which include a stainless steel fence around the two sides and back (which helps to prevent spattering or dripping of batters off the edge of the cooking surface) are also useful for some schools. These griddle-type tops are made of thicker steel and offer grease troughs and grease containers that can be emptied after each use. They are used for continuous heavy cookery of griddle items and may come with Teflon or other non-stick coatings. Countertop models are also available for griddles or other range top types.

Other types of specialty range tops are also available, but are generally not used in school nutrition operations, including Chinese or wok ranges, stockpot ranges, and taco ranges.

Induction Cooktops

Induction cooktops use a newer type of cooking technology and are being installed in some schools. Induction cooktops are sold by fewer manufacturers, but variations in options are still available. Induction involves a different method of heating in which an electromagnetic field is created between the stovetop and pan which provides a current that converts to heat with the resistance of the metal in the pan. In this heating system, the choice of pan type is critical.

Magnetic metal pans (made of magnetic stainless steel, cast iron, or nickel) must be used in order to create the electromagnetic field for heating. School nutrition directors should check with manufacturers to make sure that pans will work on induction units. Some stainless steel pans, for example, are magnetic (because of their higher iron and nickel content) and some stainless steel pans are not magnetic (so they are not suitable for induction cooktops). Pans made with non-magnetic metals (such as copper or aluminum) will not work on induction cooktops, unless the non-magnetic metal is used only in the interior of the base of the pan (so that it is sandwiched between two pieces of magnetic metal) to improve the evenness of the heating of the pan.

Research at Purdue University in the Hospitality and Tourism Management Department has suggested that not all magnetic pans heat equally well on an induction cooktop. Best choices are the most highly magnetic and have a flat bottom that provides the best contact with the induction surface. Whatever the pan type, empty pans should not be heated as this could result in damage to the cooktop.

Advantages to the use of induction cooktops includes:

- Safety benefits when used around children
- Faster cooking
- Easy cleaning
- Does not heat up the kitchen
- Energy efficiency
- Operate from a 12 volt, standard three prong plug-in so that they may be used with most standard outlets in non-traditional locations where higher voltage wiring is not available

Disadvantages may include:

- More expensive
- Limited in capacity (unless multiple units are purchased)
- Require the purchase of new pans

Induction cooktops have a smooth, solid ceramic top and come in both one and two burner models. They may be free-standing, making them easy to carry from one location to another or installed into countertops. They generally operate from 12 volt, standard three prong plug-ins and are therefore, only available as electric models. Temperature controls on these units vary with the manufacturer. Some units have specific temperature settings for the control knob; others have an infinite number of settings possible and operate similar to a rheostat.

Basic Use of Range Tops

General rules for efficient use of range tops would include the following:

- Pots should be one inch (2.5 cm) larger than the burner
- Gas flames should be adjusted to barely touch the bottom of the pan
- Gas flames should be adjusted until they are blue for the most efficient type of flame
- Pan bottoms should be flat bottomed allowing for full contact with the range
- Pots should be kept covered

Other considerations include that the range tops will need:

- A nearby and convenient work table
- A nearby refrigerator
- A sink to drain pots and an overhead mixing faucet
- Daily cleaning with a manufacturer recommended cleaner
- A fire suppression system

SUMMARY

Cooking equipment is a huge investment for schools. Many choices exist including newer technologies that offer faster and more efficient cooking (although it may also be more expensive). Although many prefer the advantages of gas cooking equipment, the decision between gas or electric models depends on several factors including purchase price, utility costs and warranty.

Many oven choices are available. Some experts have suggested that more changes have occurred in oven designs in the last 20 years than in any other kind of kitchen equipment. Although conventional ovens are not as commonly used anymore, convection ovens are now very common and are available in a variety of models (gas or electric), sizes, and depths. Although they are more expensive than conventional ovens, they offer faster cooking and good browning in a compact space. Deck ovens may be used for many cooking and baking needs. Reel ovens and conveyor ovens are not commonly used in schools, but may occasionally be used in some high volume operations. Microwave ovens have become widely used since they were first introduced. Combination microwave ovens (with infrared, convection, or steam cooking ability) are now available. Turbochef® and cook by light ovens are two of the newest cooking technologies. They offer extremely fast cooking (including browning) in a very compact space, but are a more expensive alternative.

School nutrition directors should think carefully about their oven choices. Products can generally be cooked/baked in more than one type of oven (convection versus conventional versus combi-ovens, etc.). Because of this, school nutrition directors should look at the best oven choices for their particular needs. Careful decision making is important because each oven type will vary by purchase price, repair and maintenance cost, energy consumption, ventilation requirements, cooking speed, product quality, space requirements, and flexibility for different kinds of cooking.

In addition, even though a versatile oven may be purchased, it may not be able to be used for all cooking needs because of overlapping production requirements with several products needing to be prepared at the same time. Salespeople may promote one oven for all cooking needs, but school nutrition directors should always look at their production schedule before making final cooking equipment selections in order to make sure that all products can be prepared that need to be prepared. School nutrition directors' familiarity with their menus and recipes, as well as the coordination and scheduling of equipment in preparing food, elevates them to the valued position of *Trusted Advisors* in selecting which pieces of cooking equipment are best for their operations.

CHAPTER ELEVEN

Cooking Equipment: Tilt Skillets, Broilers, and Fryers

CHAPTER HIGHLIGHTS

Introduction

- School nutrition directors are the *Trusted Advisor* in deciding which pieces of equipment are required to meet the production needs

Tilt Skillets

- Versatile piece of equipment with four sides and rectangular grill top, a pour spout, cover, and a trunnion
- Purchase recommendations include:
  - Upgrading the metal in the tilt skillet to stainless steel
  - Considering features such as spring assisted lids, power tilts, gallon markings, hot/cold faucets, and draw-offs for larger tilt skillets

Broilers

- Available in infrared or radiant heat
- Require operator skill and can be a fire hazard
- Small broilers are used for finishing entrees, larger broilers are used for fast cooking of thinner cuts of meat
- Purchase recommendations include:
  - Buying heavy gauge steel, well insulated units with reflective interiors
  - Considering infrared units when speed is more important than cost
  - Placing broilers side by side rather than stacking
  - Selecting stainless steel sides on the broiler if installation is near fryers
  - Considering warming ovens
  - Evaluating grids and shelves in the broiler

Fryers

- Newer fryers offer improved efficiency, improved quality of finished products, and more automation to make them "mistake proof"
- Purchase recommendations include:
  - Purchasing more than one fryer to avoid flavor transfer if different products are commonly prepared
  - Comparing capacity of floor and countertop models
  - Assessing space and fire suppression needs of the fryer
  - Considering what types of products will be prepared in the fryer
  - Evaluating the amount of desired automation
  - Deciding on the type and thickness of the metal for the fryer
  - Deciding on inclusion of a filtering system
  - Checking to see if the fryer has a cool zone

Cooking Equipment: Fryers, Broilers, and Tilt Skillets

Introduction

Cooking options in school nutrition programs may include tilt skillets, broilers, and fryers. Broilers and fryers not very versatile pieces of cooking equipment, so some schools may not use these at all because they do not support the menu needs. On the other hand, tilt skillets are considered very versatile, but they may not be found in all school kitchens because they are either unfamiliar, or the school nutrition programs use alternative pieces of equipment. School nutrition directors are the *Trusted Advisors* when determining equipment needs because of their knowledge related to the menus and production needs related to the meals served.

Tilt Skillets

The tilt skillet is also known as the tilting braising pan and tilting fry pan. Tilt skillets have a rectangular grill top with four sides, a centered pour spout, a hinged cover, and a trunnion which allows the grill top to be tilted to drain at a 90 degree angle. In fact, some school nutrition programs have replaced large kettles with tilt skillets, due to their versatility. They are particularly good when all the ingredients are ultimately cooked in the same piece of equipment. Most common uses of a tilt skillet include:

- Grilling
- Browning or braising
- Pan frying
- Sautéing
- Stir frying
- Steaming with the assistance of optional steamer pan insert rack
- Boiling stews and sauces
- Holding

Most tilt skillets are free standing units but models are available that can be wall or counter mounted. Counter top models may range in size from 10-16 gallons, whereas most floor models hold either 30 or 40 gallons. Tilt skillets may be gas or electric, but gas units will still require electricity for the controls. Additional options that may be purchased include:

- Receiving pan support
- Pour lip strainer
- Vented lid
- Fill faucet or spray hose
- Casters
- Special stands

Purchase Recommendations

- Best for large batch cooking
- Good for pan grilling or pan frying
- When one needs to grill several products at different settings, maybe the tilt skillet is not the better equipment choice

- Consider upgrading the metal to a stainless steel for improved versatility
- Consider spring assisted lids to make lifting the lid easier/lighter, and a power tilt to automatically raise or lower the skillet
- Consider optional accessories such as gallon markings stamped on side of skillet, hot and cold faucets for adding water as needed in food production or to aid in cleaning, and a draw-off when pouring contents from the tilt skillet
- Installation needs should be addressed to effectively use the tilt skillet, such as including a floor sink or grate in line with the tilt skillet's pour path
- Size requirements should be evaluated based on production needs, because production capabilities may be overstated by manufacturers

Broilers

Broilers provide very intense dry heat to cook or finish the surface of meats or other entrees. Heat may be either infrared or standard radiant heat. The infrared heat provides faster heating, but is more expensive than standard radiant heat. Products prepared in broilers have excellent flavor. In addition, products are often lower in fat and better in retention of vitamins with this fast cooking process. The speed of the cooking process is also a disadvantage in that it is not very versatile in the types of food products that can be prepared in broilers. Different types of broilers include:

- Smaller broilers are used for finishing entrees, for example browning, melting, reheating
- Larger broilers are used for broiling thinner cuts of meat that have a low to moderate fat content

Broilers also require some skill on the part of the operator as there are no timers, ejectors, flashing lights, or buzzers to tell when the product is done. In addition, they can be a fire hazard, due to the high temperatures used in the broiler itself as well as the food cooked in the broiler. In addition, to prevent a fire hazard, broilers must be installed correctly. Fires have occurred when broilers are bolted into wooden studs in the wall to stabilize them and prevent tipping. Unfortunately, because of the high heat, the metal bolts caused the wooden studs in the wall to catch fire. Broilers need to be located under a ventilation hood, as well as fire suppression equipment.

Purchase Recommendations

- Buy 16 gauge stainless steel (or heavier), well insulated units with reflective interiors
- If speed is more important than cost, get infrared, but consider that they:
  - Cost more
  - Cook in half the time
  - Preheat in about 30 seconds verses approximately ten minutes for standard radiant broilers
  - Use 30% less energy than standard radiant broilers
- Buy multiple broilers when peak time periods require multiple products to be broiled
- Place multiple broilers side by side rather than stacking them, to improve accessibility
- Stainless steel sides on the broiler are recommended if broiler placement is near a fryer
- Consider a built-in warmer oven with the broiler when there is a delay from preparation to service
- Adjustable grids (1 ½ to 8 inches or 3.75 to 20 cm) and shelves that pull out provide easy use, but should have a safety lock to prevent them from coming out all the way, and shelves should be warp resistant

- Be cautious of broiling productivity stated by manufacturers because they generally do not include the time associated with product loading

Fryers

Fryers are used less often in school nutrition programs because of the concern for healthy methods of food preparation. Also, many of the food items that required frying techniques are now available in formats that do not require frying. Fryers are categorized in size by the capacity of the frying oil and the pounds of frozen food which may be cooked in one hour. Fryers are available as stand alone units or banked as several units together.

Modern technology in fryers has improved the quality of fried products, improved their efficiency, and made the fryers easier to use. Models can be countertop or floor standing. Newer models have become more automated and may include devices to lower baskets, time the frying cycle, and then raise the basket. Additional options include:

- A stainless steel fry tank cover
- Extra baskets and screens
- Skimmer
- Crumb scoop
- Tank brush
- Automatic basket lift
- An upgrade to stainless steel fry tank, if not standard
- Casters
- An upgrade on choice of controls
- Flex hose and quick disconnect with restraining device
- Stainless steel exterior
- Landing station
- Warming lamp for the landing station
- Filter station

Controls are the key to maintaining temperature. The best fryers have less variation in the cooking temperature which produces a better quality product. There are three basic types of controls:

- Millivolt control system has a ten second delay response to temperature and a possible temperature swing of 20° F (11° C)
- Solid state control system has modulating thermostats and may react to +/- 2° F
- Computer control system reacts to +/-1° F with various programmable functions

Appropriate care of fryer oil is a must. Choose oil that will withstand frying at high temperatures for longer periods of time. The following practices will save the life of the oil and support improved food quality:

- Change or replenish the oil periodically
- Filter frequently
  - Frequent filtering may result in a net savings of 25-50% of the oil as well as an improvement in product quality

- Oil breakdown is accelerated by
  - Food crumbs, particularly from breaded, battered products
  - Water from improper drying after cleaning or from "wet" foods that are fried in the oil
  - Soap residue left from cleaning
  - High heat for long time periods
  - Salt from food or from "salting" food items while in fryer baskets

Determine which method of filtering is needed in advance of purchasing the fryer. It is important for the nutrition assistant/technician to maintain safety at all times and to follow manufacturers' directions carefully with any of the methods listed below.

- The skimming method only skims bread/food crumbs from the top of the oil with a strainer or skimmer
  - Least expensive method but does not provide complete oil care as the vat will still need to be cleaned periodically
- A manual method is more often used for smaller fryers
  - A stockpot, metal filter holder and filter for the holder are used to filter the oil, the vat is cleaned, and the oil is poured back into the fryer
  - Provides somewhat better filtering of the oil than skimming and is inexpensive, but has some safety concerns
- A portable filter method is used more often for larger fryers
  - A wheeled cart is rolled under the fryer, oil is poured directly onto a filter or screen, then through a pump, and a hose back into the vat
  - Does an excellent job filtering, but is more expensive and requires a storage area
- Built-in filters are generally used for multiple fryers
  - The filter unit, stored in a cabinet below the fryer, automatically transfers oil from the vat to a tank where filtering occurs
  - The vat may be cleaned while the oil is being filtered
  - Does an excellent job filtering the oil and is the most expensive, but does not require extra space for the filter

Purchase Recommendations

- If frying more than one product in the same frying oil and the products have strong flavors (fish, for example), purchase more than one fryer to avoid transfer of flavors
- Check fryer capacity
  - If frying less than 65 lbs. (30 kg) of fries/hour, a countertop model can be used
  - If greater than 65 lbs. (30 kg), a free standing fryer is needed
  - If frying greater than 100 lbs. (45 kg) of fries/hour, more than one fryer may be needed (check manufacturers' guidelines)
- Make sure adequate space is available
  - Need 12-24" (30-60 cm) width for each unit, 22-36" (55-90 cm) depth
- Fire protection is critical
  - Should be placed under a hood with fryer fire protection
  - Should be positioned at least 16" (40 cm) away from surface flame cooking equipment such as gas ranges
  - When using a solid or semi-liquid shortening there must have a melt cycle for safety reasons

- If frozen foods are the primary frying items, the fryer should have a quick recovery time
- Consider the volume of food needed at any given time
- Consider automatic basket lifts, timers, and computer controls for maximum food quality and to save labor time
- Stainless steel that is a minimum of 18 gauge is recommended to maintain life expectancy
- Determine the appropriate filtering system (built-in, portable, manual)
- Select a fryer with a "cool zone"
  - A deep well indentation that allows crumbs to settle to the bottom of the well in an area where temperatures are lower and removes food particles from temperatures that would char or burn it and give bad flavors to the other products that are to be fried in the oil
- Consider an extended flue to move the exhaust high away from the tank
- On gas models, evaluate whether a pressure reducing valve is needed

SUMMARY

Purchasing recommendations for tilt skillets would include upgrading the metal used in the tilt skillet to stainless steel to provide production versatility and consider including spring assisted lids, power tilts, gallon markings, hot/cold faucets, and draw-offs for larger tilt skillets. Installation needs should address the most effective use and include a floor sink or grate in line with the tilt skillet's pour path

Although school nutrition programs have reduced or limited the use of fryers, they may be used in some situations. Fryers and broilers are not versatile pieces of cooking equipment, but some schools may find them useful for meeting particular production needs. Tilt skillets, on the other hand, are quite versatile and could be used for a great deal of cooking in school nutrition programs. The primary advantage of the tilt skillet is the versatility it provides in addressing menu needs.

Fryers and broilers are intense cooking methods and need both hood ventilation and fire suppression equipment. Newer fryers offer improved quality of finished products, improved efficiency, and more automation. Should a fryer be a part of the equipment purchase, school nutrition directors should decide in advance what type of filtering method should be used for their fryer as they cannot retrofit the fryer with a built-in filter, if this is desired.

Broilers require operator skill to use to prevent fire hazards. Smaller broilers are used for finishing of entrees, whereas larger broilers are used for fast cooking of thinner cuts of meats. Purchasing recommendations might include evaluating the choice of standard radiant broiler verses infrared broiler and determining whether there is a need for an attached warming oven.

CHAPTER TWELVE

COOKING EQUIPMENT: STEAM EQUIPMENT

CHAPTER HIGHLIGHTS

Steam Jacketed Kettles

- Can be used to make soups, stockpot products, double boiler products, and braised or boiled meats
- Full-jacketed models are preferred for large quantities of boiled products where products float at the surface, such as potatoes, boiled meats, pastas
- Two-thirds jacketed models are preferred for products that are not boiled, such as soups, stews, sauces, bisques, puddings, pie fillings
- For larger models, consider getting bottom drawoffs, counterbalanced or spring-assisted covers, and kettle mounted faucets with hot and cold water
- Consider splash guards, drainage pits, stainless steel, ventilation hoods, condensate ring, installation, capacity, power stirrer, shallow style kettle, cold water jacket, and the need for flexibility

Steamers

- Water treatment of hard water is critical for steamers
- Advantages include faster cooking, uses less water and energy, results in better nutrient retention, less product shrinkage, and reduced labor
- Disadvantages include ease of overcooking, carry-over flavor, difficulty in cooking frozen food, and lack of browning
- Best practices include cooking vegetables al dente, cooking uniform size food, defrosting before cooking, not using plastic wrap or aluminum foil during the cooking process, using a perforated pan for most cooking, water filtration, and regular deliming of equipment

Pressureless or Convection Steamers

- Use more water and energy than pressurized steamer, but have less flavor transfer, doors can be opened during the cooking process, and they are less expensive
- Purchase recommendations include considering an automatic deliming or filtration system, evaluating gaskets, selecting good doors, selecting a suitable location, evaluating available steam capacity, looking at overall production needs

Low-pressure Steamers

- Typical pressure of five pounds per square inch (psi) in a low-pressure steamer produces a temperature of 227° F (108° C)
- Used for large volume preparation and will hold up to eight standard-sized sheet pans per compartment

High-pressure Steamers

- Cook at the highest steamer temperatures, a pressure of 15 psi produces a cooking temperature of 250° F (121° C)

CHAPTER HIGHLIGHTS *(continued)*

- Capacity is generally less than low pressure models as they only may hold three standard-sized pans

Combination Convection Oven Steamers (Combi-ovens)

- Able to cook in hot air mode, steam mode, and a combination of both modes
- Flexible, fast, and able to reduce shrinkage and enhances the quality of some cooked foods
- First introduced into the U.S. in the 1980's
- Highly programmable
- Gas or electric models are available, but gas models require electricity
- Needs a nearby floor drain
- Energy efficient
- Can be half size or full size

Boiler Free, Boilerless, or Connectionless Steamers

- Do not require a boiler, water filtration system, steam connection, or even a plumbing connection
- Water is added manually into a tank with a heating element which then creates steam in the cabinet

Cooking Equipment: Steam Equipment

Introduction

Steam cooking can be done in a diverse group of equipment. Some of the equipment, such as steam jacketed kettles, have undergone relatively few changes for many years (steam jacketed kettles have been manufactured for at least 100 years). Others such as combination convection oven steamers, convection steamers, and boilerless/connectionless steamers are newer and have become very popular in some school nutrition programs.

Proper sizing of equipment is essential. Production capacity is highly dependent on the piece of equipment, the type of food being prepared, the temperature of food put into the compartment, and the size and number of pans that can be used or the overall size of the steam jacketed kettle. These should be evaluated carefully based on the school's menu and the school nutrition director's knowledge as the *Trusted Advisor* in making equipment decisions. Additional detailed information on steam equipment's capacity can be obtained from manufacturers or through the website for the North American Foodservice Equipment Manufacturer's Association website at http://www.nafem.org. One example of a resource at this website is a pdf document titled *Handbook of Steam Equipment*. Manufacturers' information, if used, should be evaluated carefully. Capacity estimates will generally not take into account actual use factors, such as the time needed to load or unload the equipment, or the time needed for pressure build-up prior to cooking.

Steam Jacketed Kettles

Steam jacketed kettles have been one of the mainstays of the cooking equipment choices. Steam jacketed kettles can be used to make soups, stockpot products, double boiler products, and braised or boiled meats. The advantage of using steam jacketed kettles is that it reduces preparation time for products that would otherwise be prepared on a range top. Some estimates are that it reduces the time needed for boiled products by one-third.

Purchase Recommendations

- Selection of full or two-thirds jacketed models, referring to the amount of surface area of the inner jacket that transfers steam heat, should be based on the products that will be prepared in the kettle
  - Full jacketed models are preferred for large quantities of boiled products where products float at the surface such as potatoes, boiled meats, pastas
  - Two-thirds jacketed models are preferred for products that are not boiled such as soups, stews, sauces, puddings, pie fillings
- For pastas, baskets are helpful accessories to eliminate the draining process
- For larger wall- and floor-mounted kettles, evaluate the tilting mechanism for how easy it is to use and consider whether a bottom draw-off is needed
- For larger models, consider these optional accessories:
  - Bottom draw-off pipe style drains used for pouring the food into pots or pans (available in 1, 2, 3 inch diameter or 2.5, 5, 7.5 cm sizes, based on product usage)
  - Counterbalanced or spring-assisted covers

  - Kettle mounted faucet with hot and cold water
  - Kettle mounted mixing motor, particularly for models which are 80 gallons and above
- Because products are hot, purchase splash guards for both tilting and drawoff models
- Drainage pits are recessed areas in the floor with a drain and are highly recommended for wall and floor mounted models in new construction
- Upgrade to stainless steel for more longevity when preparing diverse food products
- Steam jacketed kettles must be placed under ventilation hoods if braising meats or entrées
- Check local regulations for specific ventilation requirements
- A condensate ring option on a steam jacketed kettle protects the employee from hot dripping condensate when the lid is raised
- Consider when writing the specification what type of mounting/installation (pedestal, legs, wall) is needed
- Table models are available up to 20 quarts
- Floor or wall models are available up to 200 gallons
- Kettles greater than 40 gallons require a power stirrer attached to the side of the kettle which mechanically mixes the food in the kettle
- Shallow kettles are preferred for foods that are easily crushed
- Some kettles have a connection to cold water within the jacket which can be used for faster cooling of mixtures, such as pastas to prevent overcooking
- Purchase the size required based on maximum volume required for any recipe
- Two kettles may provide more flexibility for multiple recipe preparation
- All kettles require head space (80% of listed capacity) for safe operation
  - Nominal kettle capacity is the calculated maximum volume when filled to the rim
  - A minimum of 2-3" of clearance below the rim is needed for stirring and to avoid boiling over

Steamers

Steamers use a closed cavity with moist steam heat at pressures from 0-15 lb. (0-6.8 kg) to cook the food. Steamers can be pressureless, low-pressure, or high-pressure, or combination steamers. Steamers are often the cooking method of choice with delicate items, such as fish and some vegetables that need to be kept whole during the cooking process and fast cooking of vegetables, pasta, rice, potato, or meat products, either in small batches or volume. Steamers are often stacked and a separate timer is recommended for each compartment. Steamers should hold standard sized steamtable pans and the slides should allow the pan to be pulled out 2/3 of the way without tipping.

All steamers, both pressureless and pressurized, provide a very efficient and fast heat transfer cooking method. In fact, the rate of heat transfer in cooking speed is very rapid in a steamer as compared to a standard conventional oven. To illustrate this, if you stick your hand into a preheated oven, you are not immediately burned although it will feel quite hot. By contrast, if you place your hand over a pan of boiling water or a tea kettle, you will be scalded in a matter of a few seconds.

In addition, steam cooking uses less energy than convection ovens and allows for preparation of food closer to the time of service. This is an advantage for delicate foods, such as vegetables that might dry out if held for a long time in a warming cabinet.

It is critical to treat hard water for use in steamers. When steamers are being selected, school nutrition directors should carefully consider their water quality and their possible need for filtration systems and automatic deliming options. Warranties and service agreements may not cover repairs for breakdowns caused by water hardness. Since water quality varies from one geographic area to another, it is best to have a water analysis conducted prior to building a new kitchen or purchasing a steamer. In doing so, serious problems can be deferred. For example, dirt may clog equipment, excess chlorine can cause corrosion, and lime or scale build up can lead to equipment breakdown. Recommendations for water quality consist of:

- Total dissolved solids are no greater than 60-80 parts per million (ppm)
- pH is neutral or near neutral (7.0-8.0)
- Water hardness is no greater than 2.0 grains
- Chlorine is no greater than 25-30 ppm

Finally, schools should check with the local health department and fire code to make sure of venting and other requirements for steamers. Regulations may vary from one area to another.

Advantages of steam cooking include:

- Faster cooking
- Uses less water than boiling
- Uses less energy than boiling
- Results in better nutrient retention
- Results in less product shrinkage
- Reduced labor demands associated with pan washing

Disadvantages of steam cooking include:

- It is easy to overcook foods, although newer steamers may have more accurate thermostats, including a load compensating thermostat to automatically adjust cooking time by the volume of food cooked
- Carry-over flavor from one product to another can occur if the equipment is not properly cleaned, although some of the newer steamers have an open free-vented drain which allows food waste and condensate to automatically be collected and removed out the drain to minimize carry-over flavors
- Frozen blocks of products, such as frozen vegetables, do not cook well
- Steam cooking does not brown foods

Steam sources for cooking equipment may include:

- Central steam plant
- Self-contained steam made by a boiler installed in the equipment itself and powered by gas or electricity
- Direct steam made by a boiler near the kitchen
  - Contains descaling agents and is not allowed to have direct contact with food
- Regenerated/steam coil generated steam made from direct steam that is provided to a coil immersed in water that then produces "clean steam"
  - This may be the type of steam used for steamers that have steam touch or contact the food during heating

Best Practices

- Be careful of overcooking, as this is the most common mistake in steam cooking
- Cook vegetables al dente
- Make certain foods are uniform in size to create more even cooking
- Defrost frozen vegetables before pressure cooking
- Frozen products should first be defrosted and then separated and/or stirred for actual cooking
- Do not use plastic wrap or aluminum foil as covers in pressure steamers
- Consider the effect of the pan depth in cooking, as food in shallow pans will cook faster than in deep pans
- Perforated pans should be used for most foods for faster cooking, with the exception of scrambled eggs and dried fruits that are being dehydrated
- For pasta, nest a perforated pan in a solid pan filled with cold water
- Consider water filtration for the steamer
- Descale or delime steam equipment on a regular schedule

Pressureless or Convection Steamers

Pressureless steamers, also called convection steamers, cook food in an enclosed cabinet at temperatures of 212° F (100° C). Steam is injected into the cabinet and creates a kind of current of convection steam. Some units also have a fan to help distribute steam.

Convection steamers can be either gas or electric. Steam sources can be from self-contained generators or direct steam from a central supply or external boiler. Installation of the steamer in an area with a drain reduces the hazard of wet or slippery floors.

Pressureless steamers are used for rapid cooking of vegetables and other foods. They are ideal for cooking vegetables because they minimize vitamin, color, and texture changes, and minimize shrinkage.

There are several differences between pressureless and pressurized steamers. For example, pressurized steamers use less water and energy than pressureless steamers. On the other hand, in pressureless steamers, steam is vented and the condensate is drained off to reduce less flavor transfer. In addition, one of the biggest advantages to the use of pressureless steamers is that the door can be opened during the cooking process, whereas the door cannot be opened during cooking with a pressurized steamer, without it being a serious safety hazard. Finally, pressureless

steamers are generally smaller and less expensive than pressurized steamers. Because of their easy use, more than half of the steamers sold in the U.S. are pressureless steamers.

The use of pressureless steamers has grown, particularly those with self-contained generators. In addition, manufacturers have recently improved pressureless steamers so cooking speed and volume capacities are greater, therefore, increasing their usefulness. Finally, some of the newest types of steamers may have the option of either pressureless or pressure steaming.

Purchase Recommendations

- Consider an automatic deliming option
- Consider adding a filtration system if the water is hard
- Evaluate the gaskets carefully because good gaskets need to be very heat resistant and provide a good seal to prevent steams leaks
- Select doors that can withstand much abuse
- Consider placement location carefully, as all steamers require:
  - A floor drain
  - A place for pan storage
  - Utilities, such as the steam, gas, or electricity
  - A level floor
  - A ventilation hood
- Consider steam capacity if the unit is not self-contained, because it will impact other pieces of steam equipment that are connected into the same steam line
- General guidelines to consider for steam equipment that is not self-contained:
  - It takes 75 boiler horse power (BHP) for one steamer compartment and 1 BHP per 20 gallons of steam jacketed kettle capacity
  - If the steam line can not accommodate additional steam equipment, a self-contained steam unit can be used
  - Consider steam pressure levels for each piece of steam equipment
  - When steam pressure levels differ for multiple pieces of equipment, a valve is needed to accommodate the different pressure levels
- Consider overall production needs
- Two smaller steamers may be better than one larger steamer, unless similar sized pieces of food are being cooked together such as multiple pans of vegetables
- The size and type of steam equipment varies tremendously among schools, although general foodservice guidelines might suggest the following for the size of steamer based on the number of meals served per hour:

Size of operation	Size of steamer
0-200 meals/hour	1 single compartment
200-400	1 double
400-600	1 triple
600-800+	1 quadruple or 2 double

High-pressure Steamers

High-pressure steamers cook at the highest steamer temperatures. Pressure levels may go up to 15 psi depending on the manufacturer and the model purchased. A pressure of 15 psi produces a cooking temperature of 250° F (121° C). Their capacity, however, is generally less than low-pressure models as they only may hold three standard-sized steamtable table pans. Because of this, they are generally used for small batches cooking techniques. High-pressure steamers come in both countertop and cabinet models, and may be either gas or electric. Steam is usually regenerated/steam coil generated. Steamers will require hook up to drains.

Low-pressure Steamers

Low-pressure steamers have better productivity and lower operating costs than pressureless steamers when volume cooking is being done. Power requirements for low-pressure steamers are the same as high-pressure steamers, except that they may use self-contained boilers, direct steam from a central source, or steam produced from another part of the building, which is then used to make steam for the steamer through a steam coil heat exchanger. Hook up to drains is also required. The cooking temperature in low-pressure steamers is higher than pressureless steamers, but lower than high-pressure steamers. The typical pressure of five psi in a low-pressure steamer, for example, will produce a temperature of 227° F (108° C) in contrast to pressureless steamers that only produce a cooking temperature of 212° F (100° C). Low-pressure steamers are used for large volume preparation and will hold up to eight standard-sized steamtable pans per compartment.

Combination Convection Oven Steamers

The combination oven steamer commonly referred to as combi-oven, offer a single chamber with the ability to cook in three modes. These are the hot air mode (convection oven), a steam mode (convection pressureless steamer), and a combination of both modes (circulating hot air with superheated steam). The combi-oven may cook in all three modes independently or in sequence moving from one mode to another depending on the menu item. For example, one can start the cooking cycle of a meatloaf in the steam mode to sear the outside and accelerate the cooking process, move to the combination mode to reduce shrinkage and the cooking time, and finish in a high temperature convection hot air mode to enhance the outside color. Advantages to combi-ovens include:

- Flexibility
- Reduced cooking time
- Less shrinkage of meat products
- Enhancement of food quality
- Large cooking capacity

Combi-ovens were introduced in Europe in the 1970s and the United States in the mid-1980s. Their use has become quite common in the U.S. because they provide very fast and flexible cooking. Combi-ovens are also highly programmable to efficiently combine the different cooking technologies of pressureless steam and convection heating to produce high quality food products. There is also a holding mode for finished products for short time periods of an hour or less. Combi-ovens can be used on a countertop or a cart, and are available in stacking or roll-in models.

Combi-oven modes provide production flexibility. The most commonly used modes by products include:

- Dry cooking mode
  - Bakery products
  - Pizza
- Steam cooking mode
  - Vegetables
  - Seafood
  - Rethermalization
- Combination mode
  - Pastries
  - Breads
  - Meats

In combi-ovens, steam is produced by a self-contained steam generator. Softened water is recommended for combi ovens. A cold water connection is required, as well as an indirect waste pipe with an air gap for the floor drain. Gas or electric models are available, but gas models will still require electricity. Combi-ovens should be installed with an open air gap drain underneath the oven, as recommended by the manufacturer. Combi-ovens are more expensive than standard ovens, but may be used to replace two pieces of cooking equipment and may also be space-saving. Combi-ovens are thought to be 60% more energy efficient as compared to standard ovens.

Combi-ovens are available in two generic sizes which are half size and full size. Half size models accommodate 12" x 20" x 2" pans or 13" by 18" pans. Full size models accommodate 12" x 20" x 2" pans and 18" x 26" pans. Both sizes are available in several capacity sized models. Some manufacturers describe sizes in levels or pan racking positions, such as 10 levels. Models up to 10-11 pan capacity can be mounted on tables, stands, or even double stacked. Both half and full size models in the 20 pan capacity can be placed on carts which provide space for pan storage below the oven. Additional options and accessories available for extra cost include:

- Stainless steel support stands
- Landing or loading tables
- Roll-in carts
- Pan slides for stands
- Additional pan racks/wire shelves
- Casters
- Water treatment system
- Special electrical requirements

Boiler Free, Boilerless, or Connectionless Steamers

- Different manufacturers have different names for this type of steamer
- This type creates steam in the cabinet from water which is manually introduced into a tank with a heating element
- These are useful for low to medium volume operations because they hold three to six pans

- They are easily movable, although they still require electricity and use considerably less water than other types of steamers
- They may not require a water filtration system
- Some may not require any type of plumbing connection, while others may have plumbing connections to automate the drain control, draining the generator when the main power is off or the water level control through the use of low-water and high-water probes so there is no need to refill or monitor the water level during cooking
- One consideration is that they may have slower cooking times than standard steamers
- This type of steamer will require careful use, as employees may still be burned by steam when the door is opened
- This type of steamer requires time to heat up

SUMMARY

Steam cooking equipment includes a diverse group of equipment, some of which have been used for 100 years or more and other types which are quite new. Steam cooking generally offers speed, energy savings, labor savings, and good nutrient retention as compared to other types of cooking.

Steam jacketed kettles are found in many school nutrition operations and can be used to make soups, stockpot products, double boiler products, and braised or boiled meats. They come in full or two-thirds jacketed models. More options are available on larger capacity kettles.

The choice of steamer type depends on the volume and speed needs of the school nutrition program. For all types, water treatment of hard water is critical. Overcooking is the most common mistake with steamers. Pressureless steamers are one of the most popular types in foodservices. They use more water and energy than pressurized steamers, but offer the advantages of less flavor transfer and the flexibility of being able to open the door during the steaming process. Low-pressure steamers are used for large volume preparation. Interestingly, high-pressure steamers cook at higher temperatures, but do not handle as great a volume because they are only able to hold three standard-sized pans.

Combi-ovens have also become very common in school foodservice operations. The combi-mode is highly flexible as it can cook in hot air mode (convection oven), a steam mode (convection pressureless steamer), and a combination of both modes (circulating hot air with superheated steam). Connectionless steamers offer desirable flexibility and are becoming more popular in schools.

CHAPTER THIRTEEN

Refrigerated and Low-Temperature Storage Equipment

CHAPTER HIGHLIGHTS

Refrigerators and Freezers

- Mechanical parts
  - Evaporator
  - Compressor
  - Condenser (air or water cooled)
- Water cooled condensers are more expensive, but last longer, require fewer repairs, and operate better in hot climates or conditions
- Walk-in refrigerators and freezers are appropriate for large quantity storage
- Reach-in refrigerators are the main use refrigerators
- Under-the-counter refrigeration provides convenience
- Roll-in and pass-through refrigerators are useful for racks and rolling carts
- Milk or ice cream chest-style units are often used in service areas where doors are opened frequently
- Outside walk-in units may add needed storage space when no more interior space is available
- Amount and types of refrigerated storage will vary with the menu, delivery frequency, volume and type of preparation, use of commodity foods, and reliance on refrigerated versus frozen food products
- School nutrition directors act as *Trusted Advisors* in determining the amount of refrigerator and freezer space needed. The amount will depend on:
  - Number of meals offered
  - Types of meal/snack programs offered
  - Type of menu
  - Delivery frequency
  - Volume of preparation done
- General purchasing recommendations for all refrigerators and freezers include:
  - Purchase only commercial equipment
  - Evaluate the refrigerant and purchase new rather than used equipment
- Purchasing recommendations for reach-in refrigerators include:
  - Determine the number of compartments needed
  - Evaluate the insulation, construction materials, doors, and gaskets
  - Check the thermometers
  - Determine freight rate and warranties
- Purchasing recommendations for walk-in refrigerators include:
  - Evaluate the insulation, construction materials, doors, and gaskets
  - Check the thermometers
  - Determine freight rate and warranties
  - Determine whether alarms would be useful

CHAPTER HIGHLIGHTS *(continued)*

- Purchasing recommendations for reach-in freezers include:
  - Determine the number of compartments needed
  - Evaluate the insulation, construction materials, doors, and gaskets
  - Check the thermometers
  - Determine freight rate and warranties
- Purchasing recommendations for walk-in freezers include:
  - Evaluate the insulation, construction materials, doors, and gaskets
  - Check the thermometers
  - Determine freight rate and warranties
  - Determine whether alarms would be useful

Energy Efficiency for Refrigerators and Freezers

- Minimize the number of times doors are opened

Blast Chillers and Freezers

- Blast chillers and freezers very rapidly cool foods through the use of a forced air current
- Purchasing recommendations include:
  - Select heavy duty components
  - Choose larger compressors
  - Compare fans

Ice Machines

- Four types are those that only make ice, those that make and store ice, those that dispense ice, and those that make and dispense ice
- Choice of ice machine is affected by the volume produced
- Generally between one to three pounds of ice are needed per customer
- Purchasing recommendations include:
  - Purchase countertop or under-counter models for smaller/moderate quantities, floor models for larger quantities
  - Consider buying two units if need will vary throughout the day
  - Evaluate manufacturers' sizing charts carefully
  - Select ice cube shape and size based on the intended use of the ice
  - Consider water softening and/or filtration

Refrigerated and Low-Temperature Storage Equipment

Introduction

Refrigerated and low-temperature storage equipment is designed to keep potentially hazardous food cold so that it is out of the temperature danger zone where microorganisms might grow. In addition, although it is not as obvious, cold temperature equipment serves at least three other purposes. They are to preserve the quality of the food put into them, lengthen the shelf life of fragile foods, and enhance the sensory perception of foods that might be stored in them.

For these reasons, good cold holding equipment is extremely important. The selection of efficient cold holding equipment is also important because the equipment operates continuously and it must be energy efficient. Small differences in insulation or the way the equipment is used can impact energy use and costs to run the equipment.

Insulation and the way the equipment is used also affects the temperatures of the food held in refrigerated and low-temperature storage equipment. This is critical also because cold holding equipment faces a huge task in achieving and maintaining food to the proper temperatures. Some equipment can not handle this task very well when they are not used them wisely. Without proper cold holding, a foodservice operation would be shut down by a health inspector. Good holding equipment is absolutely key to the safety, quality, shelf life, and sensory perception of the food served in school nutrition operations.

Location of the refrigerated and low-temperature equipment is important for efficiency of the equipment. Refrigeration should be placed conveniently for food deliveries and storage, but also located in areas where employees will be using them.

Refrigerators and Freezers

All refrigerators and freezers are composed of three mechanical parts. They are the evaporator, compressor, and condenser. The evaporator is located inside the cabinet and helps to convert the refrigerant into a gas to help in cooling. The compressor is often located above the cabinet or outside the kitchen and performs the pumping of the refrigerant. The condenser may be located either inside or outside the kitchen and converts the refrigerant gas back into a liquid so that the process may be repeated. As the three parts work appropriately, maximum efficiency is achieved.

Condensers may be air or water cooled. Prices will be higher for water cooled condensers, but they are generally considered more effective. Advantages and disadvantages to both systems as shown below.

Air Cooled Condensers

- Do not operate well in extremely hot climates or conditions
- Require more frequent repairs
- Have a shorter lifespan
- Are less expensive

Water Cooled Condensers

- Operate well in the kitchen
- Require less frequent repairs
- Last longer
- Are more expensive

Most new refrigerators do not need a separate plumbing connection because they are now equipped with an automatic defrost and condensate disposal system. The need for a separate plumbing connection should still be checked, however. In addition, local sanitation codes should be consulted. For example, floor drains are generally prohibited inside refrigerators. The type and amount of refrigeration that is needed should be considered carefully. Because of their size and utility needs, changes after construction are extremely difficult. Types of refrigeration and their "ideal" use are given below:

- Walk-in refrigerators and freezers are considered most affordable for storage of large quantity
- Reach-in refrigerators and freezers are often viewed as the major form of refrigeration in most foodservice operations, as they are preferred if constant access is required
- Pass-through refrigerators act as a wall dividing two work areas where food needs to be accessible from both sides
- Under-the-counter refrigerators/freezers or refrigerator/freezer drawers are useful if constant access is required, particularly for smaller quantities
- Roll-in refrigerators are used in quantity preparation where racks and rolling carts are heavily depended upon to transport food to the refrigerator
- Mobile refrigerators are used to transport food to other locations as temporary holding refrigeration
- Combination refrigerator/freezers provide a great deal of flexibility due to the ability to switch the unit from a refrigerator to a freezer and back as the need arises, but are more expensive and are generally used in similar situations to reach-in refrigerators
- Milk or ice-cream chest-style refrigerators and freezers are often used in service areas because they are energy efficient when doors are opened frequently
- Outdoor walk-in refrigerators or freezers may be used to add additional cold space, but special consideration is needed to accommodate outdoor placement

The amount of refrigerator and freezer space that is needed for school nutrition programs is different for each school. School nutrition directors functioning as *Trusted Advisors* should understand the program profile associated with each school to truly determine appropriate refrigerator and freezer space requirement. The amount of space will depend on:

- Number of meal programs offered
- Type of menu and variety
- Type of production
- Type of recipes and forms of ingredients
- Frequency of food deliveries
- Volume of preparation based on number of customers served
- General advice
  - Schools receiving deliveries multiple times per week will need less space
  - Schools receiving less frequent deliveries will need more space
  - Two times as much refrigerated space is suggested as compared to the volume of

freezer space, but newer schools are now being planned with a greater volume of freezer space as compared to refrigerated space
- 159 cubic feet of refrigerated space may be needed for every 250 lunch meals served, with additional space for breakfast meals and afterschool snacks
- 28 pounds of food will fit into a cubic foot of refrigerated storage space

These guidelines are highly dependent on the individual school. For example, some schools will use the opposite amount of freezer versus refrigerated space. In these schools, they may allow for twice as much freezer space as for refrigerator space. Their reasons include a greater reliance on convenience and processed foods due to a shortage of labor and high labor/benefit costs, the food safety benefit of using frozen food, use of frozen commodity foods, and other frozen foods such as bread products.

If space and the budget are not limited, the ideal kitchen would provide a variety of refrigerators and freezers for both bulk storage and convenient storage near work areas. In addition, it would include refrigerators and freezers in the service areas for both holding of pre-prepared products for the serving line and for self-service areas. More specifically, it would likely include:

- Walk-in refrigerators/coolers
- Walk-in freezer
- Roll-ins/Reach-ins by
  - Hot food production
  - Salad
  - Dessert/bakery
- Reach-in/pass-through and chest refrigerators and freezers in the service area as needed, including a milk coolers

Purchasing Recommendations for Refrigerators and Freezers

For all refrigerators and freezers, it is important to remember that only commercial pieces of equipment may be used in the school nutrition program. Home models of equipment should never be used in a commercial operation.

In addition, for all refrigerators and freezers, it is important to evaluate the type of refrigerant. This is an issue when buying a used refrigerator because of changes in regulations regarding the use of environmentally friendly refrigerants. For example, the production of chlorofluorocarbon (CFC) containing refrigerants was banned in 1995, although their use in existing systems is still allowed. Retrofitting can be done, although expensive and it may be a stress on other components of the refrigeration system which may cause the system to fail. The purchase of used refrigeration equipment is generally not recommended for several reasons. The primary reasons include:

- The CFC issue/retrofitting is expensive
- Lack of warranty on compressor or coil
  - Most warranties on new equipment are 12 months for refrigeration unit and 5 years on compressor motors
- Cost of disassembling, moving, reassembling walk-in units
- Life expectancy is between 5-20 years according to most manufacturers, although many older models are still in use

Purchase Recommendations for Reach-in Refrigerators

- Determine desired number of compartments
  - Multiples of 1, 2, or 3, are common and 4 are possible, but will require wide doorways for delivery of these units
  - Each compartment generally has 20-25 cu. ft.
    - Single compartment 20-25 cu. ft.
    - Double compartment 46-52 cu. ft.
    - Triple compartment 70-80 cu. ft.
    - Quadruple compartment 100 cu. ft.
  - Interior compartment space may vary with brand name
  - Bottom mounted refrigeration will reduce interior storage space and require a door that is ½ the height of a regular door
  - Top mounted refrigeration has more interior storage space
- Evaluate the insulation
  - Good insulation allows flexibility if the cold holding temperature requirements are lowered (for example to 35° F or 2° C)
  - Industry standard equals 2 to 3" rigid or foamed in place polyurethane
- Select the exterior materials carefully, as it can change cost by 30-35%
  - Satin or polished stainless steel is considered the best
  - Anodized aluminum is less expensive than stainless steel and may be acceptable if the sides are hidden
  - Laminated surfaces are one of the least expensive and more commonly used in home refrigerators
  - Plastic or vinyl finishes over steel is a less expensive alternative
  - Fluorescent lighting and white ceilings also create more brightness to the interior of the refrigerator or freezer
- Determine whether shelves or slides are preferred
- Slides are a flexible choice, but will require the use of pans
  - Near the serving line, slides may be preferred when these refrigerators are used as pass-through units
  - Determine the type and number of slides based on the pans that will be used for that serving area
- Determine preferred hinges (right or left); three hinge doors provide more stability
  - Choose the opening so that it is opposite of the work area, allowing more access to the food products
  - Should lock at 90° angle, although some allow 120° or 180° door swings and adjustable stops to provide access in tight spaces
- Select door opening type and size
  - Solid doors have better insulation
  - Glass doors allow staff to view the inventory of prepared items, minimizing opening of doors to locate food
  - Sliding doors are an option
  - Split or half doors decrease the amount of cold air lost when door is opened, but yields less interior storage and smaller size door opening for large items
- Choose door closers
  - Latch style
  - Magnetic seals, providing a tighter close to the door

- Evaluate the gaskets
  - Type of gasket to promote cleanability, durability, and ease of replacement
  - Purchase gasket heaters as an option to prevent condensation in high humid climates
- Check thermometers
  - External thermometers make it easy to frequently check the temperature
  - Should be accurate to within 3° F (about 2° C)
  - Inside thermometers are appropriate and provide added verification of unit temperatures
  - Consider linking the thermometers to the school alarm system for added protection of food when power or equipment failures occur
- Determine freight rate
- Compare warranties

Purchase Recommendations for Walk-in Refrigerators

- Determine whether pre-fabricated or pre-engineered units are desired
  - Consider purchase price, freight cost, and construction/installation costs
  - Walk-ins built on-site may be constructed with Styrofoam insulated walls and have glazed tiles
  - Pre-fabricated or pre-engineered units may be built with 4-6" thick insulated modular panels
  - Many manufacturers use fiberglass reinforced plastic (FRP) for the framing
- Evaluate the insulation
  - Appropriate thickness will vary
  - Verify insulation rating because some types may need to be 4-6" thick
  - Urethane provides better insulation and does not need to be as thick as fiberglass, polystyrene, or styrofoam insulation
  - Floor may be insulated to prevent sweating from condensation
- Determine whether approved to use food storage pallets on the floor for additional storage
- Select door opening type and size
  - Doors should be durable to resist the impact of carts so that they will not dent, rust, warp, or scratch
  - Solid doors have better insulation
  - Glass doors or viewing windows allow staff to have a better view of the type of products inside (which may minimize door opening to find certain foods)
  - Small access doors on walk-in coolers are also very useful
  - Compare the size of the door opening with the width needed for roll-in carts
- Choose door closers
  - Latch style
  - Magnetic seals provide a tighter closer
  - Door snubbers help to pull a door closed when it starts to shut
- Consider getting a kickplate (i.e. diamond tread) to improve durability and prevent damage to the door
- Evaluate gaskets
  - Type of gasket to promote cleanability, durability, and ease of replacement
  - Gasket heaters are an option to prevent condensation in humid climates
- Confirm best location for condensation drainage pipes to prevent interference with kitchen work

- Check thermometers
  - External thermometers make it easy to frequently check the temperature
  - Should be accurate to within 3° F (about 2° C)
  - Inside thermometers are appropriate and provide added verification of unit temperatures
  - Consider linking the thermometers to the school alarm system for added protection of the food when power or equipment failures happen
- Determine freight rate
- Compare warranties
- Determine whether alarms would be useful to send alerts when the temperature rises above an established level

Purchase Recommendations for Reach-in Freezers

- Determine desired number of compartments
  - Multiples of 1, 2, or 3, are common (4 are also possible, but will require wide doorways for delivery of these units)
  - Each compartment generally has 20-25 cu. ft.
    - Single compartment 20-25 cu. ft.
    - Double compartment 46-52 cu. ft.
    - Triple compartment 70-80 cu. ft.
    - Quadruple compartment 100 cu. ft.
  - Interior compartment space may vary with brand name
  - Bottom mounted refrigeration will reduce interior storage space and require a door that is ½ the height of a regular door
  - Top mounted refrigeration has more interior storage space
- Evaluate the insulation
  - Good insulation allows flexibility if the cold holding temperature requirements are lowered, for example to 35° F or 2° C
  - Industry standard equals 2-3" rigid or foamed in place polyurethane
- Select the exterior materials carefully, as the selection can influence the overall cost by 30-35%
  - Satin or polished stainless steel is considered the best
  - Anodized aluminum is less expensive than stainless steel and may be acceptable if the sides will be hidden
  - Laminated surfaces are one of the least expensive and are commonly used in home refrigerators
  - Plastic or vinyl finishes over steel are a less expensive alternative and are easy to clean
  - Fluorescent lighting and white ceilings also create more brightness to the interior of the refrigerator or freezer
- Determine whether shelves or slides are preferred, slides are a more flexible choice, but will require pans
- Determine preferred hinges (right or left); three hinge doors are also better for stability
  - Choose the opening so that it is opposite of the work area, allowing the employee be access
  - Should lock at 90° angle, some allow 120° or 180° door swings and adjustable stops to provide access in tight spaces

- Select door opening type and size
  - Solid doors have better insulation
  - Glass doors allow staff to view the inventory of food items, minimizing the need to open door
  - Sliding doors are also available
  - Split or half doors decrease the amount of cold air lost when the doors are opened, but yield less interior storage and smaller size door openings for large items
    - Split or half doors that individually lock may be very useful, depending on type of use
- Choose door closers
  - Latch style
  - Magnetic seals provide a tighter close to the door to minimize cold air loss
- Evaluate the gaskets
  - Type of gasket to promote cleanability, durability, and ease of replacement
  - Purchase gasket heaters as an option to prevent condensation in high humid climates
- Check thermometers
  - External thermometers make it easy to frequently check the temperature
  - Should be accurate to within 3° F (about 2° C)
  - Inside thermometers are appropriate and provide added verification of unit temperatures
  - Consider linking the thermometers to the school alarm system for added protection of food, due to power or equipment failures
- Determine freight rate
- Compare warranties

Purchase Recommendations for Walk-in Freezers

- Determine whether pre-fabricated or pre-engineered units are desired
  - Consider purchase price, freight cost, and construction/installation costs
  - Walk-ins built on-site may be constructed with styrofoam insulated walls and have glazed tiles
  - Pre-fabricated or pre-engineered units may be built with 4-6" thick insulated modular panels
  - Many manufacturers use fiberglass reinforced plastic (FRP) for the framing
- Evaluate the insulation
  - Appropriate thickness will vary
  - Verify the insulation rating because some types may need to be 4-6" thick
  - Urethane provides better insulation and does not require the thickness of fiberglass, polystyrene, or styrofoam
  - Floor needs to be insulated to prevent sweating from condensation
  - Doors should not freeze shut
- Determine whether approved floor pallets are needed for additional storage
- Select door opening type and size
  - Doors should be durable to resist the impact of carts so that they will not dent, rust, warp, or scratch
  - Solid doors have better insulation
  - Glass doors or viewing windows allow staff to view the type of products inside, minimizing opening of door
  - Compare the size of the door opening with the width needed for roll-in carts

- Choose door closers
  - Latch style
  - Magnetic seals provide a tighter closer
  - Door snubbers help to pull a door closed
- Consider getting a kickplate to improve durability and prevent damage to the door
- Evaluate the gaskets
  - Type of gasket to promote cleanability, durability, and ease of replacement
  - Gasket heaters are an option to prevent condensation in high humid climates
- Confirm best location for condensation drainage pipes to prevent interference with kitchen work
- Check thermometers
  - External thermometers make it easy to frequently check the temperature
  - Should be accurate to within 3° F (about 2° C)
  - Inside thermometers are appropriate and provide added verification of unit temperatures
  - Consider linking the thermometers to the school alarm system for added protection of food when power or equipment failures happen
- Determine freight rate
- Compare warranties for all parts of the unit
- Determine whether alarms would be useful to send alerts when temperature rises above an established level

Energy Efficiency of Refrigerators and Freezers

To best use refrigerators and freezers, the single best practice is to minimize the number of times that the door is opened and closed. Other ways to increase the energy efficiency of refrigeration systems includes:

- Locating the walk-in freezer inside the walk-in refrigerator
  - When the freezer door is opened, the cold air goes into the refrigerator instead of the kitchen
- Maintain cool kitchen temperatures
- Perform routine maintenance on gaskets and coils
- Store deliveries into storage promptly
- Leave air space around foods for proper air circulation

Blast Chillers and Freezers

Blast chillers and freezers very rapidly cool foods through the use of a forced air current. They are much more efficient than regular refrigerators and freezers at cooling foods particularly if a great deal of food is prepared in advance. Their efficiency can best be explained as an analogy to wind chill temperatures in winter where the actual temperature seems colder when wind is present as compared to temperatures when there is no wind.

In addition to their food safety advantages, this rapid cooling is also likely to result in a better quality product. Blast units are common in cook-chill preparation. They are also usually adaptable to Hazard Analysis Critical Control Point (HACCP) systems because they have temperature probes, and have printing systems which allow temperature monitoring of products used in them. Because of the added fan and HACCP components, they are also more expensive than standard refrigeration. Units can be either reach-in or roll-in styles.

Blast chiller capacities vary. Smaller sizes will hold 18-30 pounds of food, medium chillers will hold 45-100 pounds, and larger sizes may hold up to 400 pounds of food. Food may be placed on shelves in reach-in style or on roll-in carts in larger units. Some blast chillers even include a conveyor belt system. Some units have casters and can be rolled from one production area to another.

Purchase Recommendations

- Select heavy duty components
- Choose larger compressors
- Choose fans with higher speeds
- Select easy to clean units
  - Access to evaporator components is important as they will need to be cleaned periodically
  - Removable racks or shelves are also easier to clean
- Choose units with automatic defrost and evaporation systems

Ice Machines

The four types of ice machines include:

- Those that only make ice in production facilities
- Those that make ice and store it
- Those that dispense ice
- Those that make and dispense ice

One of the biggest concerns related to ice machines is the volume that is produced. The need for ice will vary considerably in each school nutrition operation based on the use in the production and service areas. Should iced beverages be a part of the meal service, commonly used estimates range from slightly less than one pound per customer up to three pounds. The best choice of ice machine will depend on how much ice is needed and where it is needed.

Purchase Recommendations

- If smaller/moderate quantities are required in several locations, consider countertop or undercounter ice makers which will generally produce 25-200 pounds or 11.4-90 kg per day
- Floor models are required for larger quantities and can make up to 3,300 pounds or 1500 kg per day
- If the school has heavy peak requirements, but lighter off-peak requirements, buy two smaller stacked-type units with on “on-hold” during off-peak time periods
- Multiple units are also good if one unit goes down
- If a great deal of ice is needed in the production area and a moderate need for dispensing in the dining room or cafeteria, consider purchasing a larger ice making/storage unit for the kitchen and manually fed dispensers in a self-service location

- Evaluate carefully manufacturers' sizing charts for volume production, their assumptions are often that
  - The bin can hold the peak volume of ice produced every hour or that the ice is removed for storage elsewhere
  - Ice is not wasted
  - Ice machines are operating at peak efficiency which means the kitchen is not hot, but cool room temperature
- A 10° F (6° C) air temperature difference will decrease production by 5%
  - Ice in the bin will melt faster
  - Warm tap water to make the ice will lengthen the time needed for ice production
- Select the preferred type of condenser
  - Air cooled condensers work best if the unit is outside the kitchen, particularly if the ambient temperature exceeds 80° F (27° C), they can be located up to 100 feet away, for example on a roof
  - Water cooled condensers are less affected by warm temperatures
- Select ice cube shape and size based on the intended use of the ice
  - Smaller shaped ice melts faster, but packs easier into a glass
  - Larger shaped ice melts more slowly, but may be awkward, based on use
  - Most commonly preferred ice for beverages are straight cubes or pillow cubes
  - Salad bars use crushed or flaked ice
- Consider noise level of unit
- Consider water softening and/or filtration to improve performance of the machine
- Consider warranty and preventative maintenance

SUMMARY

Refrigeration equipment should be chosen wisely. Refrigeration is critical for the quality, shelf life, sensory characteristics, and safety of the food that is stored in them. In addition, refrigerators and freezers are among the most expensive pieces of equipment purchased in a school nutrition kitchen. They are also considered a "main use" piece of equipment. Staff open and close the doors to the refrigerators numerous times over the course of one day, therefore, they need to be accessible and convenient to provide a smooth work flow. Without them, perishable food could not be held safely. In addition, if a unit is undependable and breaks down and the food in them becomes unsafe to use, there is a great risk for losing huge amounts of food. Refrigeration equipment operates continuously, therefore, energy efficiency is a serious consideration when making this type of purchase.

Refrigeration equipment typically are one of the longest use pieces of equipment and the choices that are made affect the operation for many years. School nutrition directors functioning as *Trusted Advisors* will therefore need to consider their choices carefully. They need to purchase the types of refrigerators and freezers that best meet their operational needs. The selection options include walk-ins, reach-ins, under-the-counter, roll-in, pass-through, and chest units. Blast chillers and freezers are a more efficient style of refrigeration unit that rapidly cools food through the use of a forced air current, but are more expensive.

The choice of ice machine is also critical. Several types are available. Volume needed and the preferred shapes of ice are important considerations in ice machine purchases.

For both refrigeration equipment and ice machines there are, of course, are many manufacturers. Some of these manufacturers have been around sixty years or more. Compare brands carefully. The quality of refrigerators, freezers, and ice machines purchased is a decision that will influence the school nutrition operation for a long time.

CHAPTER FOURTEEN

Serving Equipment

CHAPTER HIGHLIGHTS

Serving Equipment

- School nutrition directors as *Trusted Advisors* understand that flexibility is key in selection of serving equipment
- Important trends:
  - Mobile serving equipment
  - Modular serving equipment

Cold Food Tables and Salad Bars

- Two types are mechanically refrigerated and non-mechanical, ice-cooled models
- Tables are based on modules of 12 x 20" and come with 2-6 units put together
- Upscale trends are to use more wood and stone-like materials
- Good insulation on the sides and bottom is essential
- Local health code requirements should be checked for drain and temperature sensing device requirements
- Considerations in self-service areas:
  - Height
  - Sneeze or breath guards
  - Tray slides
  - Attractiveness
- Self-service options:
  - Adapter bars
  - False well bottoms
  - Templates
  - Air screens
  - Casters

Hot Food Tables

- Two types are steam tables and dry tables
- Dry tables are convertible to steam tables with spillage pans
- Come in modules of 12 x 20", usually 2-6 modules are put together for a unit
- Can be preassembled or assembled on-site
- Local health code regulations should be checked for sneeze or breath guards and temperature sensing device requirements
- Not very heat efficient, best practices include:
  - Keeping the amount of food in serving pans to a minimum
  - Using covers on pans
  - Using infrared heat lamps
  - Stirring liquid foods
  - Using hot water according to manufacturer's directions
  - Prewarming plates or dishes

CHAPTER HIGHLIGHTS *(continued)*

Warming Cabinets

- Although batch preparation is preferred, short term hot holding of food is sometimes necessary
- Holding cabinets with humidity control are better at holding foods than dry cabinets
- Available as drawers or cabinets, and as reach-in, pass-through, roll-in, and roll-through models
- Warming cabinet options:
  - Bumpers
  - Heavy duty casters
  - Right or left opening hinges
  - Timers
  - Fans
  - HACCP compatible monitoring and documentation systems
  - Dual doors with dual temperature controls

Upright Display Cases

- Unrefrigerated cases are available for bakery products
- Refrigerated units are used for salads, sandwiches, juices, and dairy products
- Generally not recommended for overnight storage
- Units are generally not very energy efficient
- Upright display case options:
  - Doors or air curtains
  - Sliding or swinging doors
  - Right or left openings on doors
  - Locks

Milk Coolers

- Capacity of units will vary from 4-16 cases of milk
- Units should be evaluated for ability to maintain temperatures when the door is open
- Thermometers should be accurate and easily visible from the front

Serving Equipment

Introduction

Types of serving equipment for a school nutrition operation will be determined based from the menu. Because menus will vary, however, flexibility is key in the selection of serving equipment. School nutrition directors in their role as *Trusted Advisors* clearly understand the menu and this need for flexibility. Service trends in schools are to incorporate multiple points of service both inside and outside the dining room. Mobile equipment is particularly valuable today as it offers the most flexibility and allows conversion of the serving line from a straight line to a scatter to a food court as needed. In addition, most manufacturers now offer a variety of modular serving line choices which offer a mix and match combination of well units (generally 12 x 20 inches or 30 x 51 cm). Multiples of three and four well units are common, but more are possible. Units can also be attached to each other to increase the service choices.

Freshly prepared food is the ideal in terms of quality and food safety. However, if food needs to be prepared in advance and held prior to service, proper temperature control is critical for food safety. In addition, the Health Code requires that all potentially hazardous foods be held at proper temperatures during the service period. This is important because holding and serving equipment is generally not designed to raise or lower the temperature of food. Instead, holding and serving equipment is designed to hold already hot or cold food at the appropriate temperatures. Selection of good quality equipment and the appropriate use of that equipment are essential to keep food safe during service.

Safety for employees and student customers is also important in serving equipment to prevent injuries. Important safety features would include lockable casters, smooth corners and edges on equipment, wrap around or corner bumpers, and doors which will not drop down or close unexpectedly and catch hands, arms, or fingers. Appropriate height of serving equipment is also important for safe use so that difficult reaching into equipment is not needed. In addition, employee safety can be improved with steam tables or cold tables with drains that direct water into floor drains.

Cold Food Tables and Salad Bars

There are two types of cold food tables that might be used for salad bars or service of other cold food items. Cold food tables may either be mechanically refrigerated or non-mechanical, ice cooled models. Some of the mechanically refrigerated food tables are also convertible to hot food tables with the flip of a switch. Cold food tables can also be purchased with wells for pans or as open bin units that can serve as display areas for 18" x 26" (46 x 66 cm) trays of pre-portioned fruits and vegetables, pre-wrapped sandwiches, or pre-made chef salads.

Size of the cold food table is an important purchase consideration. Tables are based on modules of 12 x 20" (30 x 51 cm) and come in units with two to six of these modules put together, although other configurations are possible with custom purchasing and allow for just about any length or shape. Custom units are generally more expensive than buying direct stock, but their ability to fill a particular need may make their purchase desirable. For all units, adapters can be purchased to divide the 12" openings for use by different sizes of pans.

Depending on the need for electricity, cold food tables may be attached to the floor as a freestanding unit or may be portable so that they may be used in more than one location. All cold food tables, however, should have insulation on the sides and bottom. In addition, a drain with a one-half inch (2.5 cm) hose diameter is also important. Finally, health code requirements require a built-in thermometer to make certain that potentially hazardous foods are kept out of the danger zone temperature. Options for cold tables include:

- Adapter bars are useful to divide the 12" openings for use with different sizes of pans
- False well bottoms are useful in non-mechanical units to allow water to drain from melted ice and slow the melting of the remaining ice
- Templates are available for either mechanical or non-mechanical units which create holders for bowls or containers in the salad bar; they also create a more finished appearance and keep ice at colder temperatures to minimize melting when ice is used
- Air screens create a directed air flow across the top of food and back into the casework to help in temperature maintenance of foods kept in the cold table
- Casters offer greater flexibility for use; important features include durability, size, and locking ability
- Overhead display shelves provide opportunity to maximize space while displaying menu items, a la carte items, or promotional decorations/displays

Cold food tables that are used in self-service areas have additional considerations that school nutrition directors as *Trusted Advisors* understand. Height of the cold food table, sanitation regulations related to sneeze or breath guards, tray slides, and the attractive appearance of the cold food table are important in self-service areas.

For example, cold food tables are available with heights that are more suitable for elementary school aged children (28" or 71 cm) in addition to the standard height units. Consideration of the age and height of the student customers is important if food is to be served safely from self-service cold food tables in the school nutrition program. School nutrition directors acting as *Trusted Advisors* use their knowledge of food safety to determine how best to serve food.

Local health codes should be checked for sneeze or breath guard requirements for all self-service tables. Generally, sneeze or breath guards are required above all cold (or hot) tables and should be placed so that they protect the food at a height between 18-45" (45.7-114 cm) above the table top surface. Adjustable portable sneeze guards may be useful in situations where flexibility is needed.

Self-serve tables will also require tray slides. These can be tubular or full shelf designs. Tray slides should be free from sharp edges and should have rounded corners so that they will not catch clothes or hands, and will allow for smooth movement of trays. Full shelf designs are preferred by some school nutrition directors to minimize spills as the customers move through the lines.

Finally, appearance of the cold food tables is also a consideration in self-service areas. Cold food tables are commonly constructed with metal, plastic, or coated wood countertop surfaces. Upscale trends are to use more wood coated to meet sanitation code regulations and stone-like materials.

Hot Food Tables

Two types of hot food tables are available. Most units are called steam tables and hold pans over a well containing heated water which helps to maintain a constant temperature, 180-190° F (82-88° C). Hot food tables have a sealed well with a drain and may be ordered with a water tap for filling the well. The second type is dry tables which are used without water in the wells and do not contain a drain, but can be converted to a wet steam table with the use of spillage pans. Spillage pans are typically 8" deep (20 cm) to accommodate all depths of serving pans. They act like a double boiler in that the smaller serving pan is placed inside a larger pan (the spillage pan) which contains water. The use of steam (either with a wet steam table or a spillage pan in the dry table) improves the heat transfer to serving pans so that they heat more evenly with minimal scorching of the food. The advantage to the dry tables is that they do not require a plumbing connection; however, tables with drains (that are plumbed into floor drains) are generally preferred because employees will not need to empty hot water from the wells. Hot food tables may either be gas or electric.

Hot tables are also based on modules of 12 x 20" (30 x 51 cm) and come in units with two to six connected modules. Adapters can be purchased to divide the 12" openings for use with different sizes of pans. For example, they can be used to make the openings appropriate for ½, ¼, 1/6, 1/3, or 1/9 size pans. Typical depths of serving pans can be 4" (10 cm), or 2 ½ (6.25 cm).

Hot food tables can be purchased either preassembled or may be assembled on-site. Preassembled tables have higher shipping costs, but greater stability.

Similar to the regulations for cold tables, local health codes should be checked for sneeze or breath guard requirements. Generally, sneeze or breath guards are required above all hot (or cold) tables and should be placed so that they protect the food at a height between 18-45" (45.7-114 cm) above the table top surface.

Health code requirements also call for a built-in temperature sensing device for the water in the well because of the need to keep potentially hazardous foods out of the temperature danger zone. In addition, food temperatures will need to be checked with a food thermometer prior to putting the food into the hot food table and periodically after placing the food into the table (for example, once every hour) because steam tables are not very heat efficient.

Steam tables should never be used to cook potentially hazardous foods as this is a violation of the health code regulations. Although they can achieve fairly high food temperatures, they are extremely slow at bringing foods to those temperatures. Steam tables should only be used to hold hot food at hot temperatures. To best maintain food temperatures in hot food tables, the following guidelines include:

- The amount of food in serving pans should not exceed what can be served in a fairly short period of time
- Covers should be used when food is being held to keep food hot, but uncovered when customers are being served
  - The disadvantage is that covers on food do not allow the food to be seen by customers. If this is a concern, the following practices could be done:
    - Using clear plastic covers
    - Using a half size cover to keep a portion of the food covered while the other half

of the pan is available for serving

- Infrared heat lamps can be used above the hot food line to enhance the hot holding capacity of the hot food table, but not in an area where students may be burned
- Liquid foods such as soups and stews should be stirred periodically to even out the heating of the food
- Hot water should be used according to manufacturer's directions in the steam table
- Lunch plates should not be chilled

Hot food table placement should also be considered. Tables should be placed in an area where they can be easily filled, but should not be next to laminated table top surfaces because they will cause the separation or peeling of the laminate

Warming Cabinets

Ideal preparation of school lunches is generally thought to be batch preparation so that food is held a minimal amount of time, if at all. If holding of hot food is required however, warming cabinets may be used as an interface between production and service. Warming drawers are also possible as an under the counter model. Warming cabinets and drawers provide a safe temperature controlled storage area for short periods of time (for example, less than one hour) for cooked and ready-to-eat food items to meet service demands.

If food must be held for an hour or longer, a better food holding device is a humidified holding cabinet in order to best maintain the quality of the food product. Non-humidified holding cabinets dry and toughen food products that are held in them for extended time periods.

Holding cabinets come in a variety of mobile and stationary styles for short term holding of foods. Reach-in, pass-through, roll-in, and roll-through models are possible. They are made with glass or aluminum doors. Applications for heated cabinets include:

- Meat
- Poultry
- Fish
- Pizza
- Vegetables
- Breads, muffins, biscuits, rolls
- Proofing bakery dough

Holding cabinets should have sufficient power to be able to reheat rapidly when the door is opened in order to keep food out of the temperature danger zone. The best types of holding cabinets provide heat both from the bottom and the top. Because the quality of food will decrease during holding, the following practices are recommended:

- Holding food for minimal lengths of time by incorporating batch preparation techniques
- Covering food with pan lids or foil

Single cabinets are generally about 20" x 27" x 27" (51 cm x 69 cm x 69 cm) and hold 6-8 full size sheet pans. Smaller countertop models are also available. Exteriors are generally aluminum (less expensive) or 22 gauge stainless steel (more durable). Controls may be either manual or electronic. Electronic controls may provide the option of setting different temperatures for compartments

within a multiple cabinet. Cabinets with stainless steel interiors and removable tray slides are generally the easiest to clean. Options and accessories include:

- Corner or perimeter bumpers
- Heavy duty casters (casters may also be different sizes, such as three or five inch with brakes)
- Right or left opening hinges
- Timers
- Fans
- HACCP compatible monitoring and documentation systems which have temperature probes and printing systems to allow temperature monitoring of products used in them
- Dual doors with dual temperature controls
- Half doors (instead of full doors) which minimize the heat loss when doors are opened
- Glass doors on the kitchen side allow for an easier view when restocking

All warmers should come with a temperature gauge on the outside of the unit to help in monitoring the temperature of food products.

Display Cases

Display cases are being used more and more to market prepackaged foods. Unrefrigerated units for bakery products and refrigerated units for salads, sandwiches, juices, and dairy products have become popular.

For baked goods, a dry cabinet is important. Wire racks provide the best air circulation. Merchandising (appearance) is better with a mirrored interior, glass doors, and interior lighting.

Refrigerated units are also common in service areas. Thermometers are required and should be visible from the front or outside of the unit. Generally, most units are not intended for overnight storage of food, so it is important to check the manufacturer's guidelines. Single units generally offer about 25 cubic feet (.7 cubic meters). Refrigerated display cases made with stainless steel exteriors are considered the best for cleaning, although the use of Acrylonitrile Butadiene Styrene (ABS) plastic for the interiors and door liners is also less expensive and durable for low temperature products and piping.

These units are generally not very energy efficient. Doors can be either sliding or a swing type. The choice of right or left openings should be based on the service flow and the location of other nearby equipment. Locks are a valuable option for areas that require greater security between service periods.

Milk Coolers

Milk cooler refrigerated units are available with top access or open front access with a single door or from both sides with dual doors. Stainless steel or white exteriors are commonly available. Milk coolers are sized by the number of cases of milk that they hold and generally will hold between 4 to 16 cases of milk.

School nutrition directors, as *Trusted Advisors*, are also considering how milk products will be merchandised when deciding the types of milk coolers to purchase. Non-traditional milk coolers, such as reach-in refrigerators with glass doors, barrel coolers, and glass door display cases are being used to present and serve milk products to students.

Units should be carefully evaluated for their ability to maintain temperatures when the doors are open. The better cabinets will hold cartons between 35-38° F (2-3° C) for at least two hours with the doors open. Digital thermometers are preferred and readily visible from the front to check that milk cartons are maintained at safe temperatures during the entire service period. In addition, the units should be evaluated for the ease of cleaning and have bottom drains for easy cleaning. Options and accessories include:

- Stainless steel interior, as well as exterior
- Legs or casters provide flexibility for use in multiple locations and serve to safely secure the unit
- Wrap-around or corner bumpers

SUMMARY

Serving equipment needs to be flexible to meet the changing needs of school nutrition today. Mobile and modular equipment are particularly valuable today because of their flexibility. Trends include the use of more attractive finishes and materials on serving equipment.

Most importantly, food safety is a key responsibility of all cold and hot holding, warming, or serving equipment. Local health code regulations should be checked for sneeze or breath guards, drain requirements, and the need for thermometers. In addition, both hot and cold holding/serving equipment may be limited in its ability to heat or chill food. Hot and cold holding/serving equipment should therefore only be used to maintain food that is already at the appropriate temperature. Best practices in the use of serving equipment are also important to maintain the safety of food while it is being served. Finally, employee and student customer safety should be a consideration in the selection of all serving equipment.

CHAPTER FIFTEEN

Cleaning Equipment

CHAPTER HIGHLIGHTS

Introduction

- School nutrition directors, as *Trusted Advisors*, understand the importance of safely cleaning dishes

Dishmachines

- Selection variables include:
  - Space available
  - Foodservice needs
  - Preference for hot water or chemical sanitizing machines
  - Power and plumbing sources
  - Local building and health codes
  - Proposed budget
- Dishmachines require:
  - Proper ventilation
  - Adequate lighting
  - Proper utilities
  - Drains of appropriate size and location
  - Adequate walls, floor, and ceiling

Hot Water Sanitizing Dish Machines

- Generally purchased, rather than leased
- Require a booster heater

Chemical Sanitizing Dish Machines

- Often leased
- Generally have lower energy costs, although higher chemical costs

Under the Counter Dishmachines

- Designed for very small volume foodservices
- Come with dual or single wash arms

Single Tank, Door-style

- Designed for small volume needs
- Require ventilation, booster heaters are generally built-in

Conveyor Dishmachines

- Designed for higher volume needs
- Instead of doors, may have plastic curtains and may automatically shut down
- Will have a thermometer in each tank

Flight-type Dishmachines

- Most expensive

CHAPTER HIGHLIGHTS *(continued)*

- Uses a conveyor with rows of plastic tipped pegs so no racks are used
- More automated

Guidelines for Selecting the Appropriate Dishmachine

- A critical step is to project the dishmachine capacity that is needed
- Needed volume depends on the following:
  - Number of students and meal periods
  - Need for speedy return
  - Length of dishwashing cycle
  - Number of dishes, pots, pans, and cooking utensils needed
  - Use of disposables
  - Whether the dishmachine is filled to capacity during dishwashing
- Guidelines are based on general estimates only and should be used only as a starting point in determining the size of machine needed

Pot, Pan, and Utensil Washers

- Differ from standard dishmachines
- Do not have a specific timed wash cycle
- Have a larger motor to pump water
- Require non-foaming type soap
- Need more horsepower to create "turbulence" in the wash water

Food Waste Disposers and Pulpers

- Municipal codes should be checked for regulations associated with use
- Pulpers produce less volume of waste that would enter a sewer system

Trash Compactors and Recycling Equipment

- Trash compactors can potentially reduce the volume of waste such that trash hauling expenses may be reduced by 50% or more
- Corrugated board balers may also decrease trash hauling

Cleaning Equipment

Introduction

Without effective dish cleaning, a school nutrition program cannot safely operate, although dish cleaning may be done differently in different schools. For example, school nutrition directors, as *Trusted Advisors*, use information regarding the use of disposables verses permanent ware in making a decision about whether to purchase a dishmachine or use a three compartment sink. Although the use of disposables minimizes the need to wash dishes, some school nutrition programs still use dishmachines. These directors believe that dishmachines minimize the labor needed for cleaning and provide a more precisely controlled method for cleaning dishes. In addition, the school nutrition director, as the *Trusted Advisor*, understands the long-term implications of dishmachine choice. For example, the space and budget needed to purchase a particular dishmachine may not be possible at a later date. This would mean that the use of disposables may become a permanent choice that the school will need to live with for a very long time.

For school nutrition programs that have decided to use permanent ware, dishmachines are critical to the safety of the school nutrition operation. They are also one of the most expensive pieces of equipment in the operation, so careful decision making is important because of the consequences of the decision will be around for a very long time.

Dishmachines

Numerous variables need to be considered when selecting a dishmachine. They include:

- Space available
- Foodservice needs, particularly in regards to the use of disposable dishes or permanent ware
- Preference for a hot water or chemical sanitizing machine
- Power and plumbing sources
- Energy and water saving features on the machine
- Local building and health codes
- Proposed budget
- Availability of good employees as labor costs for washing dishes can be a penny or more per dish

Dishmachines require a number of features. They include the following:

- Proper ventilation prevents excessive humidity and possibly poor/unsafe working conditions
- Adequate lighting allows staff to see broken dishes and excess water accumulation
- Proper utilities since inadequate power can damage the machine or result in poor performance
- Floor drains as the location and appropriate size can prevent excess water accumulation
- Moisture resistant surroundings as walls, floors, and ceiling need to resist moisture, absorb sound, and be easy to clean

The choice of dishmachine can affect utility costs. An insulated dishmachine may save hundreds of dollars per year in utility costs, as compared to an uninsulated machine. An infrared dishmachine is thought to save thousands of dollars per year as compared to a 10-20 year old conventional dishwasher.

Dishmachines are categorized by the type of sanitizing system used, the number of tanks, and the way dishes go through the machine. The sanitizing system can either be hot water sanitizing or chemical sanitizing. Hot water sanitizing machines will require a booster heater, which is either purchased as part of the dishmachine or purchased separately and added when the machine is installed. The differences between these two types of dishmachines are shown below.

Hot Water Sanitizing Dishmachines

- Generally purchased, rather than rented
- Dishes dry faster because of the hotter rinse temperatures, although plastic dishes will dry more slowly than china dishes
- Thought to be better for the environment because they rely less on chemicals
- Require the purchase of a booster heater to raise the temperature for sanitizing
  - For example, booster heaters are designed to heat the rinse water from 140° to a sanitizing temperature of 180° F or 61° to 82° C
  - Booster heaters can be electric, gas, steam, or infrared

Chemical Sanitizing Dishmachines

- Often rented, state agencies should be contacted for guidance on contracts
  - For example, state agencies may give specific guidance on not being able to pay interest or rental agreements that require the purchase of chemicals
- Dishes dry slower because of the lower temperatures used during the sanitizing cycle
- Generally have lower energy costs because they do not need a booster heater
- Higher chemical costs

Dishes move through dishmachines either by means of a stationary rack in the machine or on a conveyor. Some conveyors require the use of racks while other conveyors have pegs between which the dishes are placed. A summary of general guidelines to consider for purchasing different type of dishmachines as well as available options are listed below.

Under the Counter Dishmachines

- Designed for very small volume foodservice operations, but not as commonly used in schools
- Removable racks are recommended so employees can rack the dishes in advance
- Come with dual (top and bottom) wash arms or single
- Automatic deliming option is useful

Single Tank, Door-style (Stationary Rack Dishmachine)

- Designed for small volume needs
- Newer machines contain microcomputers to help accurately time cycles
- Require ventilation
- Booster heater is generally built-in
- Many are "field convertible" – can be converted from hot water to a chemical machine or vice versa

Conveyor Dishmachines (Two or Three Tank)

- Designed for higher volume needs
- Have more options than stationary machines
  - Recirculating prewash or power prewash cycles
  - Automated activators run the machine only when racks are inside
- Instead of doors have plastic curtains
- Machines will automatically shut down if inspection doors are opened during a cycle
- Will have a thermometer in each tank

Flight-type Dishmachines

- Extremely expensive
- Uses a conveyor with rows of plastic tipped pegs, preventing the need for racking dishes/trays
- Belt widths can be different and will affect capacity
- Microcomputer controls are available for greater precision in new machines
- Can be highly automated to minimize labor needs

Dishmachine Options

- Blower-dryer
  - Electric or steam heated blower to dry dishware and silverware
  - Adds to the length needed for the dishmachine
  - Exhaust requirements essential
- Ventilation system
  - Helps to increase the machines efficiency
  - Creates a more comfortable environment
  - Speeds air drying of the dishes
- Larger size entrance/exit
  - Allow pots and pans to be washed on typical 20 x 20 racks
  - Some are available to accommodate a 60 quart mixing bowl
- Water softener
  - Recommended unless the water is already classified as "reasonably soft"
  - Prevents dishes from having water spots after wash
  - Aids in decreasing detergents requirements
  - Aids in preventing pipes and spray arms from clogging
  - Minimizes the frequency of descaling and deliming repairs
  - Influences the lifespan of the dishmachine

Guidelines for Selecting the Appropriate Dishmachine

Requirements for dishmachines in schools vary tremendously. The first consideration in making a purchasing decision is the capacity of the machine. Careful sizing of the dishmachine is also important because these are large pieces of equipment and their location is also important.

Things to consider in the location of the dishmachine include:

- Efficient access from both the kitchen and the dining room/cafeteria
- Materials (floor, wall, and ceiling) that aid in muffling the sound
- Strong floor to support the weight of the dishmachine
- Non-skid flooring and/or rubber mats to minimize the risk of employees slipping
- Adequate water pressure
  - Confirm pressure requirements with manufacturer
  - Confirm pressure with local plumber

Selecting the correct type and capacity of dishmachine is important because of the expense associated with the machine and labor to run the machine. When pricing the costs associated with running a dishmachine, school nutrition directors, as *Trusted Advisors*, should focus on the volume of dishes to be washed, as criteria for selecting the dishmachine that will meet their needs. The volume will depend on the following considerations:

- Number of students
- Number of meal periods
- Number of dishes, silverware, and tray typically needed per student
- Number and type of meal
- Length of dishwashing cycle
- Number of pots, pans, and cooking utensils to be run through the dishmachine

Reliance on the use of disposables for some or all of the school's dish needs causes the biggest impact on the need for dishwashing. Each school will need to determine their dishmachine need. Manufacturers' websites can assist in the decision making process, as they generally have capacity information on their dishmachines. It is wise to confirm the information with an equipment distributor and other school nutrition directors that may have that type dishmachine in their operation. Keep in mind that the information may vary when it comes to application of the dishmachine. Manufacturers' information is typically based on fully loaded machines that are operating continuously and unloaded immediately. Keep in mind that training is needed for the school nutrition staff to perform the task in a productive manner. When dishmachines are not efficiently or completely filled prior to starting the dish cycle, fewer dishes will obviously be washed, therefore, reducing the level of productivity as compared to running a machine that is fully loaded.

To get a better picture of what size capacity machine to purchase, some schools use the assumption that in actual use, most dishmachines are only operated at 70% capacity. A simple example of how to calculate the needed dishmachine capacity for a school using the 70% capacity rule is shown below.

Calculation Example
Assume that a dishmachine is needed for a 500 student elementary school that serves approximately 250 children every 30 minutes during the lunch periods. Six items (dishes, silverware, trays) are used for every child. 250 students x 6 items per student = 1500 dishes needed for a 30 minute lunch period 1500 dishes x 2 lunch periods per hour (every 30 minutes) = 3000 dishes needed per hour 70% Efficiency adjustment: 3000 dishes divided by .70 (this is the 70% adjustment factor that you use to divide the number of dishes needed per hour) = 4286 dishes per hour The calculated dish machine capacity for this school would be approximately 4286 dishes per hour. The type of dishmachine that is likely to be needed for this school is a two-tank conveyor machine, using the following guidelines.

Dishmachine Type	Dish Capacity Per Hour
Single Tank, Door	1,550 dishes per hour (or 53-62 racks)
Two-Tank Conveyor	5,850 (or 205-234 racks)
Three-Tank Conveyor	6,650 (or 234-272 racks)
Flight type	12,000 (racks are not used)

Although, the example provided above uses a 70% efficiency adjustment, school nutrition directors, as *Trusted Advisors*, are advised to train staff on ways to increase efficiency. Keep in mind that costs associated with labor, chemicals, and water to run a dishmachine are the same for a 70% capacity as they are for a 100% capacity. Training staff on ways to increase efficiency when operating a dishmachine is critical.

Careful calculation of the dishmachine capacity is also important because it affects the size of the space needed for the machine in the kitchen or dishroom. Determination of the amount of space needed is slightly complicated because additional space is needed for the:

- Soiled dish area which is generally 50% larger than the cleaned dish area
- Cleaned dish area because of the space need to adequately dry the dishes
- Booster heater or other mechanical needs, such as added ventilation equipment

General guidelines regarding dishmachines are provided by manufacturers. This information is valuable and will assist in comparing types of dishmachines. *Trusted Advisors* use this information to compare one manufacture with another. It is wise to consider this information as a starting point when determining operational needs. The next step is to explore and compare the productivity of different models of dishmachines based on the information provided by the manufacturers and other foodservice operators. Be sure to compare the models of dishmachines and space dimensions needed based on the meals served per hour. By initiating a comparison process, a *Trusted Advisor* will make an informed purchasing decision based on the specific needs of the school nutrition operation.

Pot, Pan, and Utensil Washers

Pot, pan, and utensil washing can be done three different ways. For smaller schools, this washing may be done in a three compartment sink. If three-compartment sinks are used extensively, one useful option is to use an agitated powersink, which includes a powerful agitator that provides continuous turbulent movement to the wash water to more easily remove stubborn food soil without the need for scrubbing by hand. Larger schools may find it more efficient to use a dishmachine. In some schools, the same dishmachine that is used to clean dishes from the cafeteria may also be used to clean pots, pans, and utensils if a larger dishmachine opening and exit (a "tall" dishmachine) is purchased. Other very large operations may decide however, to purchase a dishmachine designed specifically for cleaning these items. Pot and pan washers can either be under-the-counter models or free-standing. They are similar to the dishmachines already discussed. Should pot and pan washer be the route taken, other issues to consider include:

- Allows for longer wash cycle because they do not have a specific timed wash cycle
- Uses a non-foaming type of soap to better penetrate baked-on food and grease
- Provides more horsepower to create water turbulence assisting in the removal of encrusted food

Food Waste Disposers and Pulpers

Food waste disposers (also called disposals) are usually integrated into the sink area set up at the dirty end of the dishmachine, although they may be used in other areas such as the salad or vegetable preparation areas. Municipal codes should be checked to see if food waste disposers are allowed, as disposers produce a great deal of waste water. Municipal codes should also be checked to see how disposers are to be connected to water or sewer systems, for instance the use of grease traps is likely to be one of the regulations.

Pulpers are usually set up in the area in front of the dishmachine for use in cleaning off plates and trays in preparation for washing. They operate very differently compared to food waste disposers and are likely to be allowed in most municipal codes. Pulpers can also take paper waste, as well as food. The greatest advantage of pulpers is that they reduce waste into 15% of its original volume and only use 1/3 of the water of food waste disposers. They operate by grinding food and paper waste into a pulp, which is then piped to an extractor where the solids are separated from the water. The waste is then sent to a garbage can and the water is reused in the grinding process. Advantages to the use of the pulper include:

- A reduction in the volume of waste by up to 85%
- A reduction in the needed number of trash pick-ups
- A reduction in labor hours taking garbage bags to the dumpster area
- Elimination of the need to sort paper from food waste
- A reduction in rodent and insect problems

Disadvantages to the use of the pulper include:

- A high initial capital cost for the pulper equipment
- Increased energy costs
- Possible odor and mess related to their use

Trash Compactors and Recycling Equipment

Schools produce tremendous amounts of garbage. The solid waste stream is composed of many types, including paper and cardboard, food, plastics, metal, glass and other materials. Schools

often pay large amounts of money to have this trash hauled away. To reduce trash hauling expenses, some schools have turned to the use of trash compactors. Trash compactors may reduce trash hauling expenses by 50% or more. The principle is simple in that the fewer the number of trash pick-ups, the less expense associated with waste hauling. In addition, trash compactors are often used as part of a comprehensive recycling program which may also include recycling of corrugated cardboard and office-type paper in order to further reduce waste hauling expenses. Several types of compactors are available, but school nutrition programs are most likely to use the type of compactor that can be used with wet food wastes. Other advantages to the use of a trash compactor include:

- Minimize odors and leakage from the dumpster
- Minimize insect or rodent problems

Corrugated board (cardboard) balers are another piece of equipment that is often used in waste management and recycling. Cardboard balers have a double benefit in that they eliminate cardboard from the waste stream and they bring in some income if the bales can be sold to recycling companies. The amount of cardboard waste can be significant as it may be more than 25% of the trash produced from a school nutrition program.

In some areas, recycling equipment may be rented so that schools would not need to use upfront money to start a recycling program. On the other hand, when the purchase of recycling equipment is the only option and on-site improvements (such as concrete platforms or pads and electrical outlets) are required for the recycling equipment site, the savings in garbage hauling bills each month is thought to compensate for the cost of the recycling equipment and site within a couple of years.

As *Trusted Advisers* school nutrition directors should carefully evaluate the advantages and disadvantages of recycling equipment. Waste hauling prices will vary across the country. One rule of thumb that has been cited for schools is that if the school (not just the foodservice) spends more than $1,500 per month on waste hauling, they should evaluate the costs and benefits of starting a trash compacting and recycling program. Even if they may not be able to purchase a complete system, schools might consider sharing a baler, if there is a convenient central location and custodians or other employees might be able to periodically drop off cardboard. Critical features to consider include:

- Size of the compactor
- Sufficient parking lot space
- Frequency of waste hauling pick-ups
- Enclosed hoppers with safety interlocks
- Key operation
- Access for the garbage hauler
- Matches local garbage truck configurations
- Odor-control units
- Trash container fullness monitors
- Safety features
- Ease of use

SUMMARY

Dishwashing is one of the most critical functions in a school nutrition program. Schools cannot function safely without clean dishes. In addition, dishmachines are a major expenditure and require a great deal of labor, energy, and water to run.

One of the first decisions in dishmachine selection is the choice of hot water verses chemical sanitizing machines. School nutrition directors will also need to consider a number of other factors including the budget and whether to purchase or lease a machine. Also, consideration should be given to available space, power and plumbing sources, energy and water-saving features on the machines, local building and health codes, and the availability of employees.

The numbers of meals served is one of the biggest considerations in equipment choice. The type and size of dishmachine required will depend on the number of students, the number of meal periods, the need for speedy return of dishes, the length of dishwashing cycle, the number of pots, pans, and cooking utensils, and the number of dishes typically used by each student. Other decisions in this area include the choice of pot and pan washers, disposers, pulpers, trash compactors, or recycling equipment. The use of disposables verses permanent ware is a critical decision that all schools should evaluate in regards to their needs for dishwashing.

CHAPTER SIXTEEN

Utensils, Trays, and Tableware

CHAPTER HIGHLIGHTS

Introduction

- Use of the right tool can help make a better quality product, create less worker fatigue, and help to get the job done efficiently

Hand Tools

- Consider:
  - Textured surface handles
  - Tools which keep the wrist straight
  - Avoiding sharp edges on gripping surfaces
  - Avoiding deeply contoured handles
  - Matching handle diameter to handling force
  - How the tool will be used
- Triple-edge spoons with straight bottom edges scoop food more completely out of a steam table pan
- Two types of whips are French whips and piano whips
- Strainers use fine mesh for straining or rinsing of foods
- Colanders have larger size holes or perforations

Cutlery

- Types of knife manufacture are forging, stamping, and computer-guided laser beams
- The metal used to make the knife is important to the quality and care
- Common knives include:
  - Chef's knife
  - Salad knife
  - Paring knife
  - Boning knife
  - Slicer
  - Cleaver

Pots and Pans

- Common metals are aluminum, stainless steel, cast iron, or some combination of these metals
- Metal type and thickness govern the ability to cook evenly

Sheet Pans

- Durability is a key selection factor

Measuring Equipment

- Weight measuring equipment should be selected based upon:
  - Weight measuring capacity
  - Area of weighing surface
  - Level of precision needed

CHAPTER HIGHLIGHTS *(continued)*

- Ease of use and calibration
- Expenses for purchase and operation
- Label printing

- Durability of measuring tools is very important

Serving and Holding Containers

- Steam table pans made of stainless steel are the most common

Flatware

- Most accurate assessments of durability can be made from evaluation of actual product samples
- Stainless steel is most durable and vary in quality and price

Plates and Glasses

- Reusable plastic plates and glasses are commonly used
- Strength of ceramic plates will depend on the clay used, air bubbles, thickness, type of edge, and size and shape of the rim
- Strength of the glassware will depend on annealing, shape and thickness of the glass, tempering, and addition of chemical compounds

Trays

- Selection of trays will consider the following factors:
  - Durability
  - Cleanability
  - Drying time
  - Functionality
  - Attractiveness
  - Cost
  - Portability

Disposable Dishes, Trays, and Flatware

- Price is critical for disposables as they are an ongoing expense
- Advantages to the use of disposables include:
  - Possibility of lower costs
  - Eliminates some dishwashing needs
  - Eliminates need to clean and transport to a commissary or satellite school
  - Lighter weight
  - Possibility of speeding up the meal service
- Disadvantages include:
  - Generally not the green choice
  - Possibility of higher costs
  - May be less safe to carry
  - Requires more storage space

Utensils, Trays, and Tableware

Introduction

Use of the right tool can make a huge difference in efficiency. It will often result in a better quality product, less worker fatigue, and a job that is accomplished faster and more safely. Why then would we not want to pick our tools carefully?

Utensils used to measure, weigh, mix, cook, and finally store food are commonly referred to as smallware. Even though these pieces of equipment do not cost as much as the large pieces of cooking, preparation, and washing equipment discussed earlier, decisions about smallwares are every bit as important to the production in your school kitchen. Individual staff members will tell you that well chosen tools can make their job easier and poorly chosen tools will make their job harder. Finally, the right tool is also very important for employee safety as well as efficiency.

Similarly, the choice of permanent ware (dishes, trays, glasses, or flatware) for student customers is also important. Permanent ware is handled extensively and may be subject to much "abuse". It also needs to be carefully cleaned and sanitized thousands of times over the course of its lifetime. Selection of disposable ware for student customers is an alternative that some schools have considered attractive. The decision of permanent ware versus disposables should be evaluated carefully in each school. The appropriate decision in each school may be different. Permanent ware may be considered the best choice in some schools because it is environmentally friendly or the "green choice". In other schools, disposables may be the optimum choice for cost reasons, particularly if recycling or composting choices are available. In schools where recycling or composting is available, some schools have, in fact, considered disposables the "environmentally friendly choice".

Hand Tools

Hand held tools should be designed to be safe, efficient, and easy to handle. The following points are useful in evaluating many types of hand held tools:

- Avoid sharp edges on surfaces for gripping
- Textured surfaces on handles help to minimize accidents
- Avoid deep contours on handles
- Select tools where the wrist will be held straight to avoid wrist strain
- Select a handle diameter to match the force used when handling the tool
- Tools that are supported by arms and held away from the body should not weigh more than 5.1 lb. (2.3 kg)
- Tools requiring precision should not weigh more than 1 lb. (.5 kg)
- Tools used for long periods should be lighter
- Minimum handle length for gripping most tools is 4 inches (10 cm)
- Minimum handle diameter for a power grip is 1.2-2 inches (3-5 cm)
- Minimum handle diameter for a precision grip is .3-.6 inch (.8-1.5 cm)

New technology is making its way into the design of many tools, including some of the simplest and most basic of tools. For example, there are a variety of spoons on the market. Newer types include spoodles which can be used for stirring, scooping, and portioning and combine the stirring capabilities of a spoon with the portion control capabilities of a ladle. In addition, the plastic handle has a notch on top and a stopper on the bottom to prevent the spoodle from sliding down into the pot when it is not being used. Spoodles range in size from 2-8 oz. (59-237 mL) and are available with different colored handles to separate the possible uses of the utensil. Because spoodles typically come with plastic handles, the heat resistance of these should be carefully checked to make certain of their intended use, serving versus cooking or both. Another newer type of spoon is called a triple-edged spoon. The bottom edge of the spoon is shaped to match the interior of the serving pan so that they will scoop out food more completely. Triple-edged spoons come with plastic handles and may be either perforated or solid metal.

Whips are created for light rapid stirring and introduce air into the ingredients. All whips should be made from durable steel and welded smooth so that they are easily cleanable. Commonly used types of whip include:

- French whips
  - Have stiff wires
  - Available in a variety of lengths from 10 to 24 inches (25-61 cm)
  - Used for small batches and heavier batters
- Piano whips or balloon whips
  - Have finer wires
  - Available in lengths between 10 to 18 inches (25-46 cm)
  - Used for lighter sauces, whipping cream, or thin soups

Spatulas are also commonly used tools in a school nutrition kitchen. The most common length is 14 inches (36 cm), but they also come as short as ten inches or as long as 20 inches (50 cm). They are available in a variety of blade shapes and may be slotted, perforated, or solid. Spatulas that act as bowl scrapers have a flexible, plastic blade and polypropylene handle. Even though they might look like they can be used on hot surfaces, most will melt when exposed to heat. Be sure to check the manufacturer's guidelines.

Tongs are commonly used for serving food, but may also be used to handle some foods during preparation and cooking. They should be commercial-grade and made of stainless steel. They are available in sizes from 10 to 16 inches (25-41 cm) and have different types of edges from flattened to scalloped.

Strainers and colanders are useful in the kitchen for straining or rinsing foods. Strainers use a single or double layer of mesh whereas colanders use perforations which provide much larger holes to drain through. They are cup, bowl, or cone shaped and range from very small to very large sizes. Specialty types include:

- China cap is a metal mesh cone welded to a stainless steel ring and handle
  - Used to strain stocks, sauces, and soups
  - Ranges in size from eight inches in diameter and depth to about 12 inches (30 cm) in diameter and depth
- Sieve is similar in appearance to a cup with a mesh screen at the bottom
  - The handle on the side is used to hold it while sifting flour or other dry ingredient

- Food mill is a strainer with a hand crank that turns a blade inside the mill
  - Used to puree or grind foods
  - Available with interchangeable blades with a different sized holes

Colanders usually have feet on the bottom to allow them to sit in a sink for draining. They also usually have handles so that they are easily carried. They are generally made of 10 to 18 gauge stainless steel.

Cutlery

Good knives are essential in food preparation. The correct knives to purchase will depend on the menu. For example, menus that require chopping of lots of ingredients will generally need chef's knives, whereas fine slicing for preparation of individual portions will require paring knives. Important considerations in knife selection also include quality and durability. The two most common types of knife manufacture are forging and stamping. Newer technology might also include the use of computer-guided laser beams to more precisely cut the blades. Differences between forged and stamped knives include:

- Forged knives are made when steel is heated and shaped or compressed with pressure and later more finely sharpened with honing and grinding
  - Forged knives are generally considered stronger and are more expensive
- Stamped knives are made from a sheet of flat steel and stamped with molds to cut the various shapes and sizes of blades
  - Stamped blades are then sharpened individually

The quality of knives depends on the metal used in producing the blade. The shape of the blade and the handle, and the construction of the handle are described below:

- Blades can be made from
  - Stainless steel
    - Does not rust or discolor
    - Holds a sharp edge longer
    - Blade edge is harder to sharpen
  - Carbon steel
    - Easier to sharpen
    - Loses the sharp edge quickly
    - Frequently needs re-sharpening
    - Darkens when in contact with acid foods
    - Pits and rusts more easily than other types
  - High-carbon stainless steel
    - Tries to take advantage of the best qualities of both metals
    - Keeps the sharp edges longer
    - Does not rust or discolor
- Length and shape of metal that goes into the handle
  - A tang is the portion of the blade that extends into the handle
  - A full tang extends to the end of the handle
    - Provides strength and durability
  - A partial tang does not run the full length of the handle

    - A rat-tail tang has a thinner tang that runs the length of the handle
        - Found in bargain-priced knives
        - May not be as durable
- Construction of the handle
    - Made from wood or plastic
    - Sanitation codes should be checked for allowed materials
    - Wood handles are sometimes preferred for the highest quality knives
    - Unfinished wood handles, if allowed, should be handled carefully as they may soak up water and become stained
    - Rivets in the handle should also be checked to make certain that they will hold the tang in place and are completely smooth with the surface of the blade
- Other considerations
    - Size of the handle
    - Shape of the handle
    - Ergonomic design

Knife selection should coincide with the tasks to perform. Types of knives include:

- Chef's knife or French knife
    - 8-12 inch blade knife (20-30 cm)
    - Used for most chopping and slicing jobs
- Salad knife
    - A smaller version (6-9 inches or 15-23 cm) of the chef's knife
    - Used mostly for salad or fruit preparation
- Paring knife
    - A very small blade (3-4 inches or 8-10 cm) with a sharp tip
    - Used for paring and trimming fruits and vegetables
- Boning knife
    - The thinner blade on this knife (5-6 inches long or 13-15 cm) is used to separate raw meat from bone
    - The blade may be stiff or flexible
- Slicer
    - A long slender knife (12-14 inches or 30-36 cm) with a flexible blade used to slice cooked meats
- Cleaver
    - A knife with a rectangular shape about 4 inches wide (10 cm)
    - Used for heavy duty chopping, including chopping through bones

The choice of cutting board is almost as important as the knife because a good cutting surface will make the job easier and safer, and will not dull the knife. Most schools will use some type of plastic cutting board. One of their greatest advantages is that they are easy to clean because they can be run through a dishmachine. The use of color coded plastic cutting boards has also made them safer because these minimize the risk of cross contamination due to the separation of tasks by color. For example, green would be used for vegetables, red for beef, and yellow for poultry. Some of the plastic-type cutting boards are non-slip and will not move during the chopping process. Regulations regarding cutting boards should be checked with the local health code. Many local health codes, for example, do not allow the use of wood cutting boards because they cannot be run through the dishmachine and are therefore more difficult to clean and sanitize.

Pots and Pans

Pots and pans are among the highest priced types of smallware that a school kitchen will purchase. Tremendous variety exists. Pots and pans most commonly are aluminum, stainless steel, or some combination of these two metals. Iron pots and pans have a limited use in most school nutrition programs, although they may be used with induction cookware. Nonstick coatings are also available for most pots and pans. The metal should distribute heat evenly and uniformly, be lightweight enough to allow for easy handling, and be durable for long-term use.

The two basic factors that govern a metal's ability to cook evenly are the type of metal and its thickness. The thicker the bottom of the pan, the better it holds the heat. Material will also affect durability, weight, beauty, and cost. Advantages and disadvantages to each type of metal are listed below:

- Aluminum
  - Lightweight and easier to lift
  - Good heat conductor
  - Not very durable because of metal softness
  - Not as good for use with acid foods
- Stainless steel
  - Not a good heat conductor
  - Very durable
  - Better for use with acid foods
- Iron
  - Inexpensive
  - Good heat conductor
  - Cracks and rusts easily
  - Very heavy and harder to lift
  - Need to check local health code regulations regarding the use of iron

Sheet Pans

Sheet pans are used extensively in school nutrition programs. Selection of good quality sheet pans is similar in many ways to the selection of pots and pans. Durability, weight, beauty, heat conduction, and cost are key to the selection of sheet pans. In addition, their size in relation to the ovens that they will be used in is important for efficient use of the space in the oven. For example, full-size pans are generally about 17 ¾" x 25 ¾" x 1" (or 45 cm x 65 cm x 2.5 cm), whereas half-size sheet pans are generally about half the length of the full size or roughly 17 ¾" x 12 7/8" x 1" (or 45 cm x 33 cm x 2.5 cm). Quarter size and other size pans are also available. Other considerations for sheet pans include:

- Choice of light and dark-colored finishes
  - Dark colored pans are often preferred because they heat up faster and result in more browning
  - Light colored pans are preferred for cookies and products in which extensive browning on the bottom is not desirable

- Gauge of the pan
  - Heavier gauge pans (18 gauge, for example) may be preferred in that they are generally less flimsy
- Durable rolled edges which provide easy handling
- Non-stick coating
  - Non-stick coatings are thought to perform better because foods do not stick and the pans are easier to clean
  - Should evaluate additional implications of using non-stick pans such as, washing method recommendations and types of hand tools that can be used
- Insulated pans
  - Generally not recommended by cooking experts

Measuring Equipment

Recipe preparation and the portioning of food require several different types of measurement tools including weight measuring scales and volume measuring cups, scoops, spoons, and ladles.

When selecting weight measuring equipment, consider the following issues:

- Select the weight measuring capacity based on the heaviest food item to be weighed during preparation or service
- Scales used in the receiving and loading dock area are a different type of scale used for bulk weighing during deliveries
- Scales with a larger weighing surface are generally easier to use
- The level of precision needed
- How easy they are to use and calibrate
  - Digital scales are usually easiest to read
  - Scales which allow the employee to "zero out" a container that might be used to hold food for weighing also simplify the weighing process
- How easy are they to clean
- How expensive are they to purchase and operate
- Need for a scale that prints out a label for the food

Volume measures include a variety of cups, spoons, ladles, and scoops. Commercial measuring cups and spoons are generally made from seamless heavy-duty aluminum. Durability of the measuring cups and spoons is important, because utensils which are easily dented may distort the capacity and not measure accurately. In addition, metal cups are generally considered more desirable than glass because of the unavoidable breakage which can occur with glass. Ladles are generally made from 18 gauge steel and their capacity is stamped on their handle. Ladles will range in size from one ounce up to 72 ounces (30 mL to 2.13 L) and handle lengths will vary from nine to 18 inches (23-46 cm). Plastic covered handles can help to keep them cool when they are used for hot liquids. Two types of scoops are used in school kitchens. The first is used as a portion measurement tool and is sometimes called a disher. Common sizes are 12, 16, or 20 with the number representing the number of scoops one can get per quart of product when this size of scoop is used. Scoops will be stamped with the size and are easier to distinguish when the handle is also color coded by size. The second type of scoop is used to handle or transfer dry ingredients or ice. These scoops are generally made from stainless steel or heavy cast aluminum and range in size from four to 84 ounces (118 mL to 2.48 L).

Serving and Holding Containers

One of the most commonly used serving and holding containers in the school kitchen are the steam table pans. Other names for these include hotel pans, counter pans, or service pans. Both solid and perforated pan types are available. They come in a variety of sizes based on the standard size of 12x20 inches (30x51 cm). In addition to the standard size, pans come in half sizes (12x10 inches or 30x25 cm), third-pan sizes (12x6 ½ inches or 30x17 cm), and fourth-pans (6 ½ x10 inches or 17x25 cm). The use of long half pans (6x20 inches or 15x 50 cm) offer a flexible side-by-side arrangement so that one does not have to reach over one pan to get to another. Depths for these pans range from 1 ¼ to 6 inches (3-15 cm). Pans range from 20 to 24 gauge steel with the 20 gauge being thicker than the 24 gauge. The gauge of thickness influences durability. A variety of lid sizes can be used on these pans to cover all or part of the food. Handles on the lids are typically indented so that they can be stacked neatly. Look for pans that are manufactured with corners that prevent them from sticking together when they are nested together. Adaptor plates are also commonly used to fit the different size pans into steam table wells other than the standard sizes. Stainless steel is the most commonly purchased material for steam table pans; however plastic pans are now available as well. The advantages and disadvantages of each are shown below:

- Stainless steel steam table pans
  - More durable
  - More expensive
- Plastic steam stable pans
  - Not as durable as stainless
  - May not be as heat or cold tolerant
  - Do not develop bent corners
  - Scratches do not show
  - Lighter in weight
  - Less noisy
  - Less expensive

Permanent Ware

Selection of flatware and dishes should always be based on an actual examination of samples of the flatware and dishes. Pictures in a catalog do not given an accurate picture of the thickness, weight, or feel of the product. Durability of the product can also be much better assessed in person.

Carefully consider replacement costs of permanent ware as replacement needs may create an ongoing expense. Availability of permanent ware to purchase in the future will also help to keep a more pleasing and uniform appearance during the service of food. Durability of permanent ware is one of the most important features because of its effect on replacement cost. Selection of permanent ware that is less likely to break is also important from the standpoint of handling. Clearly it is a safety issue for children. In addition, it is important for employees. Most breakage of china dishes is thought to occur in the dishroom, so employees should be taught how to handle and place china dishes in the dishmachines to minimize the breakage that might occur during the cleaning process.

Permanent Ware - Flatware

Durability of the metal forks and spoons is key when making this purchasing decision. Although weight may be one possible indication of its durability, a more accurate assessment occurs when the flatware is inspected. For example, the spoon and fork should be placed on a table surface and examined to see if they will bend when pressure is placed on the bowl of the spoon or the tines of the fork.

The most durable flatware is generally considered to be stainless steel. It is also often preferred because it does not rust or tarnish, and is less likely to scratch, dent, or stain. The type of stainless steel, however, should be considered carefully as there are different quality levels, hardness, and prices associated the type of stainless steel that is used. A commonly used type is "18/8" which is an abbreviation for a type which contains 18% chrome, 8% nickel, and 74% steel. The chrome is added to flatware to give luster or shine to the flatware and the nickel and steel provide strength. Together these metals help to minimize staining of the metal when exposed to acid foods and cleaning chemicals and provide strength to the utensil.

An additional concern of school nutrition directors as *Trusted Advisors* will be the safety of the student customers when flatware is being selected. Safety considerations include the quality and type of flatware selected. For example, knives may not be desirable for students. Finally, school nutrition directors as the *Trusted Advisors* will also consider how easy it is for special needs children to use the flatware or whether other types of flatware are required.

Permanent Ware - Plates and Glasses

Utility and durability are essential in the choice of plates and glasses. They are washed after each use and need to be able to stand up to this vigorous use.

Reusable plastic plates and glasses are popular choices for school nutrition directors. Plates are available as either flat plates or compartmentalized. Plastic glasses are available in a variety of sizes, depending on whether they are to be used for juices, water, or milk. The greatest advantages of reusable plastic ware are its safety for children and its low cost as compared to other types of permanent ware. Important factors in its selection include:

- Durability
- Attractiveness
- Length of time that it can be used before it needs to be replaced
- Appearance after extended use
- Replacement cost
- Ease of use
- Cleanability
- Drying time
- Functionality

Alternatively, plates may also be ceramic. When plates are properly made these should be able to easily withstand the knocks, temperature changes, and rigor of normal use.

Plates should also be considered an ongoing expense due to the occasional need for replacement. Future cost and availability of the plates, therefore, is one consideration in making the choice of

plate. In addition, durability is a very important consideration, not just from the standpoint of replacement costs; it is also a safety issue for the handling of the plates by employees and student customers.

Glasses made from glass are not commonly used in schools. If used, they should also be viewed as an ongoing expense. The future cost, availability, durability, and safety of the glassware are important factors when purchasing this item. It is beneficial to keep extra supplies of glassware on hand. If the number of glasses is in short supply, employees are more likely to grab glasses directly out of the dishmachine when they are hot and put them immediately into service. When this happens, the glasses are more likely to crack when they are "shocked" with a cold liquid when they are still hot from the dishwasher.

Most commercial glassware is pressware. Pressware is made by pressing the glass into a mold to create its shape and then cooling it slowly by a process called annealing to strengthen and stabilize the glass. Strength of the glassware will also depend on the shape and thickness of the glass, the presence of extra thick glass material at stress points, tempering, or through the addition of chemical compounds to the liquid glass material.

Permanent Ware - Trays

Two types of trays are used by student customers in school meal programs. They are flat trays which may be used to carry plates or containers of food and compartmentalized trays which function as both a plate and as a tray. Selection of trays will be based on a variety of factors, including their:

- Durability
- Cleanability
- Drying time
- Functionality
- Attractiveness
- Cost
- Portability

"Plastic" types of trays may be described as polycarbonate, melamine, fiberglass, ABS plastic, or other plastic polymers. They are known to be difficult to dry when they are run through the dishmachine. This should be carefully considered when they are being cleaned. Dishmachines that have a drying device will help to dry the trays faster. In addition, drying time may also be a factor in selecting the type of tray to purchase. Trays that have sloping compartment walls or handles, for example, generally allow water to drain faster and also help to promote faster drying.

Disposable Dishes, Trays, and Flatware

Another alternative for some schools has been the use of disposables rather than permanent ware. Disposables may include flatware, plates, trays, or some combination of these. Many choices of materials are available depending on the disposable being considered. Flatware may be made from polystyrene or polypropylene for example, and plates, food containers, or trays may be polystyrene, a type of paperboard, aluminum, or fiber molded cardboard, among other choices.

If disposables are used, their purchase is clearly an ongoing expense. Price is therefore, very important. Because prices may fluctuate, this is a careful consideration in their selection and method of purchasing. Advantages and disadvantages to the use of disposables are shown below.

- Advantages of disposables include:
  - May be less expensive than permanent ware
  - Will reduce dishwashing needs
  - Provide a very sanitary option
  - Available in a wide variety of choices
  - Are lighter in weight
  - May provide faster meal service
  - May be able to recycle or compost
- Disadvantages of disposables include:
  - They are not generally considered the "environmentally friendly choice"
  - They will need to be continuously purchased
  - May be harder or less safe, in some cases, for children to carry
  - Require more storage area

Purchasing decisions for disposable ware should also be made after examining samples of the products. Decisions should never be made on the pictures and prices shown in a catalog. If possible, it would be helpful to try these products with one's menu and cafeteria to see what other changes in service or preparation would be needed. Polystyrene flatware for example will be more rigid and may have sharp edges when broken, whereas polypropylene flatware will be almost "rubbery" by contrast and less likely to break. The purchase of combination flatware such as a spork (a cross between a spoon and a fork) would reduce the number of pieces of flatware that need to be purchased and minimize the needed storage space.

SUMMARY

Use of the right tool can help make a better quality product, result in less worker fatigue, and get the job done more quickly and safely. Because of their importance to the everyday tasks, good tools are essential in a good school nutrition program. Employees will clearly tell you that a "good" tool will make their job easier and a "bad" tool will make their job harder. In general, all tools should be easy to use, durable, readily cleanable, accurate, and reasonable in cost. Sanitation codes should also be checked to see if there are limitations to the use of particular kinds of tools, such as, wooden handles on knives or wooden cutting boards.

In addition, many of these tools may need to be replaced periodically so price is a serious consideration as they represent an ongoing expense. Keep in mind that many of these tools, including the flatware, plates, and glasses are best evaluated for quality and durability by testing samples rather than looking at their pictures in catalogs.

The use of disposable dishes, trays, and flatware has been a choice of some school nutrition programs. The most important message for the use of disposables is that this choice is a personal choice for a school based on the advantages and disadvantages to their use. The major advantages associated with their use are that there may be lower "dish" costs associated with their purchase and elimination of some of the dishwashing needs. The major disadvantage is that they generally are not considered the "environmentally friendly choice", although in some schools recycling and composting may improve their use as an environmentally friendly option.

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