

# WHITE PAPERS

## FOOD PROCESS ENGINEERING



# PREFACE

Food manufacturers today face a host of new opportunities and challenges. Not only must they keep up with ever-changing consumer trends, but they must remain vigilant in their sanitary practices and procedures to ensure the highest levels of food safety. In this paper, we review just a few of the current trends, opportunities and challenges facing food processors today.

## FOOD COMPANIES GO GREEN WITH ECO-FRIENDLY PACKAGING

Many food companies are transitioning to eco-friendly packaging as a way to preserve the environment and to appeal to environmentally conscious customers. The options available in eco-friendly packaging and the benefits companies can reap by going green make it an easy, smart transition.

### TYPES OF ECO-FRIENDLY PACKAGING

- Plastics or bio-plastics made from corn, potato or other annually renewable sources that are compostable and biodegradable
- Bio-compostable plastic and paper products, which disintegrate and biodegrade completely and safely when composted in a municipal or commercial facility
- Bio-degradable materials that decompose, usually by bacteria or sunlight, into original organic components within a reasonably short period of time
- Recycled content – materials that have been recovered or diverted from the solid waste stream. Most plastics (PETs, PEs) are classified as recycled content.

### BENEFITS OF ECO-FRIENDLY PACKAGING

- Transitioning to eco-friendly packaging is great for the environment, but many food processors are finding added benefits of going green, including:
- Reducing excess packaging material, which results in lighter, smaller, and lower cost shipments
- Helping to attract and retain customers. Most consumers will choose an environmentally friendly package over conventional packaging
- Showing that the company cares about the environment and listens to customer concerns.

In most cases, a food plant can use its existing equipment and simply incorporate the new packaging material into its production line (i.e. recycled, PET, natural materials, etc.). The effects on the process flow are minimal.

Many companies that are transitioning to eco-friendly packaging are using soy ink to print product information. This ink is low in volatile organic compounds (VOC) that can harm the environment at high levels and is available in bright colors that petroleum-based inks cannot match.

## STANDARD EQUIPMENT SPECIFICATIONS: BENEFITS AND CONSIDERATIONS

While designing a new food processing production line or adding to a line, there are a number of factors to consider when outlining equipment specifications, including product run rates, packaging format, temperature and many others. Plant managers often turn to different vendors to provide different components, but it is essential to have standardized equipment to improve efficiency, production, sanitation and aesthetics.

Inappropriate or incompatible equipment can mean loss of production time and loss of income. Whether you're adding a single piece of equipment or designing a full production line from scratch, detailed, standard requirements should be communicated among the entire team participating in the design process.

- Location and environmental factors including seismic concerns, humidity, and elevation
- Product and room temperatures
- Product SKUs, production rates and packaging size requirements
- Sanitation practices and caustics used
- Electrical, control and communication requirements including HMI configurations and screen appearances

Sanitary construction of equipment is a critical factor that designers and vendors have to follow for all washdown and production areas of a facility. For example, equipment designs need to avoid flat surfaces or metal-to-metal contact that will not drain properly during a sanitation wash down. Equipment must not have drilled holes or penetrations in tubing or pipes. This will eliminate the possibility of sanitation water entering the tube or pipe cavity and creating a home for bacterial growth.

Equipment specifications will address any pre-determined performance criteria and regulatory issues required. A Factory Acceptance Test (FAT), witnessed by the client, will prove production rates, product quality, and that all OSHA requirements for safety are met. This list is by no means exhaustive. Tagging, palletizing and clearance issues are just a few more points that must be addressed as well.

Equipment specifications are an excellent means of controlling construction and client expectations for project requirements. This documentation will reference all codes and regulations needed for equipment design and food safety.

## CONTROLLING ALLERGENS WITHIN THE PLANT: STRATEGIES AND CONSIDERATIONS

Cross-contamination of allergen products can have dire consequences for a food plant. Some of the food industry's most common ingredients – milk, eggs, peanuts/tree nuts, fish/shellfish, soy and wheat – represent 90 percent of food allergens.

Larger food processors have the financial resources to dedicate separate production lines to products with allergenic ingredients. Small processors, and those with multiple products on a production line, face a more difficult task of controlling potential cross-contamination.

### 4-S STRATEGY

Typically, plants employ the 4-S strategy to minimize cross-contamination of allergens from non-allergen products:

- **Separation** – house similar allergen ingredients in separate storage areas/room.
- **Segregation** – provide barriers (physical, material/personnel flow and HVAC systems) between production lines that use allergens.
- **Scheduling** – run the allergen-based products on the last shifts of the line prior to cleaning.
- **Sanitation** – wet clean and use clean-in-place (CIP) systems as much as possible. When dry cleaning is required, HEPA-filtered vacuum systems are preferred over compressed air blowdowns.

## DESIGN CONSIDERATIONS

From an engineering perspective, eliminating the potential for cross-contamination of allergens should be addressed during the initial design process. Incorporating design solutions at the outset can save time and money and may include:

- Dedicated ingredient delivery systems for allergen products that require no special cleaning, such as pump/tank systems, scaling hoppers and ingredient conveying lines
- Designation of separate ingredient storage areas to segregate allergen ingredients
- Equipment with CIP capabilities
- Separate rooms for lines that run allergenic products
- Material flow paths for allergens
- Color codes for rooms, pallets, tools and containers that house similar allergens.

## FOUR REASONS TO INVEST IN A REUSE CLEAN-IN-PLACE SYSTEM

Any food or beverage plant facility that uses clean-in-place (CIP) technology to clean tanks, piping or product lines without disassembly three to seven times a week should implement a reuse design, provided cross-contamination is unlikely. Here are four reasons why:

### 1-3. SAVING MONEY, WATER AND DISPOSAL FEES

Unlike the single-pass CIP design where water and cleaning solutions cycle through only once before disposal, the reuse design recycles them for pre-rinsing or cleaning out of place (COP) during future cleaning. Although the reuse design has a larger footprint and higher initial costs, that shouldn't prevent you from seeing its value. The equipment quickly pays for itself when you can save on cleaning chemicals and water consumption, plus a reduction in wastewater disposal fees.

### 4. YOUR WATER WORKS HARDER BEFORE IT GOES DOWN THE DRAIN

Recovered water can be used in a variety of applications including:

- Pre-rinse cycle of cleaning process – afterwards, the water must be disposed of due to heavy soils
- Post-rinse cycle – only if the soap from the wash cycle can be removed and the post rinse is followed by another cleaning step, such as alkaline/post rinse/acid
- Pre-rinse cycle for another product or batch – if the water isn't too soapy, or the soap can be partially removed
- Cleaning of non-product contact surfaces – with or without additional soap, depending on the application can be used COP

When choosing a CIP system, be sure to compare the upfront equipment costs with the long-term benefits.

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