

# WHITE PAPERS

## **FOOD SAFETY**

*Trends, Opportunities and Challenges*



# PREFACE

The Food Safety Modernization Act (FSMA), enacted in 2011, aims to ensure the U.S. food supply is safe by shifting the focus from responding to contamination to preventing it. Food plant architects, plant managers and employees are playing a more active role in food safety from the initial plant design to equipment to on-site inspections. In this paper, we address the proactive steps plants can take to ensure they're in compliance with all regulations and actively preventing food safety issues.

## FOOD MANUFACTURING PLANT DESIGN: TIPS FOR PREVENTING FOOD SAFETY ISSUES

It's been more than a decade since the American Meat Institute (AMI) released its "10 Principles of Sanitary Equipment Design," but many food processors are still not leveraging AMI's equipment recommendations during food manufacturing plant design.

One of the most common causes of food safety problems is a flaw in the sanitary design of food processing equipment. When building new facilities or installing new lines, many food manufacturers struggle with increasingly fast-paced project schedules and limited funds, which affect priorities assigned to sanitary equipment design and requirements during the early stages of a project.

Food processors can save significant capital dollars if they invest the time to "engineer out the problem" when first designing a new line – rather than wait to correct issues discovered after installation.

### KEY SANITARY DESIGN ISSUES AND AREAS THAT SHOULD BE ADDRESSED DURING THE EQUIPMENT DESIGN PHASE INCLUDE:

- Nooks, cracks and crevices – at its core, sanitary equipment design is about controlling potential harborage areas where undesirable microorganisms may cultivate
- Equipment feet – equipment should be designed with the minimum required number of legs to reduce harborage possibilities with special considerations for a ball foot, screw foot, welded insert foot, plastic foot, or stainless steel foot
- Off-the-shelf equipment – custom equipment design should eliminate unwanted mounting holes that may be present in off-the-shelf equipment
- Welding methods – using inappropriate welding methods can impact food safety. The single V-joint method is preferred over other methods such as square-butt joint, lap joint or T-joint, as those can lead to niche areas where debris can become trapped

- **Drill and tap** – mounting plates, brackets, junction boxes, nameplates and similar items should be attached to a stainless-steel tube or pipe utilizing continuous welded stand-offs, or be continuously welded to the surface, not attached via drilled and tapped holes
- **Flat surfaces** – plants should minimize flat surfaces, especially in wash-down areas where microorganisms are easily transferred by water. All angles on the equipment must be curved or rounded with a quarter-inch radius or more
- **Equipment finishes** – select the correct finish on stainless-steel material for food contact surfaces verse non-food contact surfaces to effectively clean and eliminate any chance of bacterial survival.

## FOOD PLANT SANITATION: FIVE ROLES YOUR EMPLOYEES SHOULD PLAY IN FOOD SAFETY

Food processing engineers are frequently challenged with developing controls and processes for managing food safety precautions within a plant. Yet food safety is a role that every employee, from the top down, needs to embrace. It should be deeply rooted within the plant's culture and most important, it should be a continuous improvement process.

### FIVE WAYS EMPLOYEES SHOULD PLAY A ROLE IN YOUR SANITATION EFFORTS INCLUDE:

1. Training should cross many functions so when workers move from one department to another, those policies and procedures transfer Stellar's team of process engineering experts have designed, specified and installed processing and packaging lines for many of the world's largest food companies.
2. Supervisors must be open-minded and receptive to suggestions from employees, just as employees need to be willing to speak up and share ideas and concerns. For example, if there is an operation that requires a hand sink to be closer, employees and supervisors should work together to mitigate the issue
3. Many food processing plants are employing stringent uniform and locker room standards to minimize airborne contaminants from outside. Plant-issued footwear and sanitary over-garments are becoming the norm
4. Plants should ensure that different work areas are zoned appropriately to eliminate any potential cross contamination, for example separating raw vs. ready-to-eat products. Many plants enforce strictly controlled paths of travel for employees within each division using color-coded uniforms
5. Electronic bar codes on badges ensure that employees only have access to their specified work center. Real-time tracking allows plants to monitor where and when a potential threshold breach has occurred, allowing the plant to react instantly by stopping a line or pulling a product.

## FOOD PROCESSING DESIGN: FIVE STEPS FOR INTEGRATING FOOD SAFETY INTO EQUIPMENT UPGRADES AND PLANT RENOVATIONS

If you're thinking of upgrading equipment or renovating your facility, it's critical that food safety requirements are met in the process. Most manufacturers are taking a proactive role in ensuring equipment is engineered for optimal cleaning and sanitizing to meet all safety regulations, but it's important that all plant stakeholders who play a role in food safety have input.

Plant managers and food processing engineers often have to balance tight budgets with the challenge of meeting the stringent food safety requirements. If you're planning an upgrade or renovation for your plant, sit down with your food processing design firm to address these issues:

1. Start with an internal audit of your existing facility and prepare a risk matrix based on the likelihood of a food safety breach, including potential timing and costs
2. Prioritize your upgrade or renovation projects based on this risk matrix. Consider the ROI specifically for food safety improvements based upon the risk of not making the improvement or repair
3. Sanitary requirements for equipment upgrades and modifications should be addressed at the outset with manufacturers, covering everything from food contact surfaces to CIP
4. Challenge old-school thinking and hire and recruit new talent and consultants who have knowledge in food safety issues based on real-world experience.
5. Determine root causes of potential violations in risk areas and address them in their entirety. Band-Aid approaches don't work. For example, changing air filters due to bacteria, mold spores or allergens will not "fix" the problem. You must look at the root cause of the problem, which may include equipment such as hygienic air units and other potential causes of airborne contaminants.

## THREE STEPS FOR REMOVING BIOFILM IN YOUR FOOD PROCESSING PLANT

Biofilm removal is notoriously difficult, but also critical for food safety. Disease-producing bacteria, including *Listeria*, can be 1,000 times harder to eliminate if it is living in a protective biofilm.

There are three key steps to removing biofilm in a food processing facility: the use of effective cleaning and sanitizing agents, proper exposure time and temperature, and mechanical action. This combination dissolves the biofilm, allowing the sanitizer to kill the bacteria embedded within it. However, the location, age, and history of biofilm formation will determine the variables involved in each step.

1. Establish an effective formulation and concentration of cleaning and sanitizing agents. Traditional

disinfectants like bleach do not effectively penetrate and remove the biofilm. However, some sanitizing agents have been found to be effective. For example, ozone, which attacks extracellular polymeric substances, is particularly efficient at penetrating biofilms. However, it is expensive, poisonous and messy, so it should be carefully applied and dried quickly.

2. Once the right sanitizing agents are determined, you'll need to factor the appropriate exposure time and temperature. Increasing the cleaner concentration for a short period may help remove bacteria that have begun to form a biofilm. Additionally, increased temperature will loosen the biofilm layer, but excessively hot temperatures could cause other problems.

3. Because biofilms can be resistant or immune to high temperatures and chemical agents, mechanical action such as scrubbing or brushing is imperative. Scrubbing or brushing will lift off the biofilm and expose the bacteria underneath to the chemical detergents and sanitizers.

## FIVE WAYS TO ENSURE YOUR FOOD SAFETY AUDIT GOES WELL

The Food Safety Modernization Act (FSMA) expanded the FDA's authority to regulate the conditions of food manufacturing facilities and how products are produced, manufactured, transported, imported and marketed in the United States. Food safety audits, whether conducted by an internal team or by an outside consultant, will ensure that your food processing plant is in full compliance with FDA regulations.

Establishing the proper programs, regular monitoring, and proper documentation are the first steps to a successful food safety audit.

### THOSE PROGRAMS SHOULD ADDRESS THESE FIVE KEY AREAS:

**1. Hazard Analysis & Critical Control Points (HACCP) Procedures** – Carefully evaluate your current processes noting any changes in operational procedures on the production floor, new ingredients that have been introduced or new equipment added to your line. The FSMA now requires companies to implement written, facility-specific hazard analysis and control plans. So if your facility does not have HACCP Procedures, you will need to comply with the new rulings.

**2. Current Good Manufacturing Practices (CGMP)** – ensure that your plant has a GMP inspection checklist and perform an inspection monthly, noting all corrective actions taken

**3. Quality Assurance (QA)** – your QA process should validate the effectiveness of your plant's sanitation procedures and include documentation of all issues found and addressed

**4. Regulatory compliance** – ensure that all applicable regulations governing your specific process and/or industry are incorporated into the HACCP Plan, GMP and QA procedures. Document all

written procedures and inspections

**5. Sanitation procedures** – document all cleaning procedures including training records of the sanitation personnel. Your report should also include detail on the disassembly of equipment, chemicals and cleaning utensils used, and actual cleaning methods. If your plant is using a clean-in-place (CIP) system, document the cycle times, water temperature and chemical levels.

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