

## Food Safety Engineering

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### **The Importance of Food Safety Design:**

Product recalls and loss of consumer confidence are the well publicized negative results of poor food process system design. However, the impact of improper design goes well beyond these obvious failures. Food and pharmaceutical processes require frequent cleaning, which may be automated or manual. A design that neglects the accessibility and cleanability of process equipment results in extended process downtimes for cleaning and product transitions, as well as higher risks for major product contamination issues, scrap generation and recalls.

### **Basic Principles of Food Safety Design Engineering:**

It is essential for food safety design considerations to be included in the front end engineering designs for new facilities and upgrades, as it is very difficult to retrofit existing facilities and processes to eliminate food safety risks once the systems are completely built. The single most important consideration is ease of access to all product contact surfaces for cleaning. Other important factors to consider include the following:

- ✓ Avoidance of crevices, ledges, voids, pockets and dead ends
- ✓ Use of appropriate lubricants, antifoams and other non-product chemicals
- ✓ Smooth surface finishes (both product and non-product contact)
- ✓ Material flow and build-up of solids and semi-solid ingredients
- ✓ Aspiration and foreign material control
- ✓ Segregation of wastes and non-food areas from critical exposed food product zones
- ✓ Avoidance of floor level obstacles for free drainage
- ✓ Non-porous, non-absorbent materials of construction for facilities and equipment
- ✓ Reliable control systems for food safety critical parameters, such as temperatures and moisture

### **Cleaning and Sanitization Systems:**

Automated Clean-in-Place systems have become more and more popular in recent years, as the system designs have become more efficient, reducing the capital costs, and spray ball designs have been made more effective in delivering complete surface coverage. It is very important that the cleaning solutions are provided with sufficient pressures, temperatures and active concentrations to meet the design intent. For manual cleaning operations, accessibility and equipment consolidation to minimize product contact surfaces are the critical considerations.

Sanitization systems rely on one of two methods – high temperatures or chemicals. Both methods rely on a minimum residence time, generally about 30 minutes, to be fully effective. High temperature systems require that the farthest point in a system from the heat source be maintained at a minimum of 180°F for 30 minutes. The most common chemical sanitization systems are sodium hypochlorite bleach, concentrated caustic or chlorine dioxide. In recent years, chlorine dioxide has developed as the disinfectant of choice, as on site chemical generation and delivery systems have become available. The chlorine dioxide chemical is broken down into harmless salts, so it doesn't create a waste stream.



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## **Experience and Knowledge:**

Above all, the use of an engineering team with direct experience and practical knowledge of food safety engineering best practices and cleaning system design is critical to the success of any food or pharmaceutical process. Foods, animal feeds and pharmaceuticals are the core of ADF Engineering's competency. ADF Engineering is a select supplier for comprehensive engineering services to several of the largest food ingredient and pet food companies in the world. This is due to ADF's extensive hands-on experience in the food and pharmaceutical industries, including:

- ✓ Corn Wet Milling and Dry Milling
- ✓ Sugars and Sweeteners
- ✓ Corn Oil
- ✓ Pet Foods
- ✓ Cattle, Poultry and Aquaculture Feeds
- ✓ Soy Meal and Grain Processing
- ✓ Oilseeds Processing
- ✓ Meat Packing
- ✓ Liquid and Powdered Flavors
- ✓ Salt
- ✓ Starches, Food and Industrial
- ✓ Pharmaceutical and Nutraceutical Manufacturing
- ✓ Dairy and Dairy By-Product Processing
- ✓ Citrus Juices and By-Products
- ✓ Algal Oil Extraction
- ✓ Phytosterols
- ✓ Clean-in-Place System Design
- ✓ Sanitization System Design
- ✓ Chlorine Dioxide Generation and Usage