Hygienic Design of Cleaning Systems

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Agenda

Evaluation of Cleaning & Disinfection Requirements

Define Cleaning & Disinfection Methods

Chemical Control

- Storage
- Transfer
- Dosing
- Application
- Rinsing

Hazard Analysis of Equipment Design

Implications:

- Cleaning Systems
- Equipment Design
- Infrastructure Faults

Evaluation of Cleaning & Disinfection Requirements

Overall Strategy

1. Identify Hazards; Determine Objectives & Set Standards Required.
2. **Evaluation of Cleaning & Disinfection Requirements.**
3. **Define Cleaning & Disinfection Methods.**
4. Conduct Risk Assessments.
5. Validation & Target Setting.
6. Document Cleaning Methods.
7. Train & Communicate.
8. Verification & Monitoring.
9. Audit & Review.

Record all stages.

Evaluation of Cleaning & Disinfection Requirements

Aspects to Consider

Standards required

Type of food processing environment

Types of cleans required (interim, daily, periodic)

Type of soiling, including allergens and species

Water chemistry

Water temperature

Water pressure and flow rates

Materials of construction

Hygienic design

Equipment sensitivity to cleaning (water damage)

Product or environmental sensitivity to water (dry clean?)

Available cleaning time

Available human resource

Cross contamination risk during cleaning

Drainage/effluent

Historical or current issues

Operator safety

Available equipment (storage, dosing, transfer, application, rinsing)

Cost.

Define Cleaning & Disinfection Methods

Once the evaluation is complete, methods can be defined and recorded

These methods should cover each type of clean (interim, daily, periodic)

Definition of methods required will include the chemicals and concentrations to be used

This step will almost certainly require significant input from the chemical supplier.

Chemical Control

Chemicals should be controlled from point of delivery to removal from surfaces. This includes:

- Storage
- Transfer
- Dosing
- Application
- Rinsing

Chemical Storag

Ideal - All chemicals stored externally and pumped into factory

Not possible or cost effective in most instances

Lots of alternatives available, all the way down to a simple keg rack

Chemical Transfer

Ideal - pumped from external area to the point of use via stainless steel pipework (not chlorinated products)

May involve use of just a trolley or manual handling of the chemical container

Chemical Dosing

Ideal - chemicals dosed from a central location

Numerous options available

Neat or dilute dosing

Vital for ensuring correct chemical concentrations are used during the cleaning and disinfection process

Chemical Applicatio

Chemicals can be applied in a number of ways:

- Manual (bucket & cloth/brush/pad/mop etc.)
- Foam / Gel
- Spray
- Soak
- Fog
- CIP
- Semi-Auto (Tray Wash, Floor Scrubber, etc.)

Chemical Rinsing

3 pressures for open plant rinsing:

High Pressure (pumped system)

- 50 bar to 70 bar (700 to 1000 psi)
- 10 to 15 litres / min

Medium Pressure (pumped system)

- 15 to 25 bar (220 - 350 psi)
- 20 to 40 litres / min

Low Pressure (mains water supply or pumped system)

- 2 bar to ~15 bar (30 - 220 psi)
- 10 to 50 litres / min

Example Cleaning Systems - 10 Users

Storage	Transfer	Dosing	Application	Rinsing	Install Cost
					£150k+
					£10k+
					£2k+

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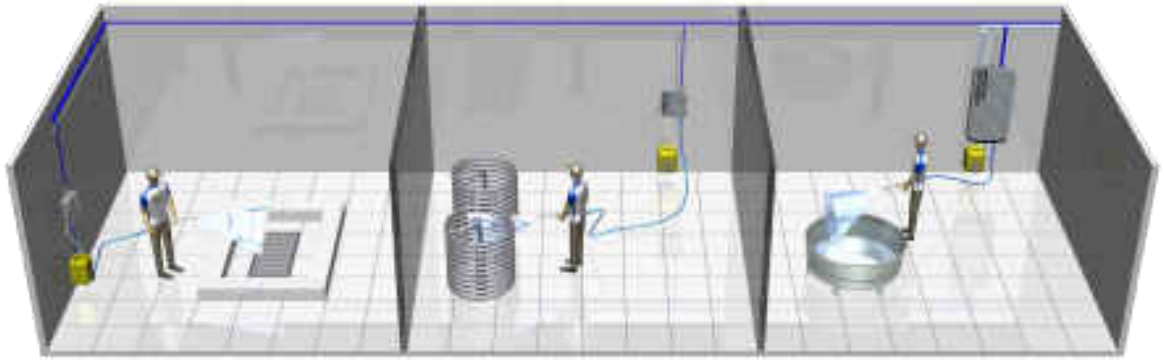
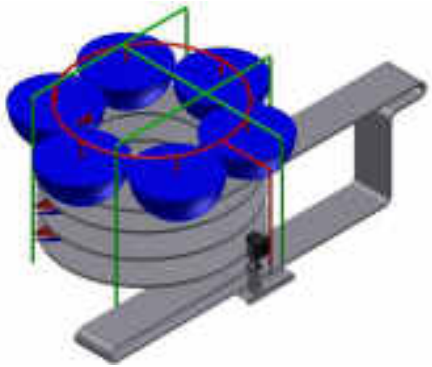
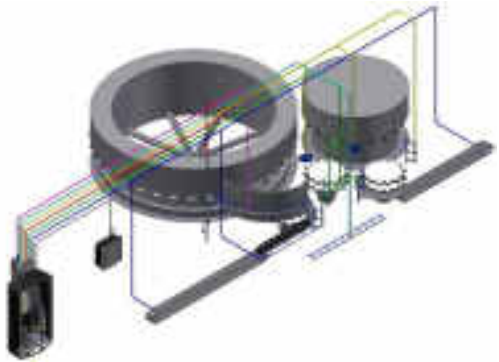
Example Cleaning Systems - 10 Users

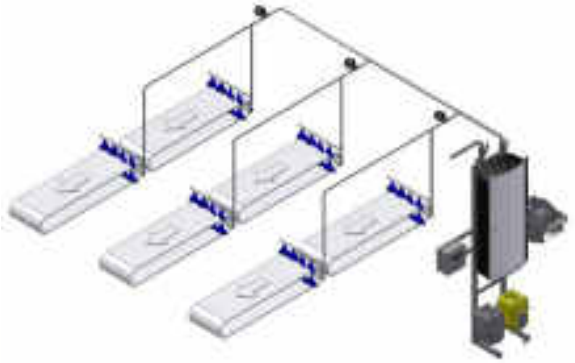
	Advantages	Disadvantages
	No manual handling Only handling dilute chemical Centralised chemical location exterior to factory Single point of dilution - accuracy No transfer of chemical containers across low/high risk barriers Lowest unit chemical costs	Cost Not compatible with chlorinated chemicals
	Reduced initial cost Reduced chemical cost Chemical stored externally Can use chlorinated product Can use a wider range of products	Manual handling Diluting neat chemical Transfer of chemical containers across low/high risk barriers
	Low initial cost Can use chlorinated product Can use a wider range of products	Manual handling Diluting neat chemical Transfer of chemical containers across low/high risk barriers Most expensive unit chemical cost

Bespoke Systems









Hazard Analysis of Equipment Design

When assessing equipment suitability for use in food and beverage processing areas, we consider:

- No direct food equipment contact? Indirect via the applied chemical?
- Potential for introducing foreign bodies (fixings, fasteners, ties, etc.) into the processing area?
- Would there be a potential for the equipment to rust?
- Does equipment need to be waterproof (electrics / electronics)?
- Is equipment robust and where required consistent and accurate for use?
- Potential for hand contact between equipment and food contact surfaces by equipment users?
- Equipment susceptible to leaks (consider materials of construction of seals, pipework, pumps, tanks, etc.)?
- Does the equipment provide harbourage for pathogenic microorganisms (high risk)? If not, is it cleanable?

Hygienic Design Requirements

Holchem encourage our suppliers to use EHEDG principles, particularly:

- 8 - Hygienic Equipment Design Criteria (2004)
- 13 - Hygienic Design of Equipment for Open Processing (2004)

Relatively new concept for cleaning equipment manufacturers to consider. Consequently some equipment is better designed than others on the market.

Holchem work closely with our suppliers to consider and improve their hygienic design.

Hygiene Implications of Cleaning Systems

- Aerosol generation
  - Change to lower pressures, restrict flow rates, reduce rinse times
- Hoses coming into contact with equipment
  - Locate hoses overhead, hose reels, adhere to maximum usage length,
- Movement of equipment between low / high risk areas or between allergens or between species
  - Use colour coding, tagging
  - If movement unavoidable, ensure equipment is easily cleanable
- Movement of chemical containers between low / high risk areas
  - Ensure decontamination procedure is in place
- Storage of chemical containers
  - Ensure containers are stored off the floor (lockable keg racks)
- Ensure effective management system in place - training, documentation, supervision, etc.

Implications of Equipment Design

In our experience, poor hygienic design of machinery, equipment and processing environments can sometimes provide the greatest cleaning challenges

If available kit and resources aren't practically successful, we have overcome the problem by introducing an engineering solution

Example:

- Problem: Rice Cooler - Listeria reservoir on outfeed section that the hygiene team were unable to access without fully dismantling
- Solution: Bespoke, automated system was designed and installed that foamed, rinsed and disinfected all internal surfaces without having to dismantle (cost ~ £20k)

Implications of Infrastructure Design

Holchem have recently introduced to the market Doorway Sanitisers for control of Listeria in high risk / high care areas

These can be used to help control the proliferation of Listeria on damaged floors or within poorly designed areas

Controlled by timers or photocell, they will spray the floor area with an appropriate volume and concentration of disinfectant

Any Questions?

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