Listeria monocytogenes
Intervention & Control Workshop

Blue Sky Sanitary Design
Rudi Groppe

United Fresh Produce Association
PMA
Michigan Apples
Hygienic Design – What are the next steps?

• Know the Enemy
• Sanitary Design Guiding Principles
• Zone Definitions
• Facility Design
• Sanitary Methods of Manufacturing

Focus: How do I ask the right questions?
Where does *Listeria* “hang-out” in equipment?

- **Laminations**
  Bolt Connections, Sandwich joints

- **Surface Finishes**
  Poor welds
  Exposed aggregate flooring
  Corrosion (rusting, pitting)

- **Control Panels**
  Condensation, Buttons, Unmaintained gaskets

- **Hollow Areas**
  Tubing
  Product Containers (Bins/Totes)
  Product Utensils (Shovels, Paddles)
  Whether purposely penetrated or not

- **Floors**
- **Drains**

- **Air Blowers, Cooling Evap Coils**

N.B.C.
Sanitary Design Guiding Principles

- AMI, GMA, 3A, EHEDG (*But what is my risk?*)
- Method to implement sanitary design across all process zones

**Facility Design Guiding Principles**

1. Defined Hygienic Zoning
2. Controlled Flows
3. Controlled Floor Systems
4. Controlled Room Temperatures
5. Controlled Room Pressures
6. Sanitarily Designed Facility Exterior
7. Sanitarily Designed Doors, Walls & Ceilings
8. Sanitation & Maintenance Access
9. Sanitarily Designed Support Equipment
10. GMP-based Facility Design

**Equipment Design Guiding Principles**

1. Microbiological Clean
2. Made of Compatible Materials
3. Accessible
4. No Liquid Collection
5. Hollow Areas Hermetically Sealed
6. No Niches
7. Sanitary Operational Performance
8. Hygienic Design of Maintenance Enclosures
9. Hygienic Compatibility
10. Validated SSOPs

*PMA & United Fresh Joint Listeria Workshop*
How do we embed the Principles of Sanitary Design into our Core Values?

- Develop a Vendor Qualification Program
  - Internal teams – Proactive training?
    - Facility Contractors
    - Equipment Suppliers
    - Equipment Installers

Are we armed and dangerous?
Who owns it?
How do we handle it?

*PMA & United Fresh Joint Listeria Workshop*
We all own a piece!

DEPARTMENTS AT HEINZEN

1. Sales: Responsible for selling of custom & standard equipment.

2. Estimating: Responsible to ensure accurate quotes are prepared for customers with direction from Sales.

3. Accounting: Responsible for payables and receivables.

4. Engineering: Responsible for the layout and designs of equipment.

5. Purchasing/Warehouse: Responsible for the purchasing, vendor management, and kitting in the warehouse, ensuring production has what is needed for the specific build.

6. Metal Prep: Sheets of stainless steel are cut, bent and deburred. These are the pieces that will be welded together.

7. Machining: Processes various material through various machines to produce parts for Fabrication and Assembly.

8. Fabrication: The welders of the process. They receive the pieces of stainless steel from Metal Prep, and weld together per Engineered drawings.

9. Blast & Wash: Responsible for ensuring that equipment is adequately cleaned and treated prior to shipment.

10. Assembly: This is where the equipment comes together. The belts, motors, and others are put on the equipment to make it function as designed.

11. QC: Responsible for ensuring the Heinzden Workmanship Standards are followed through. They are the final check (and eye) prior to equipment shipping.

12. Shipping: Responsible for all shipments of equipment and parts orders in a safe a timely manner.

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Definition of Design Zones

The development of Design Zones is critical for the development of the sanitation master plan, and standardized methods of sanitary design and methods of manufacturing.

The Zone concept is designed to work with a Master Sanitation plan to include the testing and verification process.
COLD
Zone 4
Remote: doorways, walls, drains (non-processing)

WARM
Zone 3
Below the production flow, still subject to environmental and sanitation concerns for a RTE (ready to eat) food processing facility.

GETTING WARMER
Zone 2
Non-Food Contact: table legs, floors, drains, aprons

FOUND IT
Zone 1
Product Contact Surfaces

Incidental Product Contact Surfaces:
• Drip
• Drain
• Drawn
• Diffuse
Sanitary Plant Design

Defined Hygienic zones based on a Low Risk to High Risk definition

RAW  Incoming product storage area, pallets, wood, cardboard.
RTE  Ready to Eat, zone where the product is undergoing microbial reduction.
HH   High Hygienic, product is in its cleanest state, just prior to packaging.
LR   Low Risk, Finished Product, Offices, Locker rooms.
Facility Design Guiding Principles

Best Practices: How do we all get on the same page?

*Luck favors the prepared!*

- Floors
- Floor Drains
- Walls
- Electrical and Plumbing Contractors
- Evaporator Units
- Equipment Anchoring
Floor Systems: What is the risk with a compromised floor system?

**What’s the cost of not doing it right the 1st time?**

- Sloped Floors typically 1/8 inch to 1/4 inch per foot (Specify Non-Pooling)
  - 3/16” per foot in Critical Processing areas
  - High forklift traffic areas

- Floor Coatings
  - Polyester base, Epoxy Base, Urethane Base
  - Urethane Floors, Set in 12 hours @ 36 degrees in wet cond.

- Retrofitting Existing Facilities
  - Preparation is 90% of the work
  - Urethanes cures fast in cold, now available in high build
FLOOR PREP FAILURE
URETHANE FLOOR COATINGS

- Substrate
- Ucrete® MF Body Coat
- Ucrete® WR Optional Cove Base
- Ucrete® FF Primer Coat
GREAT YOUTUBE VIDEOS!

POLY-CRETE HF

DESCRIPTION
POLY-CRETE HF is a 100% solids, aromatic, cementitious urethane system. It is a pigmented, trowel applied floor system. It is typically applied 1/4 - 3/8 inch thick depending on design requirements. POLY-CRETE HF is designed to withstand aggressive chemical and thermal attack while providing abrasion resistance. An optional, integral cove base is available.

BENEFITS

PACKAGING/STORAGE
POLY-CRETE HF is available in pre-measured kits that cover 18 Sq Ft at 1/4 inch or 12 Sq Ft at 3/8 inch. POLY-CRETE HF must be stored dry. Do not use partial bags of aggregate. Do not allow resins to freeze. Every POLY-CRETE product will be shipped with a lot number on the label. The first two digits indicate the year; the second two show the month, the third two will be the day. The shelf life is 6 months from the date on the label in the original unopened container.

DUR-A-FLEX
95 Goodwin Street, East Hartford, CT 06108
3969 East Guasti Road, Suite B, Ontario, CA 91761
Toll Free 800-253-3539 | 860-528-9838 | www.dur-a-flex.com

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Lamination Control and Mobile Equipment Protection
What can we improve on in this picture?
Floor Drain Systems:

- Short trench drains versus long trench drains
  - Stainless Steel, design allows concrete to “key” to prevent de-lamination
- 12” x 12” Drain Box
- 8” x 48” Area Drains for high flow.
Walls, Ceilings, How to handle Laminations and Penetrations?

- Ceiling Height, 25’-30’
- Raised curb system with sloped ledge and epoxy coated or Stainless Steel Base
- Wall systems use, 3” Urethane Insulated Metal Panel (FRP)
- Walk on roof system, 4” Urethane Insulated Metal Panel
Retrofitting existing walls, need creative work arounds & EFFECTIVE COMMUNICATION
Sub Contractors – Pre Qualified
Sanitary wall connections
Evaporators in Process Room

- Flush Hung to Roof
- Stainless Steel Coils
- Axial Fan vs Centrifugal Fan Types
- Water Wash and Flush Systems

Visit www.colmaccoil.com for more information
Equipment Anchoring

- Insure grout is sealed to the edge of base plate
- Cap anchors to cover exposed threads
- Quality of grout and contractor training
- Equipment removal procedure to clean all connections
Equipment Design Guiding Principles

Best Practices: How do we implement the 10 Principles of Sanitary Design?
  - Training
  - Review of each principle with updated equipment checklist
  - Examples
  - #1 TRUST BUT VERIFY
How do we find discipline?
What does it mean? .......... HOW DO I CLEAN IT?

Did you ask your plant Engineer? Are expectations clear?
## OEM DESIGN GUIDE

### Sanitary Operational Performance

Sanitary Operational Performance is assurance of food safety in normal operations, such as processing, sanitation and maintenance. The equipment will not contribute to unsanitary conditions nor promote harborage and growth of bacteria if properly designed and maintained.

1. Food contact materials meet the FDA criteria for surfaces that are non-reactive, non-corrosive, non-contaminating, non-absorbent and cleanable.
2. Product area (Zone 1) disassembly is conducted with no hand-tools for sanitation and maintenance purposes.
3. All removable components/covers have a designated place for cleaning and sanitizing.
4. Equipment markings (Serial #) can be easily wiped clean. No cut-outs, laminations, or rivets are present.
5. A 'how-to-clean' guide has been developed by the manufacturer.

### Component Fasteners

Fasteners are what temporarily (or permanently) hold pieces together. These are nuts, bolts, acorn nuts, etc. and should not be installed in locations that can contribute to harborage and contamination.

6. Weldments are designed so there are no areas for moisture or debris to collect.
7. Fabricated components are paint/coating-free.
8. Product area (Zone 1) Stainless surfaces are equivalent to a 2B mill-rolled finish, non-grained.
9. Corners are formed (non-welded) with a large radius to facilitate cleaning. (3/16" minimum, 1" preferred)
10. All joints and welds are free of pitting and are smooth (use cotton-ball test).
11. Weldments are free of skip welds and/or over-lapping welded laminations.
12. Piano hinges, knurling, braided covers, and socket head cap screws are not used.
13. Equipment design provides 18” clearance to the floor for Zone 1 surfaces.
14. Equipment legs and footings are thread-less and easy to clean.

### Fabricated Weldments

Fabricated weldments are critical to ensure the main support structure for equipment is cleanable as desired. The main components in weldments are sheet metal, welds, surface finishes, and corners/bends.

15. Product area surfaces (Zone 1) are free of bolts, nuts, or other fasteners.
16. Horizontal surfaces are free of recessed fasteners (e.g. Allen heads, Philips screw heads, etc.) in all other zones.
17. Loctite, Anti-Seize and other lubricants meet applicable approval standards (Food Grade) depending on installation zone.
18. Slope-top enclosures which are NEMA 4X are stand-off mounted (>1”) with cable penetrations from bottom of panel.
19. Wire and cording is routed and mounted using sanitary stand-off wire routing looms or clips.
20. Sensors and their connectors are IP69K, mounted out of Zone 1.

### Motor Controls and Electrical

With electrical, comes cords which need to provide power to equipment. These wires and cords should be routed and installed in a sanitary manner, not contributing to potential contamination.

21. Equipment is hardwired and not field-wired.
22. Wiring is color coded.
23. Wiring is protected from moisture and contamination.
24. Wiring is protected from physical damage.
25. Wiring is protected from electromagnetic interference (EMI).
26. Wiring is protected from electrostatic discharge (ESD).
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29. Wiring is protected from electrostatic discharge (ESD).
Heinzen Weld Standards - Zone 1

SANITARY WELDING

The “Stack of Dimes”

Not Acceptable

PMA & United Fresh Joint Listeria Workshop
Heinzen Weld Standards
Examples of bad welds, field repairs by unqualified welder
Inspect what you expect!

<table>
<thead>
<tr>
<th>Description</th>
<th>Fabrication CHK Score</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensioned</td>
<td></td>
<td>Look at the drawings and check measurements. Check for square, all parts &amp; pieces fit. Dimensioned to drawings? Does it match the print?</td>
</tr>
<tr>
<td>Mechanics</td>
<td>P F</td>
<td>(Circle One) Does it work, do parts clear, moving pieces move? Piece should be assembled as much as possible for QC check off. If it can be welded in fab, then it should be. Does it match the print?</td>
</tr>
<tr>
<td>Top rails</td>
<td></td>
<td>Corners matched properly, sanded smooth, no divots, edges smooth and straight at joints? DA finish on rail to know down scratches and blend welds (flumes, tanks, rails). &quot;Hand Surfaces&quot;.</td>
</tr>
<tr>
<td>Deburred</td>
<td>P F</td>
<td>(Circle One) Areas that were affected by the Fabricator. Sheet metal edges, corners, witness tabs, cut-outs &amp; hand rails are finger smooth. &quot;Hand Surfaces&quot;</td>
</tr>
<tr>
<td>Splatter removed</td>
<td>P F</td>
<td>(Circle One) No dingle berries, spatter, wire or ground arc's. If any, it's cleaned off with no scratches.</td>
</tr>
<tr>
<td>Weld Quality</td>
<td></td>
<td>See Sanitary Welding in the Workmanship Standards for further clarification.</td>
</tr>
<tr>
<td>Wrapped</td>
<td>P F</td>
<td>(Circle One) Welds wrapped around edges, not just stopped.</td>
</tr>
<tr>
<td>Pin holes</td>
<td>P F</td>
<td>(Circle One) ≤5 Pass / &gt;5 Fail</td>
</tr>
<tr>
<td>Consistent</td>
<td></td>
<td>The welds do not deviated in size and path more than +/-10%</td>
</tr>
<tr>
<td>Smooth</td>
<td></td>
<td>No bumps, ridges, undercut, or overlap. Use cotton ball for check. No oscillation.</td>
</tr>
<tr>
<td>Burn through</td>
<td></td>
<td>None; sugar or carbon.</td>
</tr>
<tr>
<td>100% Weld</td>
<td>P F</td>
<td>(Circle One) Welds should cover the whole welded area, completely around. Stitch welding is prohibited. Finished weld cleanliness and color. If its dirty, it's too hot.</td>
</tr>
<tr>
<td>Cleanliness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excessive warpage</td>
<td></td>
<td>None. Did the Fabricator weld to minimize warpage, was a brace or jig used, was warpage corrected?</td>
</tr>
</tbody>
</table>
You get what you pay for!

**SANITARY DESIGN EQUIPMENT MANUAL**
**ELECTRONIC VERSION PROVIDED, HARD COPY ON REQUEST**

At Heinzen, we give our customers the tools to be able to efficiently operate, maintain and clean equipment ordered from standard to custom.

To be included in each manual:
- Spare Parts List
- Drawings
- Inspection Reports
- Sanitary Design Checklists
- Sanitation Passport™

With each equipment manual, you will find references on how to order spare parts in addition to recommended maintenance schedules. The Sanitary Design Checklists and Sanitation Passport™ are additional tools to assist your Food Safety Quality/Sanitation teams in identifying key areas of sanitation focus and risk management by focusing on equipment disassembly and reassembly with and without tools. Heinzen’s engineering strategy focuses around the 10-Principles of Sanitary Design to ensure our commitment to providing hygienic designs, that are built to last.
Sheet metal - Zone 1, The importance of large radius corners

- TIG, Butt Weld in the flat – Not corner
- Large radius Formed Corners (not welded)
Channelized®
Eliminates hollow tube and threaded leg adjusters
Easy to clean is available

*It needs to be specified*

Belt Lifters
Hingeable Drip Pan
Patented Thread-less Adjustable Food Pad
Etched Marking & Serialization
Rotary Valves with Flexible Lip Seals
Sloped Top of Motor Control Panel (MCC)
**WATERTITE® (IP67) Pin-S-Sleeve Devices: Plugs, Connectors, Receptacles, Angled Inlets and Mechanical Interlocks**

Woodhead pin and sleeve wiring devices conform to IEC 507-1 and 507-2 standards which are a worldwide pin and sleeve standard established by the International Electrotechnical Commission. They also meet the requirements of Section 410-56(g) of the National Electrical Code (NEC). Watertite® pin and sleeve products are rated at IP67 while Safebay® pin and sleeve products are rated IP44. Both styles feature impact and chemical-resistant type 6 nylon housings and dead front construction. A locking mechanism prevents accidental disengagement while internal and external strain relief provides pull-out protection and cable bend relief.

**<<Safe Connectors**

**<<Cable Enters Bottom of Panel**

**PMA & United Fresh Joint Listeria Workshop**
Compressed Air Dryers
Cabinet Dryers Eliminate Moisture Problems in Electrical Cabinets and Motors

Balston CD Series Cabinet Dryers

Product Features:
- Designed specifically for wash down areas
- Protects electrical cabinet components from damage caused by water and high humidity
- Minimizes pools of water inside cabinets
- Positive pressure keeps dust out
- Adds no heat to the cabinet
- Reduces cabinet humidity to less than 10% RH
- Requires no electricity, low operating costs
- Easy to install and maintain
- Quiet operation
- Protect motors, touch screens, drives and other critical components

Do Your Cabinets Look Like This?

Corrosion leads to premature component failure
Water accumulation in electrical cabinet

A Cabinet Dryer will keep your cabinets looking as good as new

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Thank you!

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