

HYGIENIC DESIGN – HOW EQUIPMENT DESIGN MAY AFFECT PLANT ENVIRONMENTAL PROGRAMS



ENVIRONMENTAL PROGRAMS ARE NECESSARY – A PARADIGM SHIFT



An ice-cream-like food was first eaten in China in 618-97AD. King Tang of Shang, had 94 ice men who helped to make a dish of buffalo milk, flour and camphor.*

WHY NOW?

Outbreaks attributed to ice cream/frozen desserts from most recent

Fluid dairy, ice cream and frozen desserts have not been considered a problem in the past.

That has changed.

Major sized plant – in Southern US

7/13/2022

ALL FLAVORS AND LOTS WITH ANY CODE DATES PRIOR TO 6/30/2022 WERE RECALLED

Fast Facts

- Illnesses: 28
- Hospitalizations: 27
- Deaths: 1
- States: 11
- Recall: Yes
- Investigation status: Closed

Roman emperors are supposed to have sent slaves to mountain tops to bring back fresh snow which was then flavoured and served as an early form of ice-cream.*

WHY NOW?

Outbreaks attributed to ice cream/frozen desserts from most recent

Between 2000 and 2020, at least 88 ice cream-associated outbreaks were reported to CDC's National Outbreak Reporting System (NORS)



Fluid dairy, ice cream and frozen desserts have not been considered a problem in the past.

That has changed.

Organisms found:


- ❖ *Salmonella* Typhimurium
- ❖ *Listeria monocytogenes*
- ❖ *Escherichia coli* O157:H7
- ❖ *Campylobacter jejuni*

FROM *JOURNAL OF FOOD PROTECTION* NOVEMBER 1, 2017

“Hygienic Shortcomings of Frozen
Dessert Freezing Equipment and
Fate of *Listeria monocytogenes* on
Ice Cream-Soiled Stainless Steel”




ABSTRACT



“Although frozen dairy desserts have a strong record of safety, recent outbreaks of foodborne disease linked to ice creams have brought new attention to this industry. There is concern that small-scale frozen dessert equipment may not comply with or be reviewed against published comprehensive design and construction sanitation specifications (National Sanitation Foundation or 3-A sanitary standards).”

ABSTRACT



“Equipment sanitary design issues may result in reduced efficacy of cleaning and sanitation, thus increasing the likelihood of postprocess contamination with pathogenic bacteria. In this context, and given that *Listeria monocytogenes* outbreaks are of great concern for the frozen dessert industry, a complementary study was conducted to evaluate the fate of *L. monocytogenes* in ice cream mix on a stainless steel surface.”

ABSTRACT (CONTINUED)

“Our results showed that *L. monocytogenes* survived for up to 6 weeks at room temperature and 9 weeks at 4°C in contaminated ice cream on a stainless steel surface.”

Documentation of recent outbreaks validate the above research results.

Strange-But-Real Ice Cream Flavors

- Horse Flesh. ...
- Pickled Mango. ...
- Corn on the Cob. ...
- Foie Gras. ...
- Pear and Blue Cheese. ...
- Ghost Pepper. ...
- Bourbon and Corn Flake. ...
- Fig and Fresh Brown Turkey
- Lobster
- Creole Tomato
- Cheetos
- Cheetos
- Eskimo Ice Cream
- (reindeer, caribou, possibly even whale rendered fat). **

NEW REQUIREMENTS: SWABATHONS

- TITLE 21--FOOD AND DRUGS

- CHAPTER I--FOOD AND DRUG ADMINISTRATION

- DEPARTMENT OF HEALTH AND HUMAN SERVICES

- SUBCHAPTER B - FOOD FOR HUMAN CONSUMPTION

- PART 117 -- CURRENT GOOD MANUFACTURING PRACTICE,
HAZARD ANALYSIS, AND RISK-BASED PREVENTIVE CONTROLS
FOR HUMAN FOOD

- Subpart C - Hazard Analysis and Risk-Based Preventive

Controls(3) Environmental monitoring, for an environmental pathogen or for an appropriate indicator organism, if contamination of a ready-to-eat food with an environmental pathogen is a hazard requiring a preventive control, by collecting and testing environmental samples;

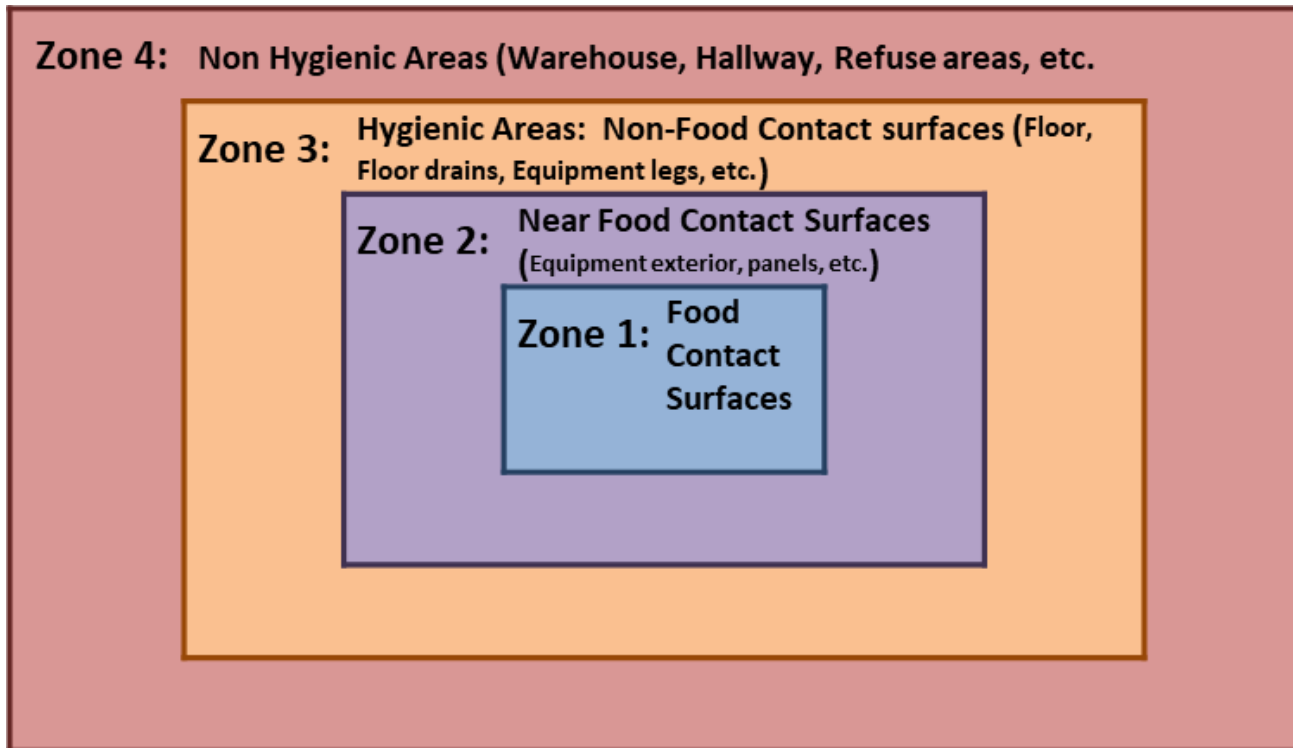
PROGRAM: Seek and Destroy

- NOT HIDE AND SEEK!
- MUST BE AGGRESSIVE
- KNOW YOUR TARGET ORGANISM
- UNDERSTAND YOUR PROCESSES AND EQUIPMENT

- ZONES ESTABLISHED
- ACTIONS TAKEN DEPENDING ON LOCATION OF PRESUMPTIVE POSITIVE “HIT”
- EVERYTHING IS SUSPECT UNTIL CLEARED



ZONES DEFINED



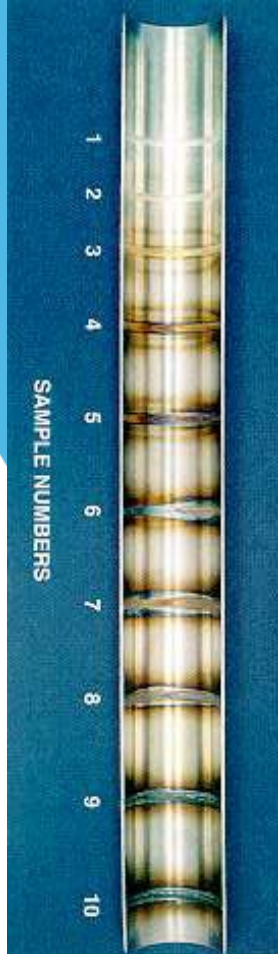
EQUIPMENT – SANITARY DESIGN IS EXTREMELY IMPORTANT

3-A SANITARY STANDARDS ADDRESS SANITARY DESIGN –
AN INTEGRAL TOOL FOR SUCCESS

EQUIPMENT THAT IS NOT 3-A CERTIFIED MUST BE EVALUATED
METICULOUSLY FOR NICHE AND HARBORAGE AREAS

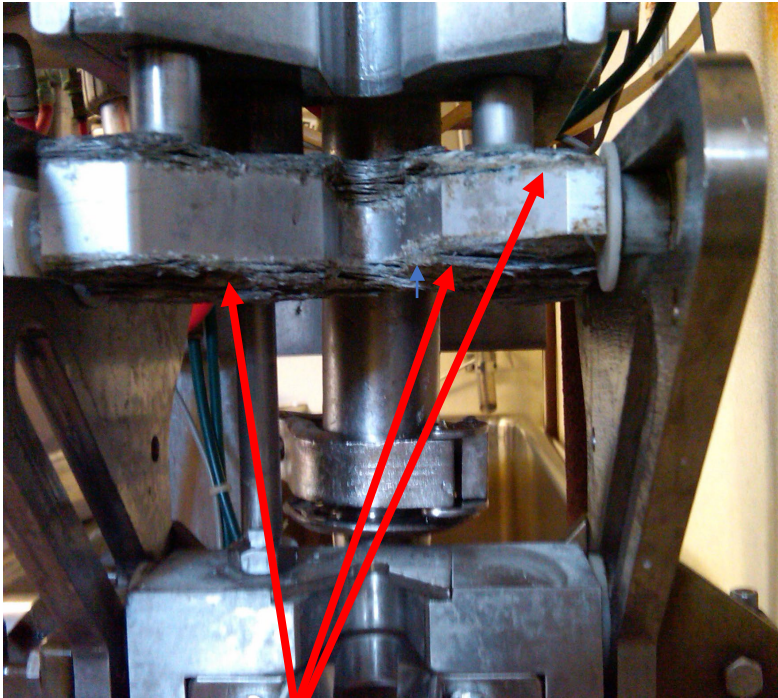
■ Niches

- ✓ Hollow equipment (rollers, equipment legs, etc.)
- ✓ Cracks (walls, floors, equipment, etc.)
- ✓ “Sandwich” fittings
- ✓ Equipment and structure ledges
- ✓ Conveyor strips
- ✓ Product contact area in disrepair, or improper construction



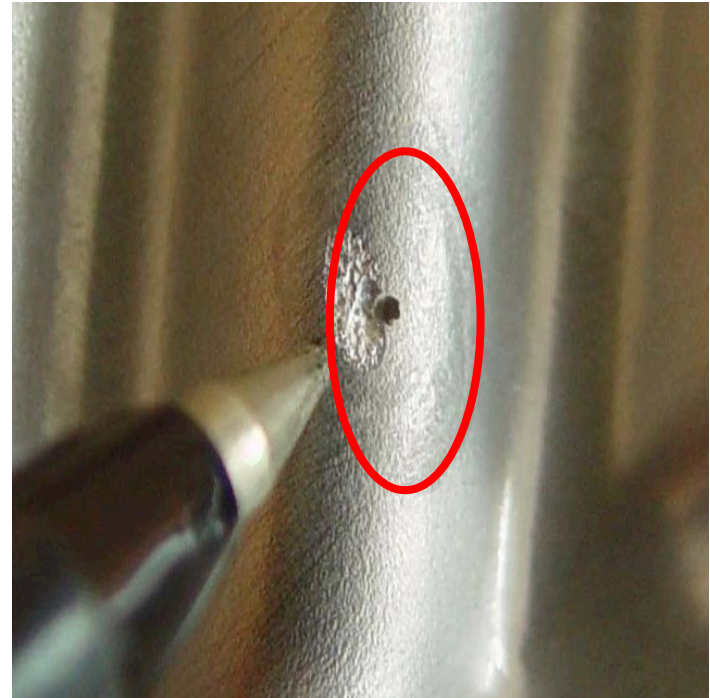
AREAS OF CONCERN

Corrosion from poor choice of materials



Galvanic (or bi-metallic) corrosion on a bin box filler component

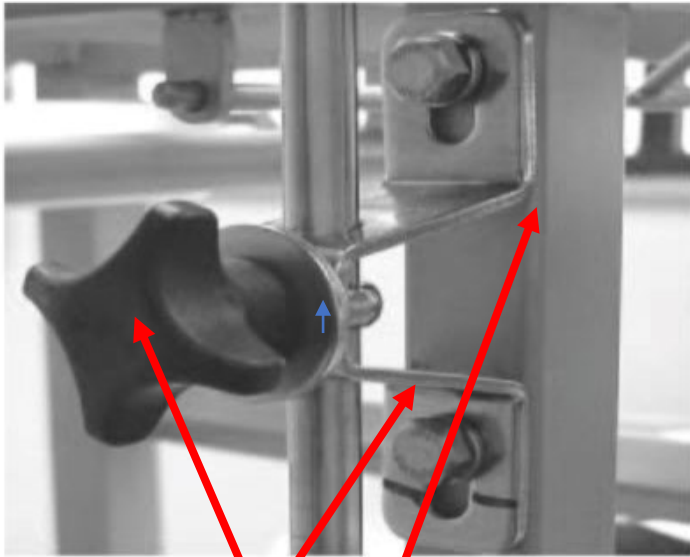
Corrosion from wear, chemicals or materials not composed of correct composites



Corrosion and pitting on plate from a heat exchanger

AREAS OF CONCERN

Design flaws



Sandwich areas, threaded fitting on adjustment knobs

Corrosion from wear, chemicals or plates not composed of correct materials



Corrosion and pitting on plate from a heat exchanger

Harborages

No longer sanitary



Area between foot and floor



Harborages

Belt too long for COP tank

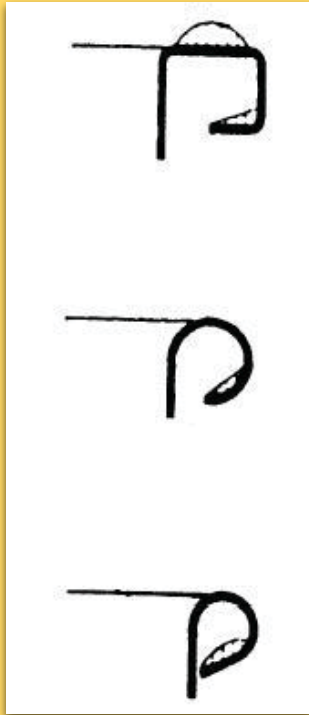


Rails, footers, drive wheels, non-accessible



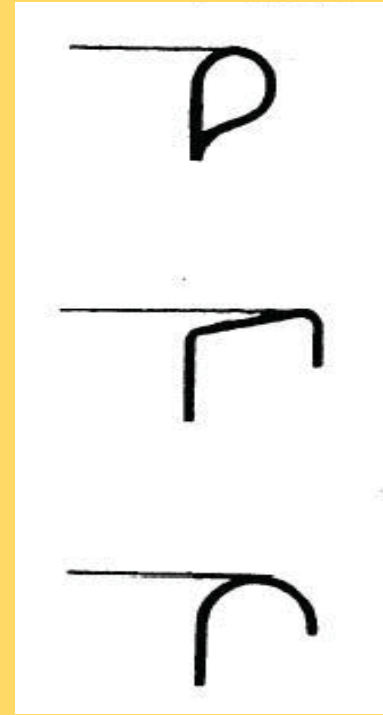
AREAS OF CONCERN

Harborages from poor choice of design



UNACCEPTABLE

Designing out a harborage

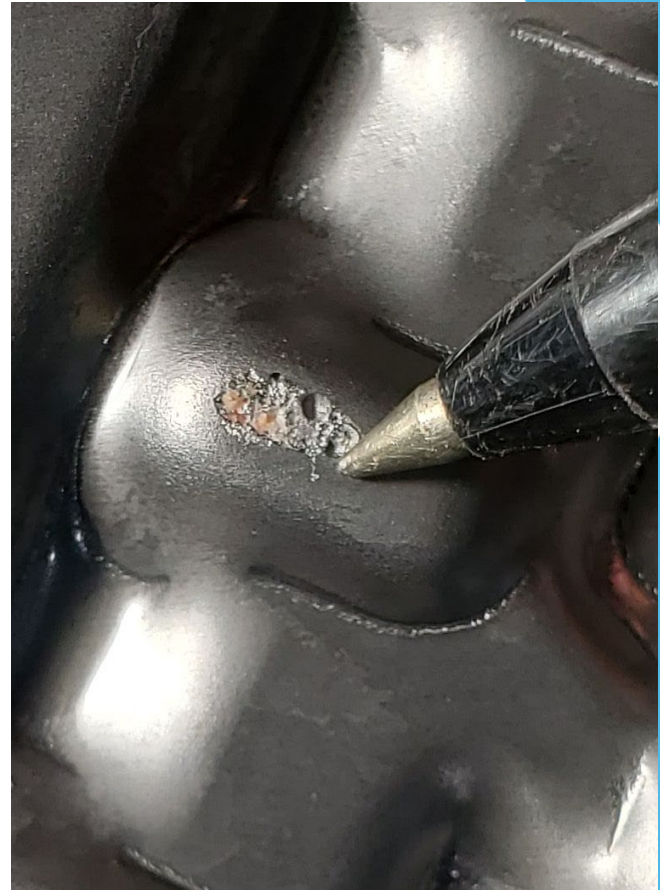


ACCEPTABLE

IF YOU BUILD IT.....

THEY WILL COME!

DON'T PROVIDE BACTERIA WITH THEIR OWN
PERSONAL FIELD OF DREAMS.



ABBREVIATED CONCLUSION



- ❖ Poor plant environmental conditions encourage bacteria to populate
- ❖ It is not a surprise that if in the environment, bacteria will find a vector to a food source
- ❖ Exposed, poorly constructed and/or poorly maintained equipment will provide niche areas for bacteria to survive/thrive
- ❖ Prevention is the best solution: provide easy to clean, easy to disassemble, sanitarily designed plant processing equipment and an easy to clean surrounding environment

QUESTIONS?



**"What do you mean I have to eat more greens?
I eat pistachio ice cream every night."**