
THE
SANITARY
DESIGN
WORKSHOP
BEMA

THE SANITARY DESIGN WORKSHOP

Equipment & Plant Design
For Allergen/Pathogen Control in Low Moisture Foods

Part 5:

Equipment Hygienic Design

Presented by:

Karl Thorson, General Mills

Sanitary design is integral to food safety.

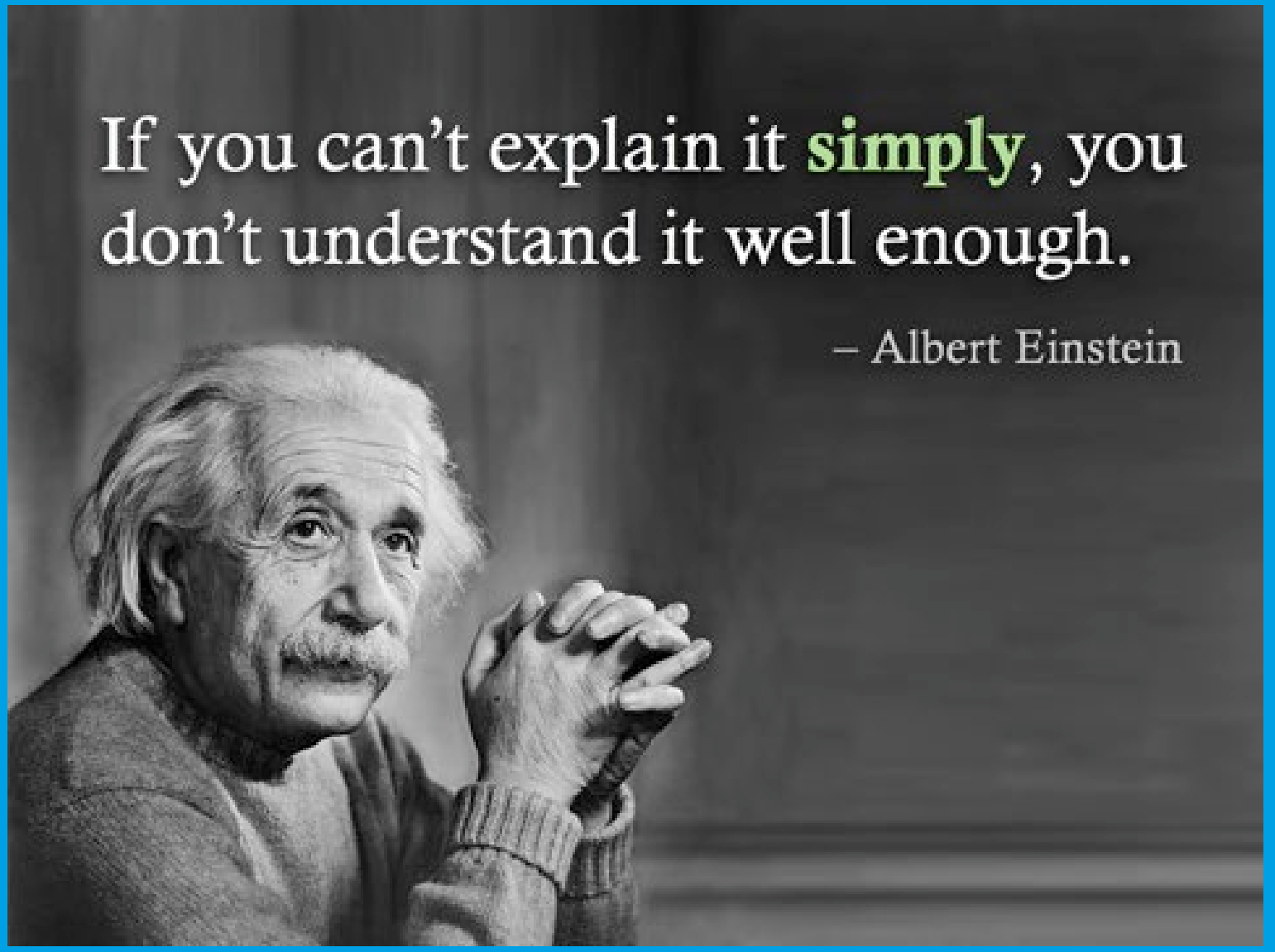
Objectives

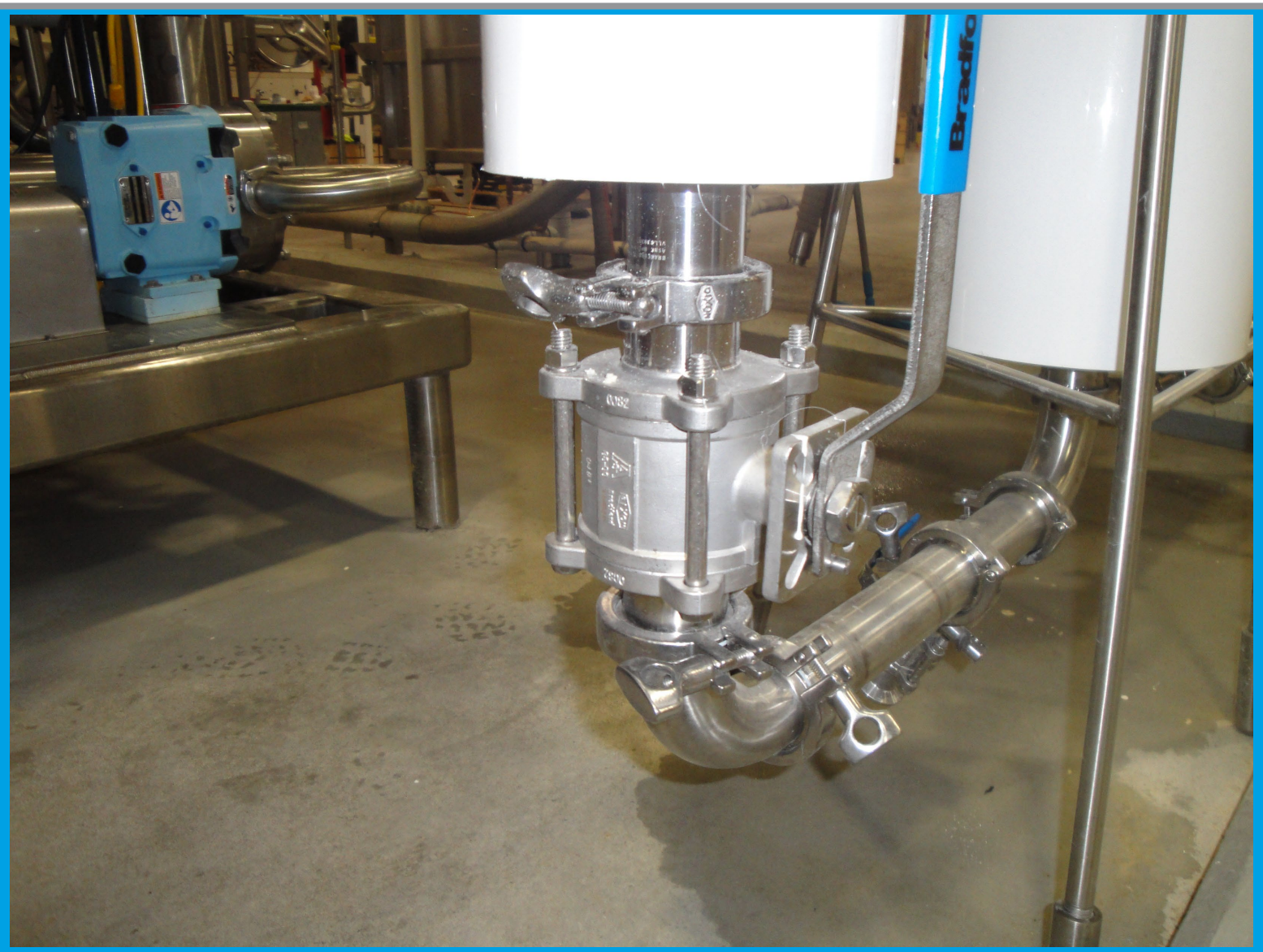
- Introduction of basic design principles
  - Case study reviews
- Definitions and expectations
  - Learn/Do/Teach
- Resources

Goal:

Safe/Quality Food…Efficiently

Sanitation by Design


If you can't explain it simply, you don't understand it well enough.
– Albert Einstein


Bradfo


INDIAN HILLS
COMMUNITY CENTER
BE CAREFUL
WHEN YOU
EAT AT
SAM & ELLA'S
DINER

Sanitary Design Principle 1

Ball Valves

Poor Sanitary Design:

1.2 cannot meet visibly clean, ATP, or micro criteria

Sanitary Design Principle 2

Valve Location

Poor Sanitary Design:

2.2 difficult to access and remove from system

Sanitary Design Principle 2

Ball Valves

Poor Sanitary Design:

2.2 difficult to access and remove from system

Sanitary Design Principle 3

Butterfly valves

Poor Sanitary Design:

3.2 difficult to disassemble

Sanitary Design Principle 3

Butterfly valve disassembled

Poor Sanitary Design:

3.2 Too many parts

Sanitary Design Principle 3

Poor Sanitary Design:

3.3 Cannot Clean In Place (CIP)

Sanitary Design Principle 7

Ball Valves

Poor Sanitary Design:

7.0.2 Retains food material

Sanitary Design Principle 8

Ball Valves

Poor Sanitary Design:

8.3 not safe, practical, or efficient

Better Designs ARE available

Lumaco butterfly valve

Easy to disassemble

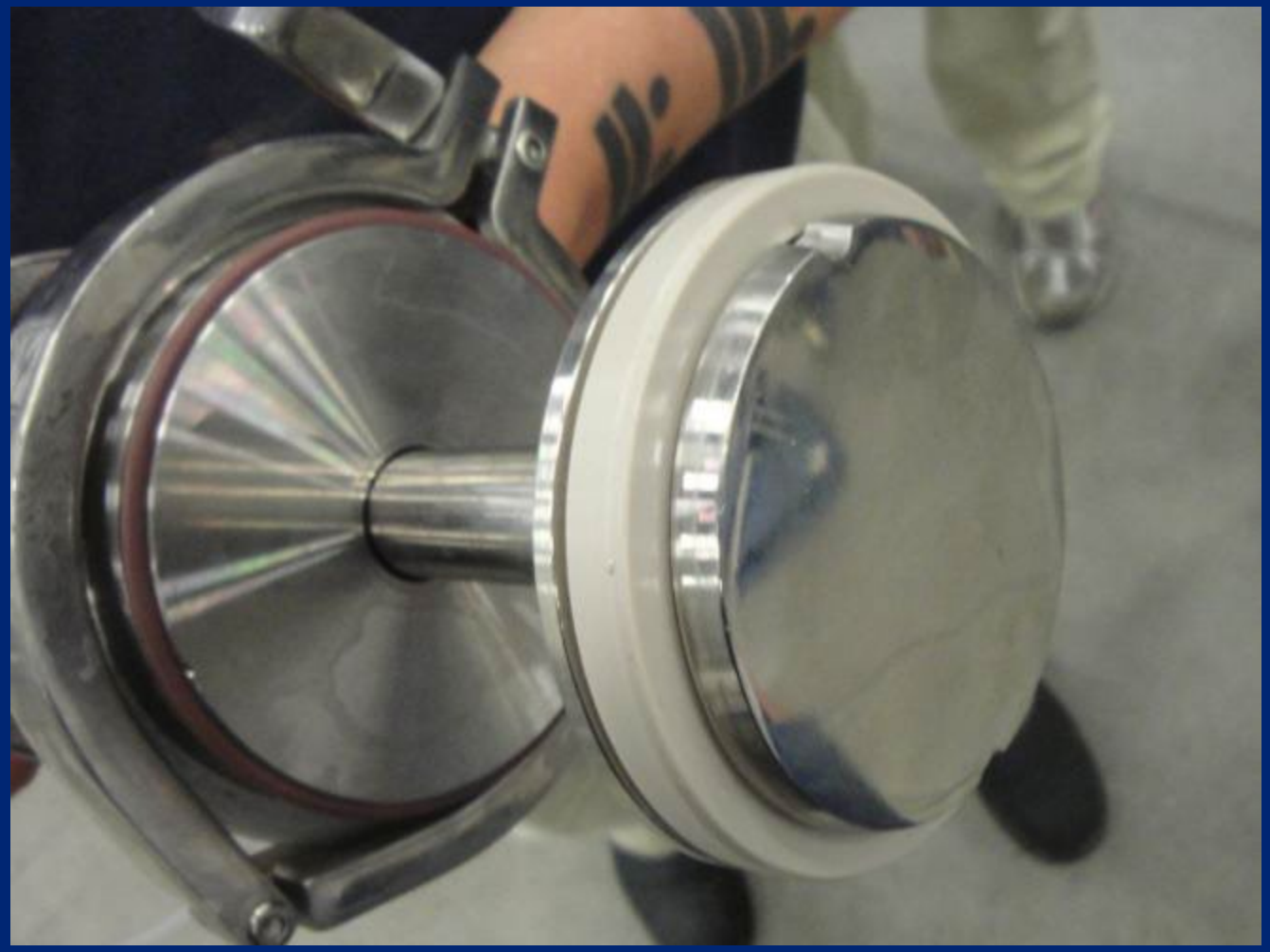
Better Designs ARE available

Lumaco butterfly valve disassembled: 4 PARTS

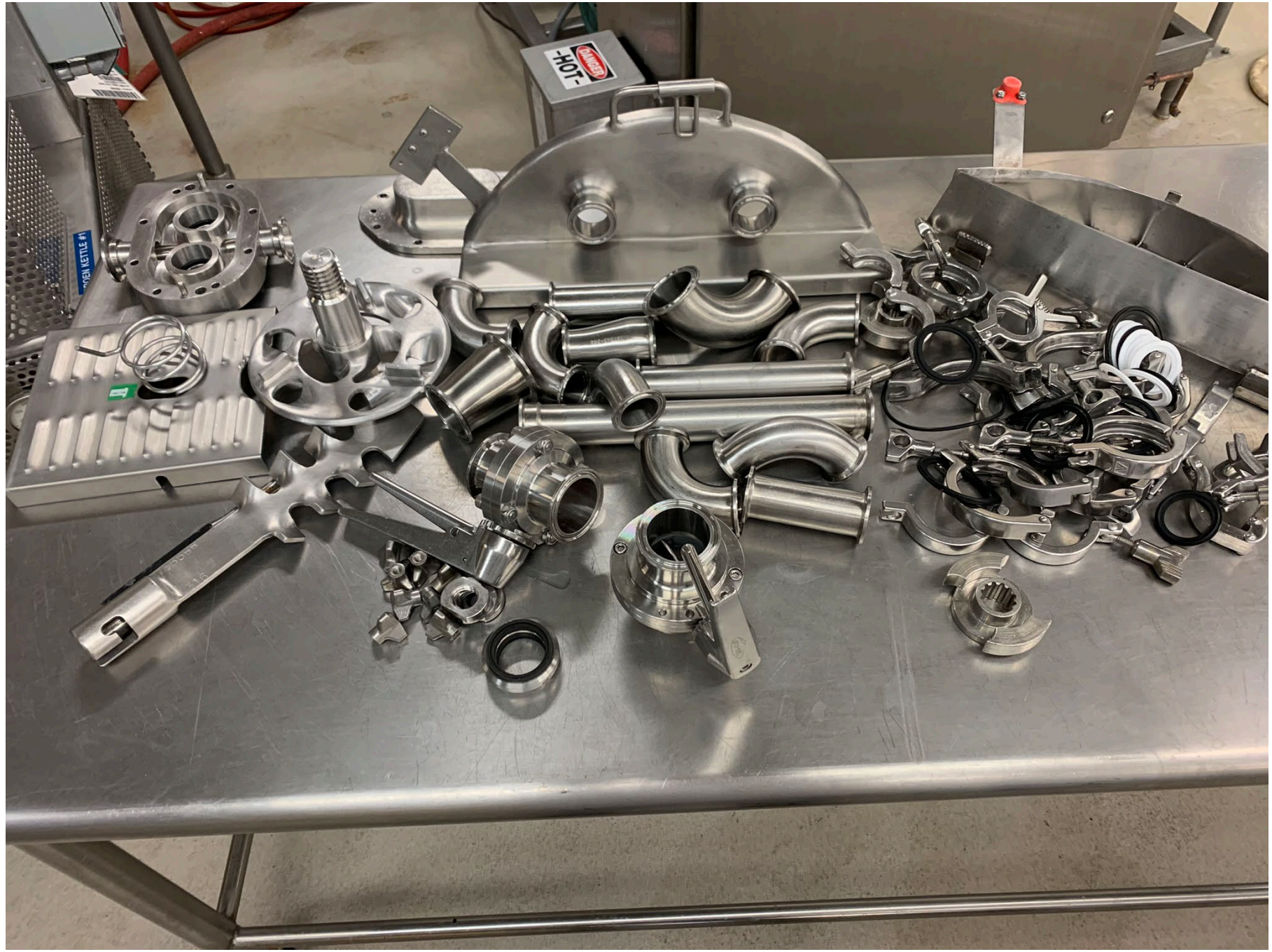
BEST Designs

Sanitary Valves

BEST Designs



Can be CLEANED IN PLACE


-HOT-

Personnel – Education is Key

- OEMs - advance from Sanitary Design to Sanitation By Design
- Onboarding and orientation with assessments
  - Employees that execute key tasks
  - Employees that lead key tasks

Equipment Checklist 8.4

FPSA
Food Processing Suppliers Association

FDA Perspective: Equipment Design

- FDA does not regulate processing equipment
- FDA *does* regulate sanitary use of equipment

…. adequately cleanable…

…Shall preclude adulteration…

…protect food from being contaminated…

Action Against Violations

"If the FDA determines equipment is not suitable for its intended use, it will go after the processors that use it."

Sanitation by Design Formula

Sanitation Success =

soil (R&D)+

design (Eng)+

method (FSQ)+

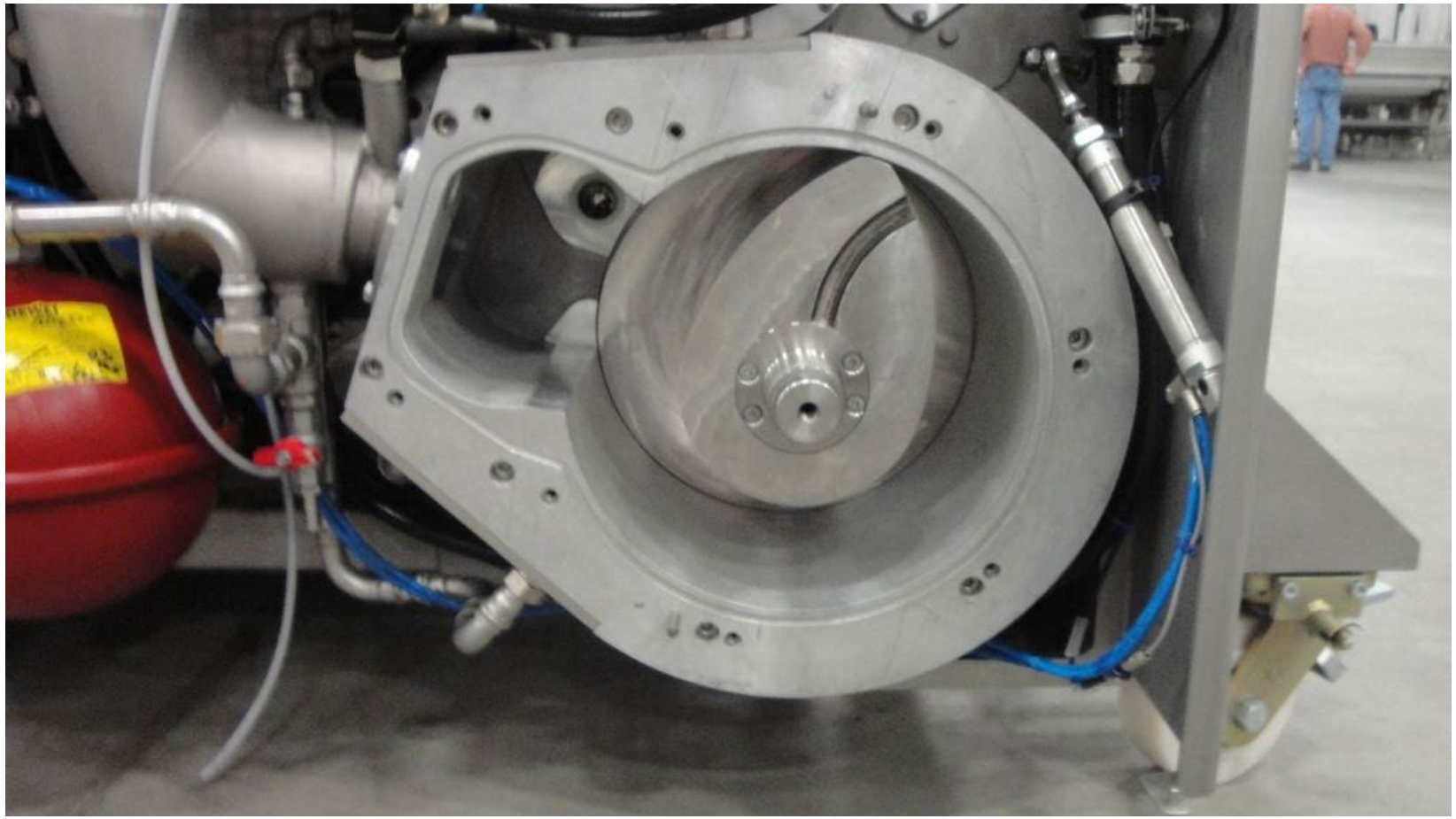
labor (Ops)+

chemicals* (FSQ) +

water* (Eng)

*only if needed

Principle 3 – Accessible for Inspection & Cleaning



Principle 3

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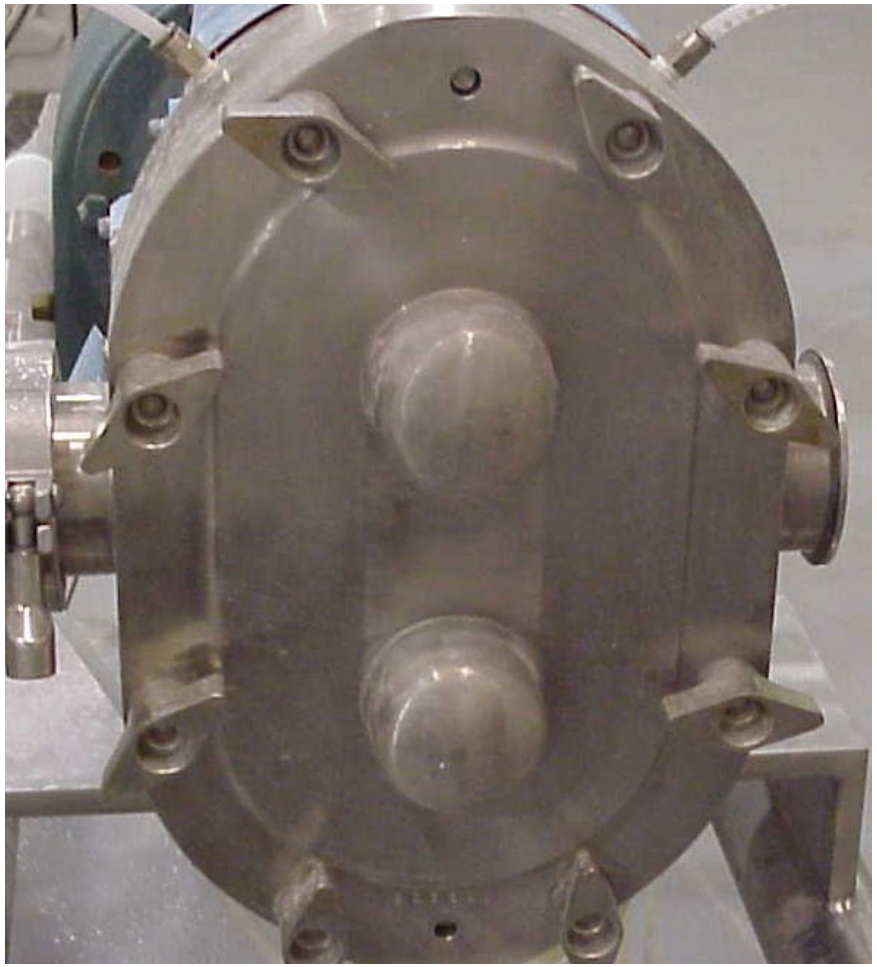
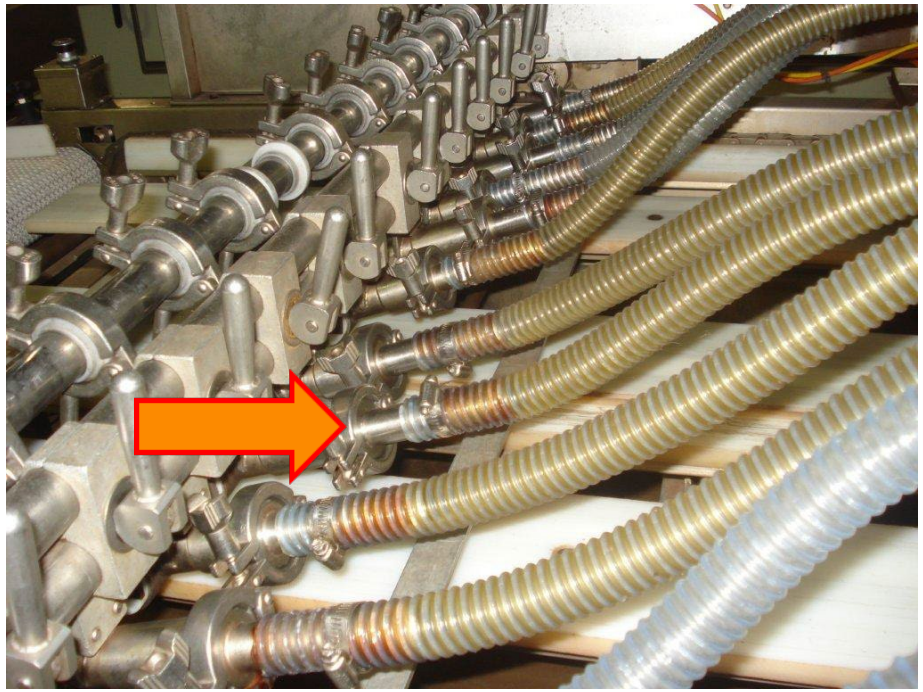


Principle 3

Principle 3 – Accessible for Inspection & Cleaning

Principle 3

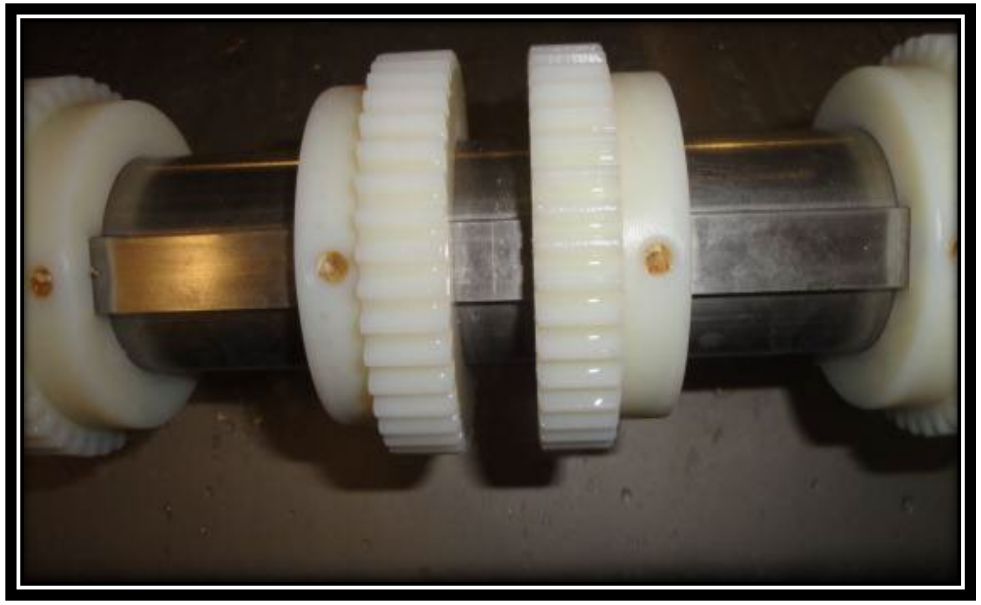
Fitting Design Alternatives

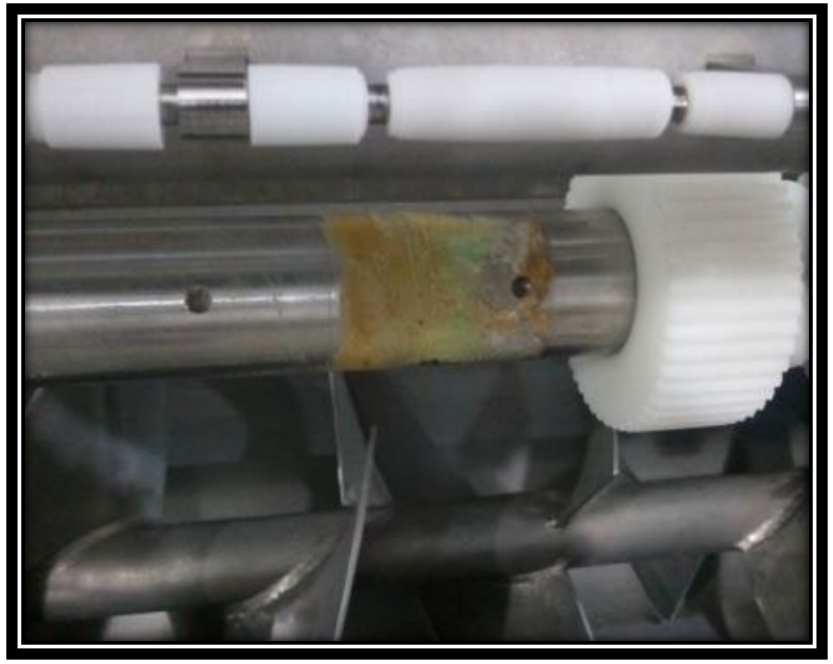


From This To This More

Design Sanitary Design

Drive System





Interior Agitator Assembly - Bushings

Figure 1 - Agitator Assembly

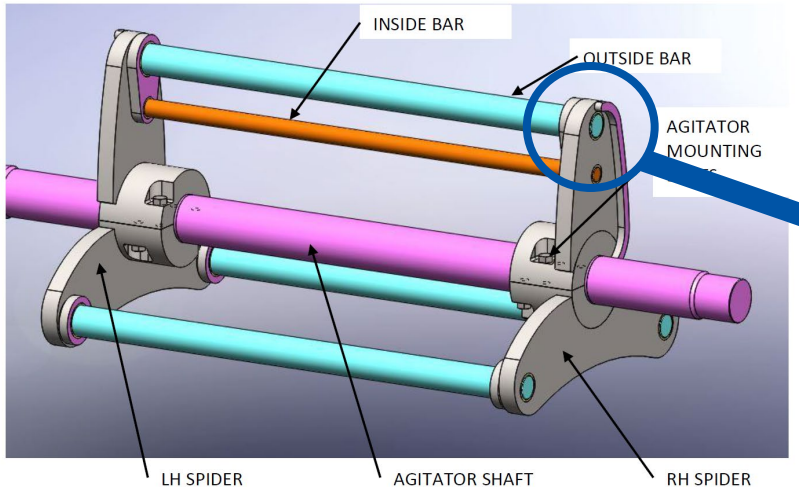
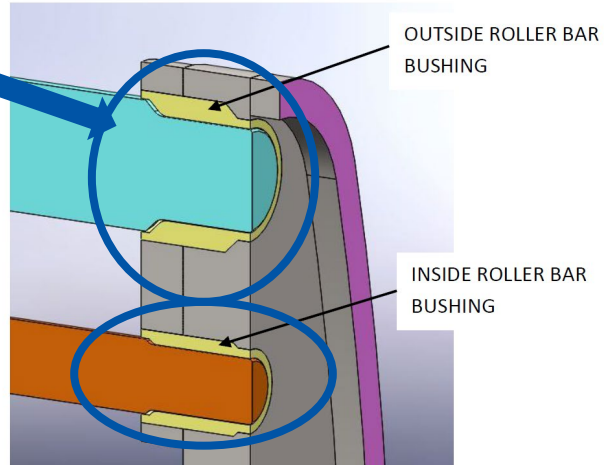


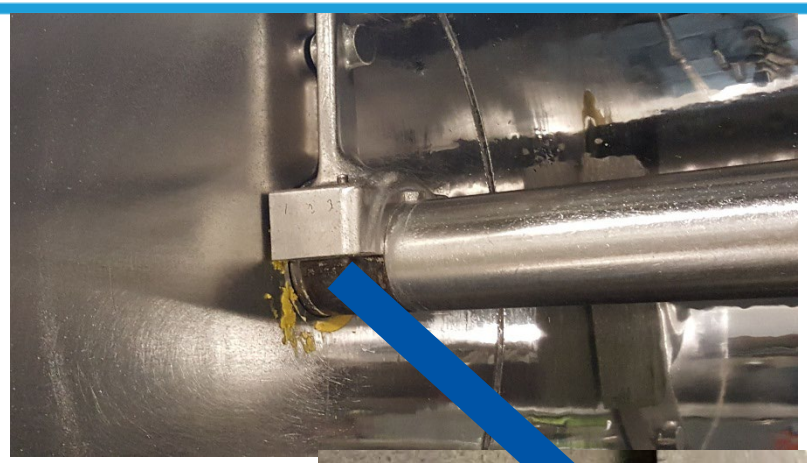
Figure 2 - Agitator Roller Bar Bushings

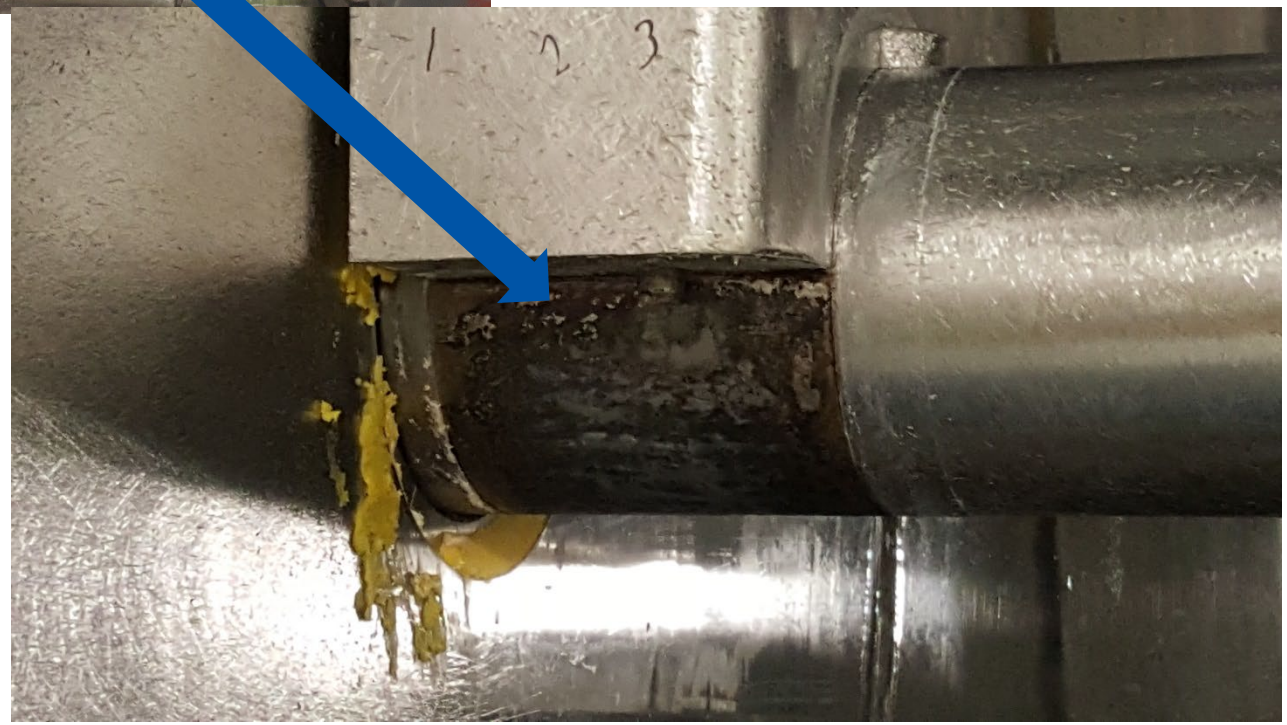


Agitator Mount

Bushings

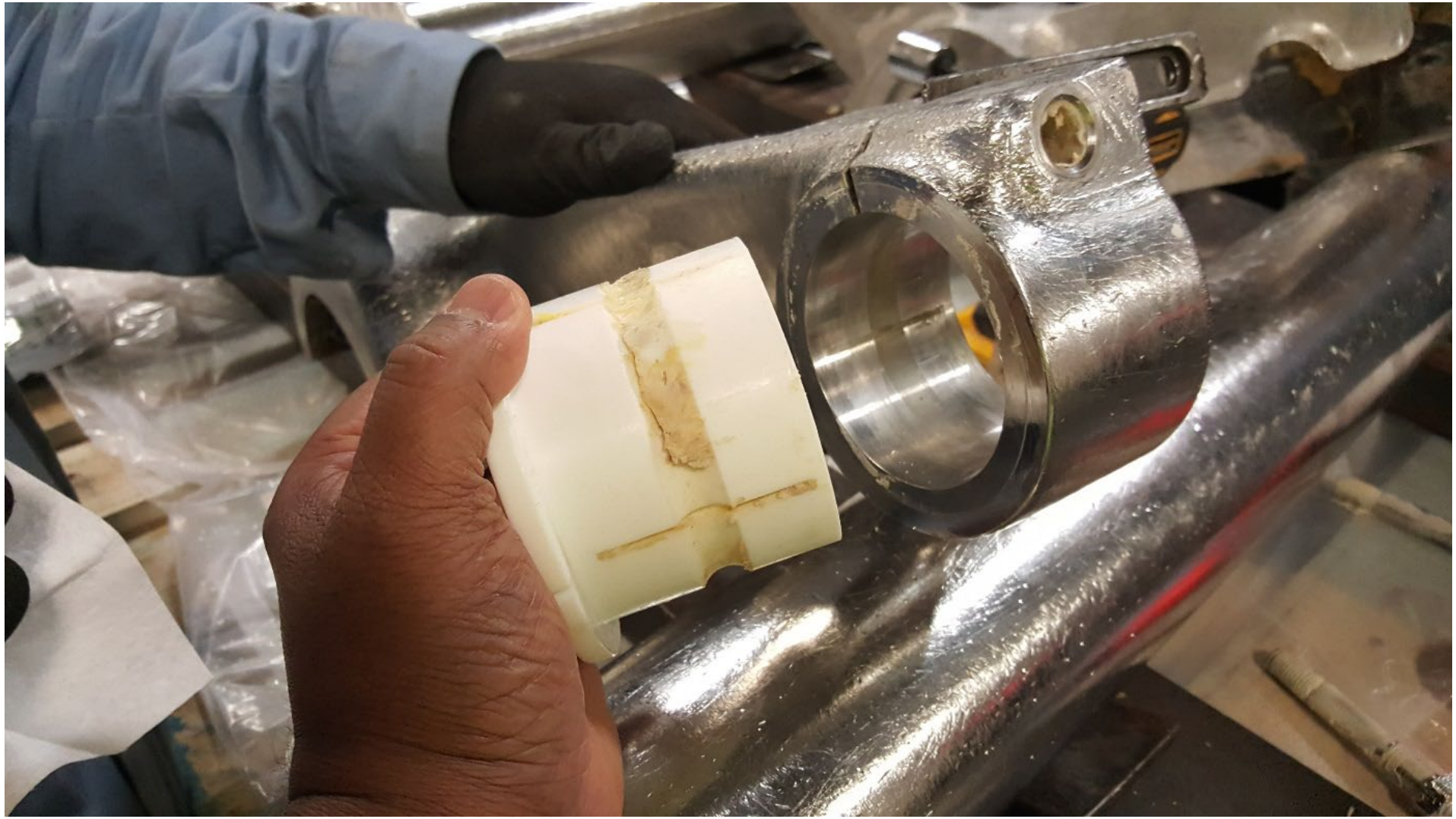
Agitator Mount – Soil Trapped





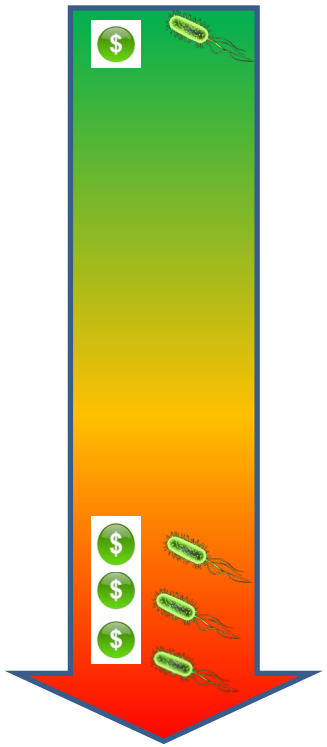
Agitator Mount – Soil Trapped

Bushings – Soil Trapped




Roses are red. Tacos are delicious.
I use paper plates because I hate doing dishes.

What Cleaning Method To Use?



1. No cleaning needed
   a. Redundant or dedicated equipment (isolated)
2. Purge (next product or inert material)
3. Dry clean
4. Dry clean w/chemicals
5. CIP (Clean in Place)
6. Controlled wet clean – out of place
   a. Automated washer
7. ACS (Assisted Cleaning System)
8. Controlled wet clean – in place
9. Flood cleaning

Case Study #1

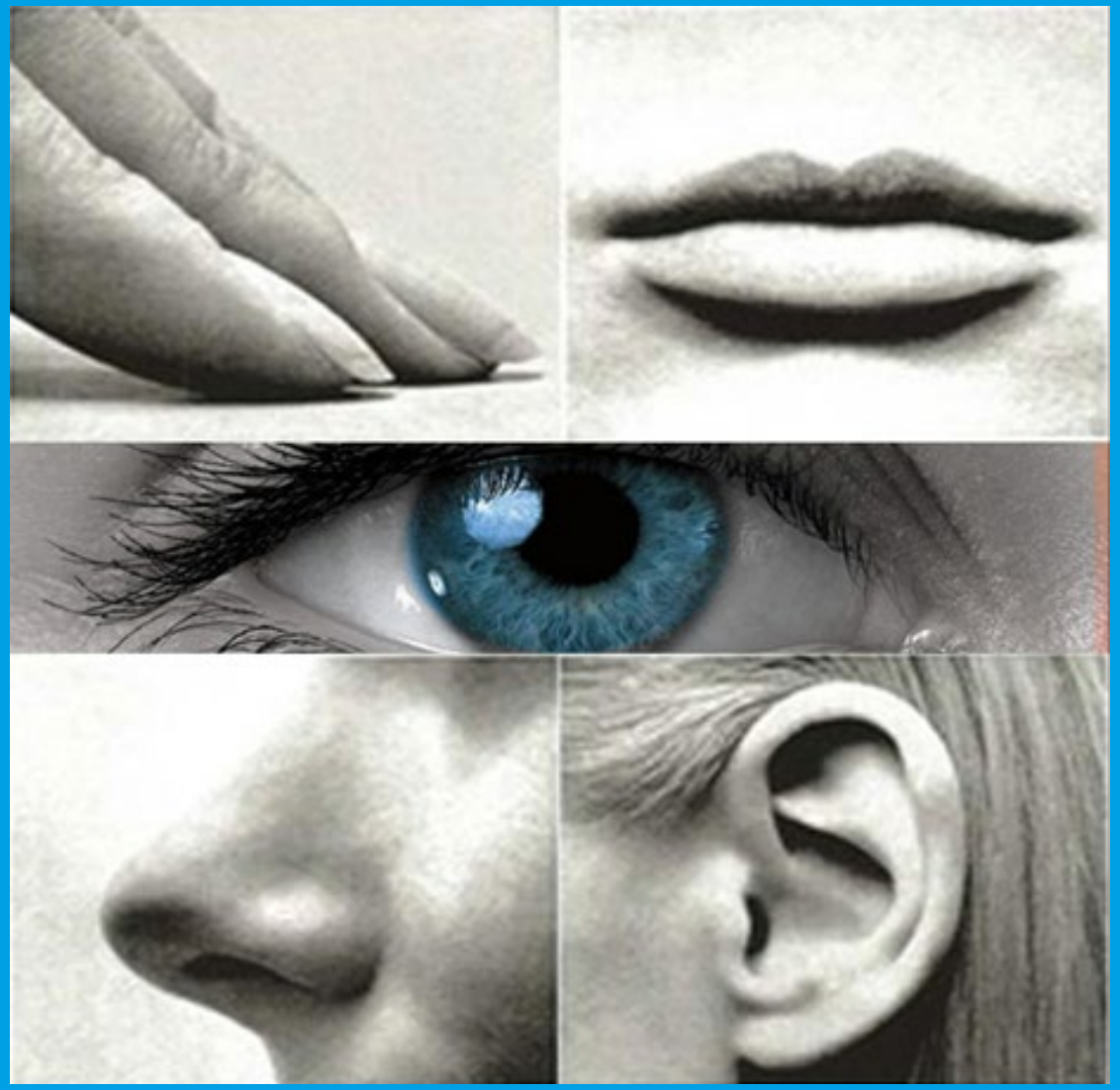
40

Before

During

After

Equipment Checklist 1.5



Case Study #2, #5


HEAT AND CONTROL


BIOABFALL


STANLEY

Equipment Checklist 1.1, 5.1

Non CIP-able Teflon bearing

Swept or scraped surface tanks

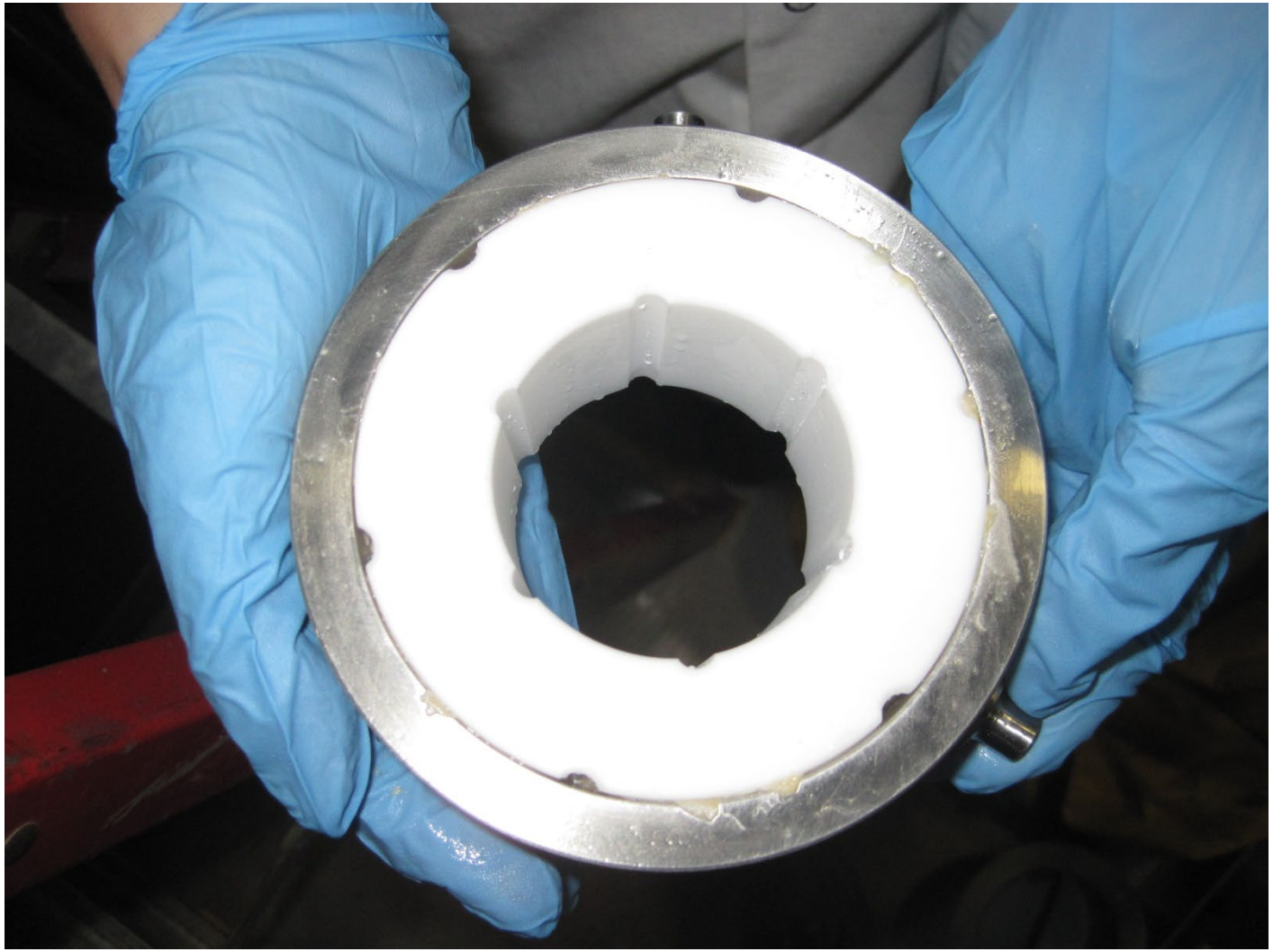
GENERAL MILLS

Holding Tank

Bearing located at bottom of shaft

Confined Space Entry & LOTO Required

Removed bearing after CIP



CIP Shortcomings

Prototype Solution Round 1

1 piece Teflon vs 2 piece Teflon & stainless steel

Prototype Solution Round 2

Tool for Removal

Other Options: Eliminate or Clean

Equipment Checklist 6.1


Happy 3rd birthday
to the tartar sauce
in my fridge. 🤣

Focus on Labor Reduction

- Simplify Downtime Activities
  - Time
  - People
  - Skills

- Metric: Downtime Labor Minutes/Unit of Operation

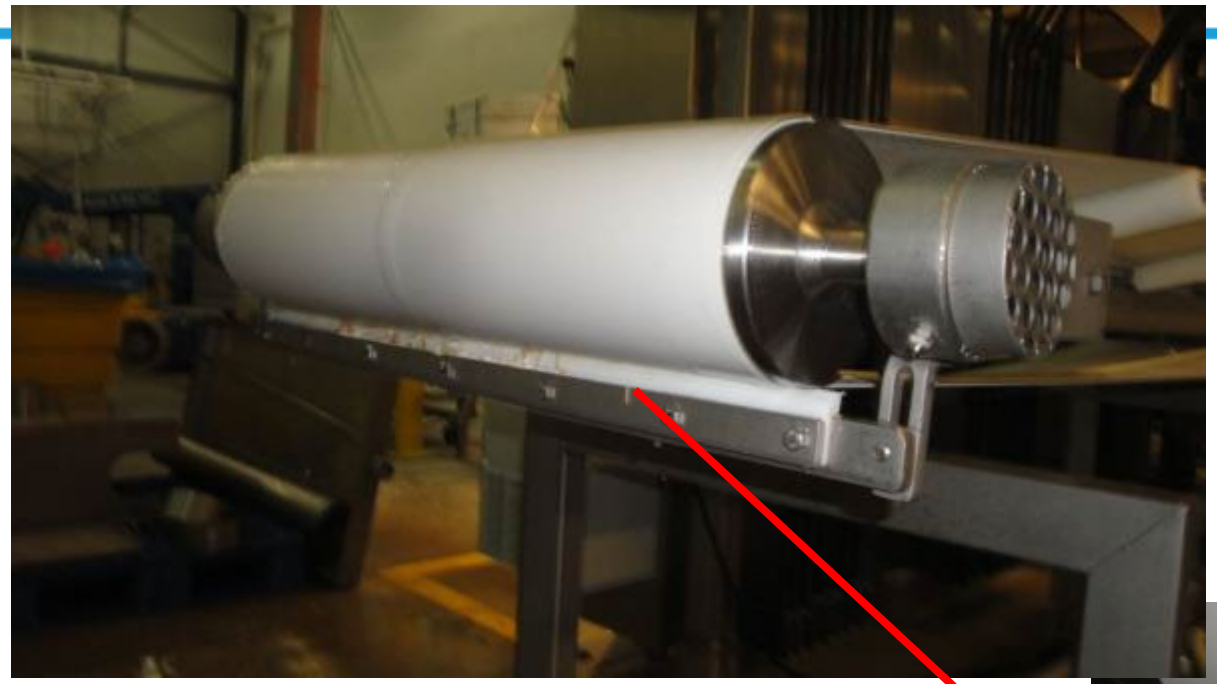
Equipment Checklist 8.3

Case Study #9

FPSA Food Processing Suppliers Association

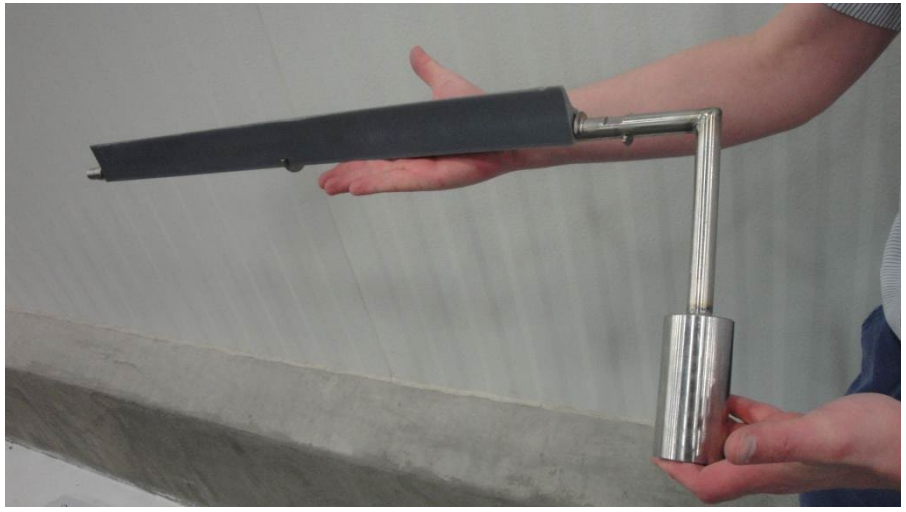
Case Study – Simple Design – Easy Diassembly

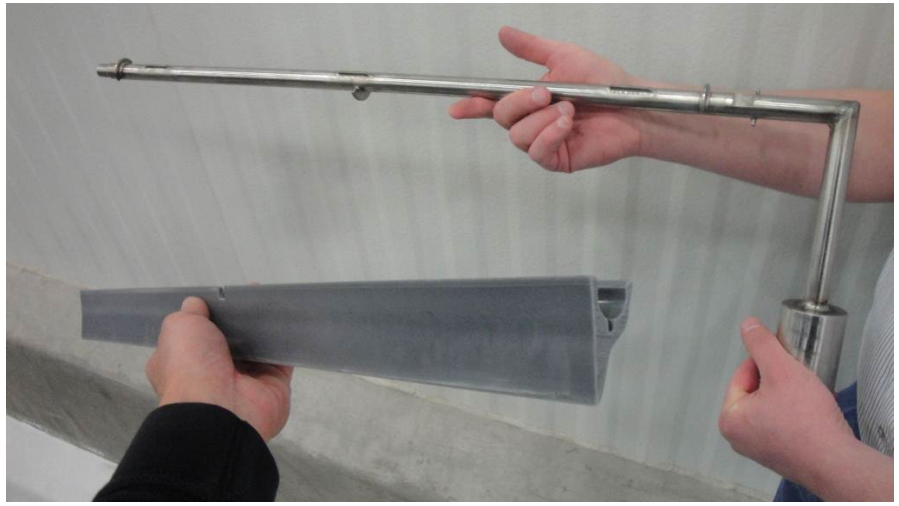
Old Design – Belt Scraper



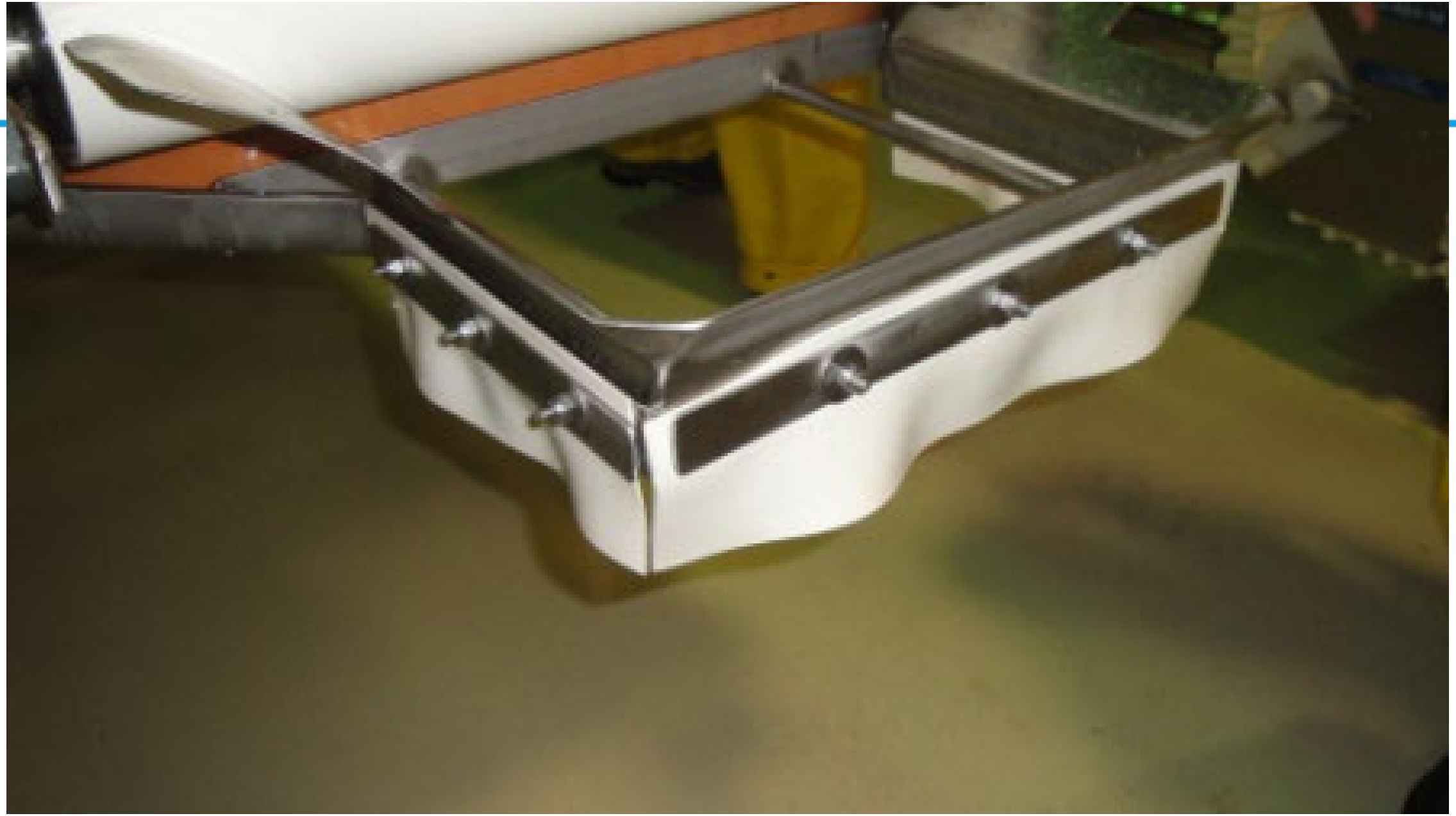
Need a socket set to remove

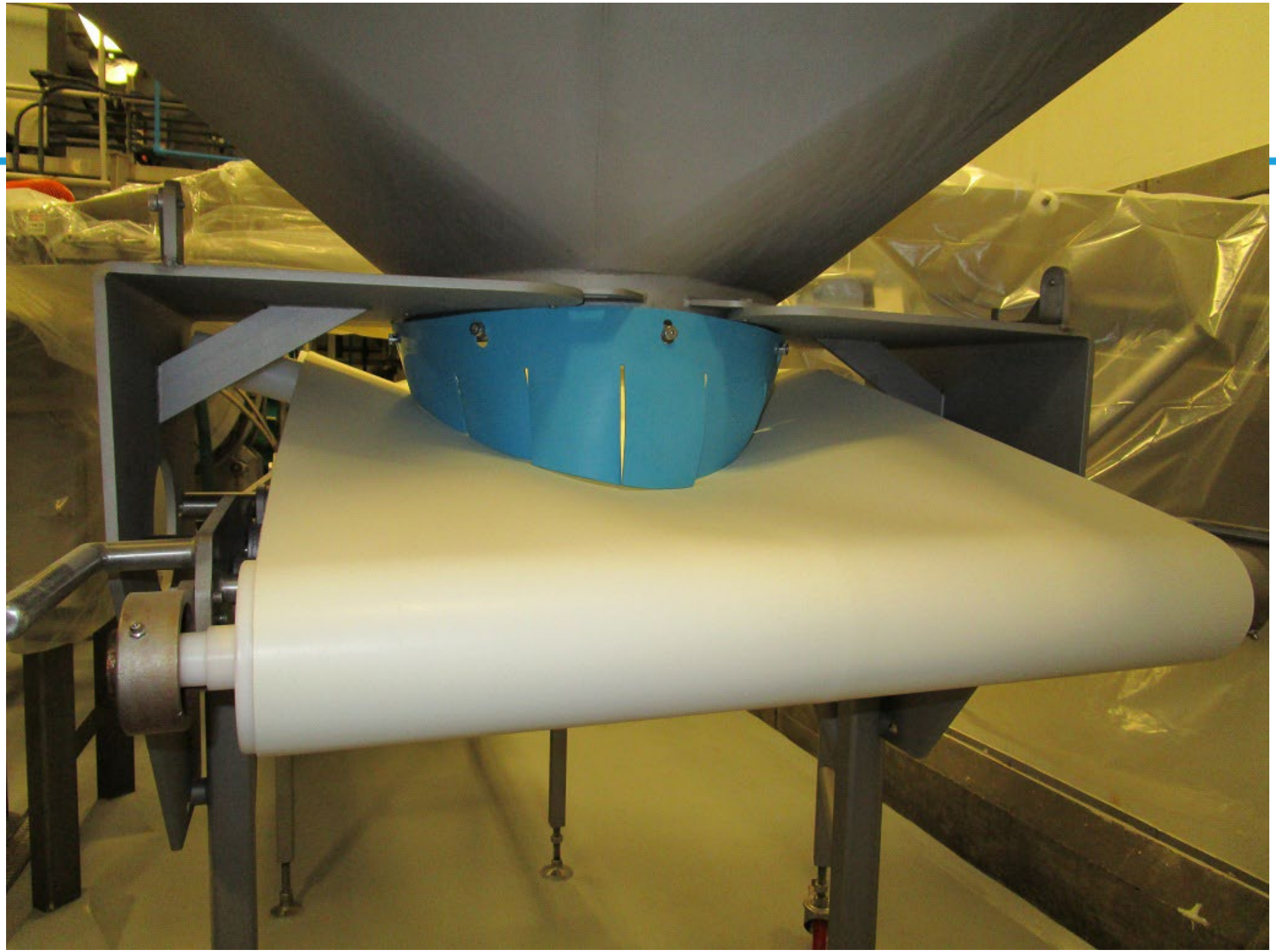
Simple Disassembly





Equipnment Checklist 1.2, 2.2, 3.1

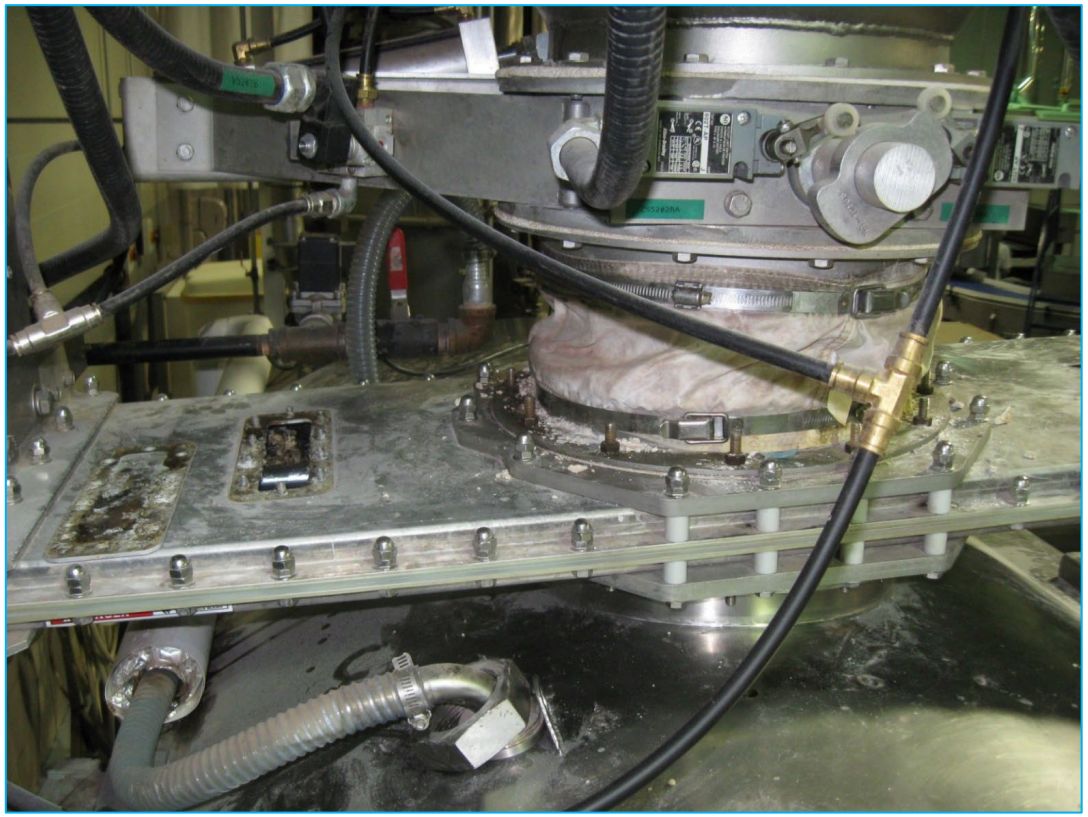


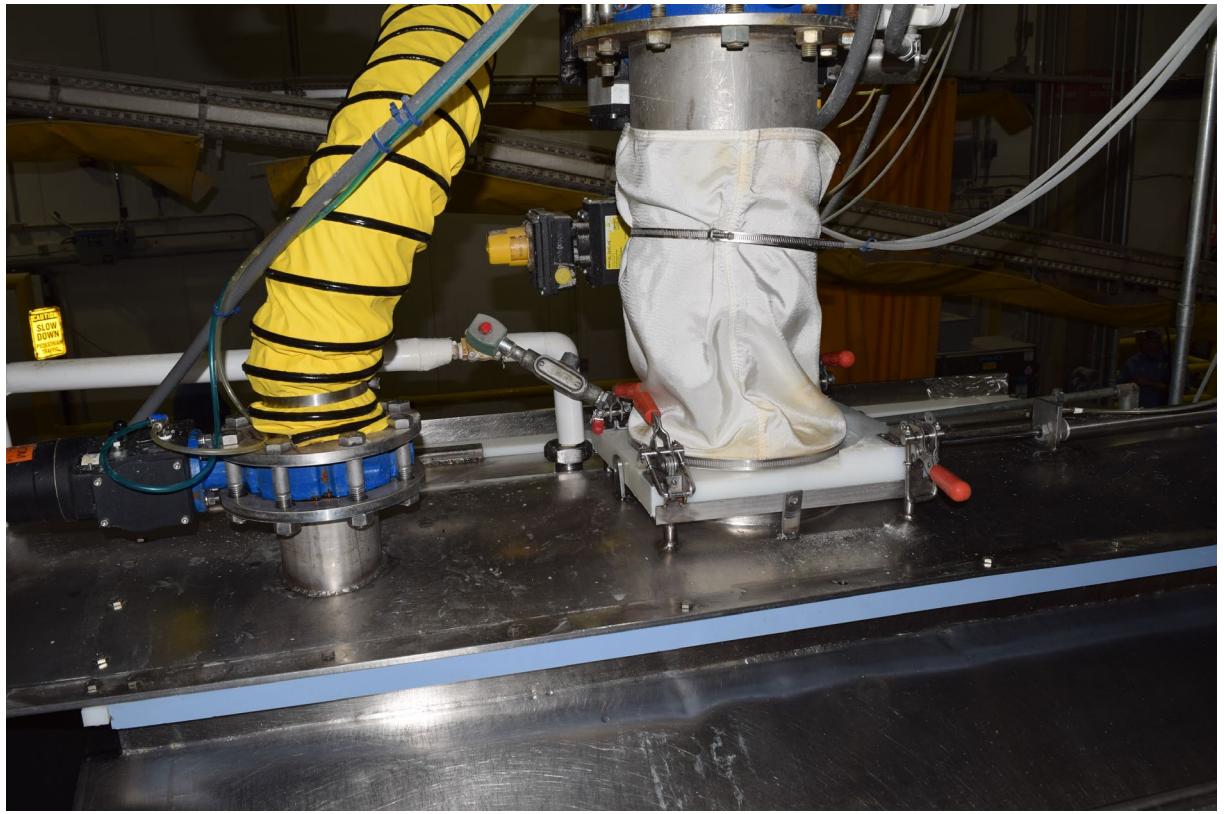


Sanitation by Design…
How to design for cleaning?

Case Study #3

72




SLOW
DOWN

Removable Flour Gate

Equipment Checklist 1.3, 1.7

PEERLESS
FOOD EQUIPMENT

Easy Clean Dry Ingredient Slide Gate Valve

PEERLESS
FOOD EQUIPMENT

Easy Clean Dry Ingredient Slide Gate Valve

Common Product Zone Challenges

- Condensation
- Leaks
- Build-up
- Rust
- Flaking paint or stickers
- Cross contamination
- Caulking
- Gaskets
- Insulation
- Mold
- Over lubrication
- Damaged/missing equipment
- Wear points
- Improper use of shielding
- Temporary repairs
- Product zone tools
  - Damage
  - Storage
- Pests
- Others?

AR (Augmented Reality)

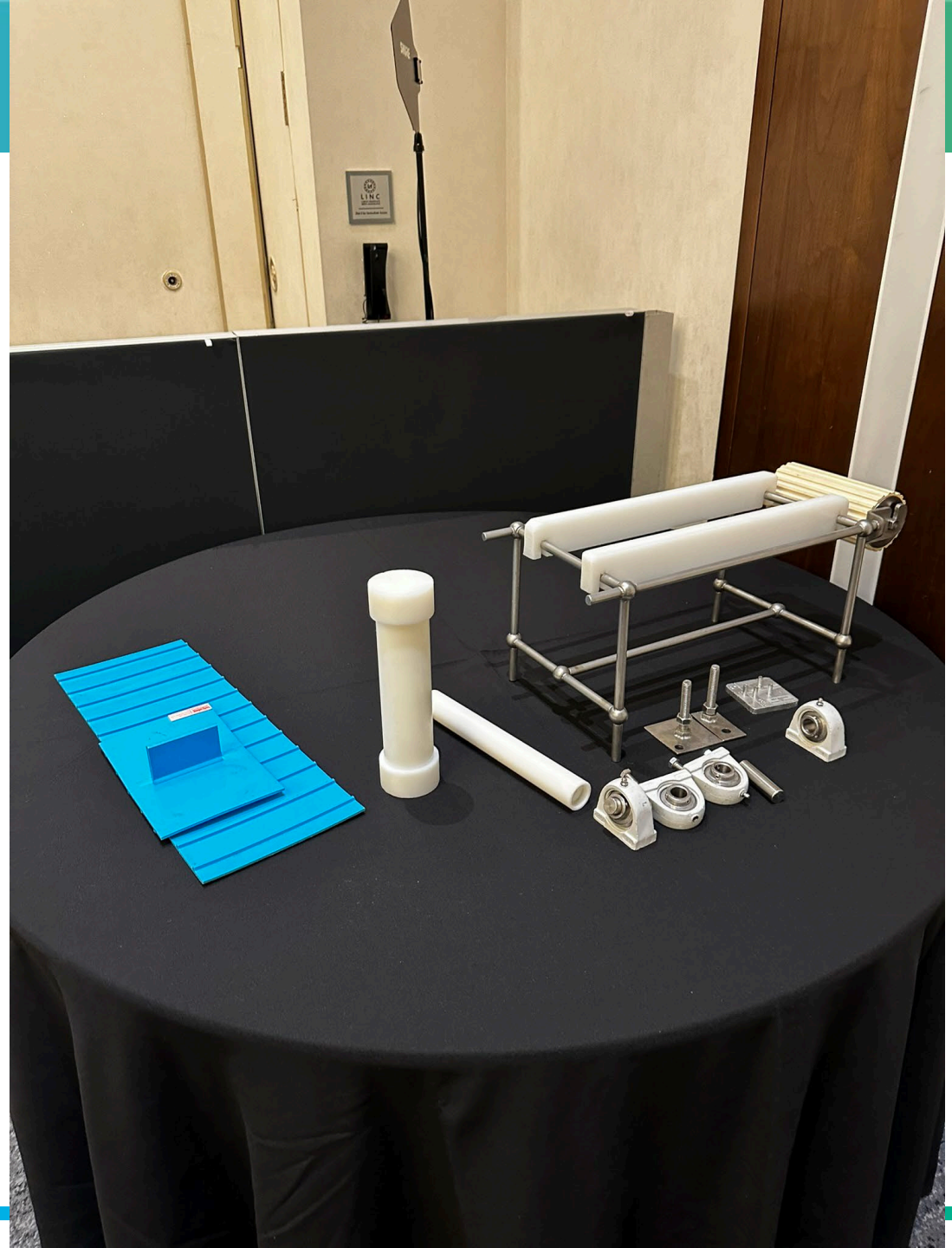
SANITARY DESIGN PRINCIPLES – EXERCISE

THE SANITARY DESIGN WORKSHOP

Sanitary design is integral to food safety.

THE SANITARY DESIGN WORKSHOP

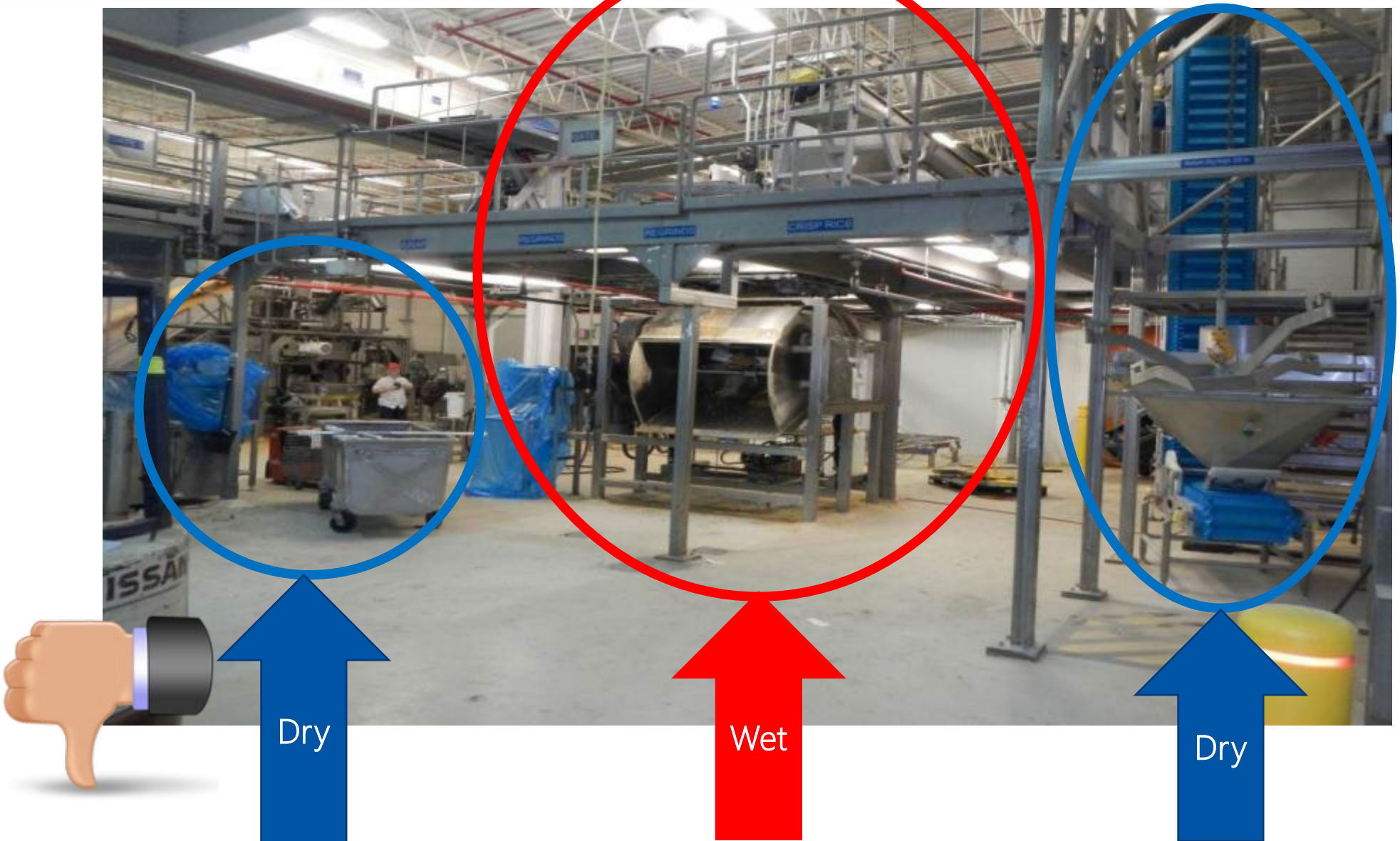
Sanitary design is integral to food safety.



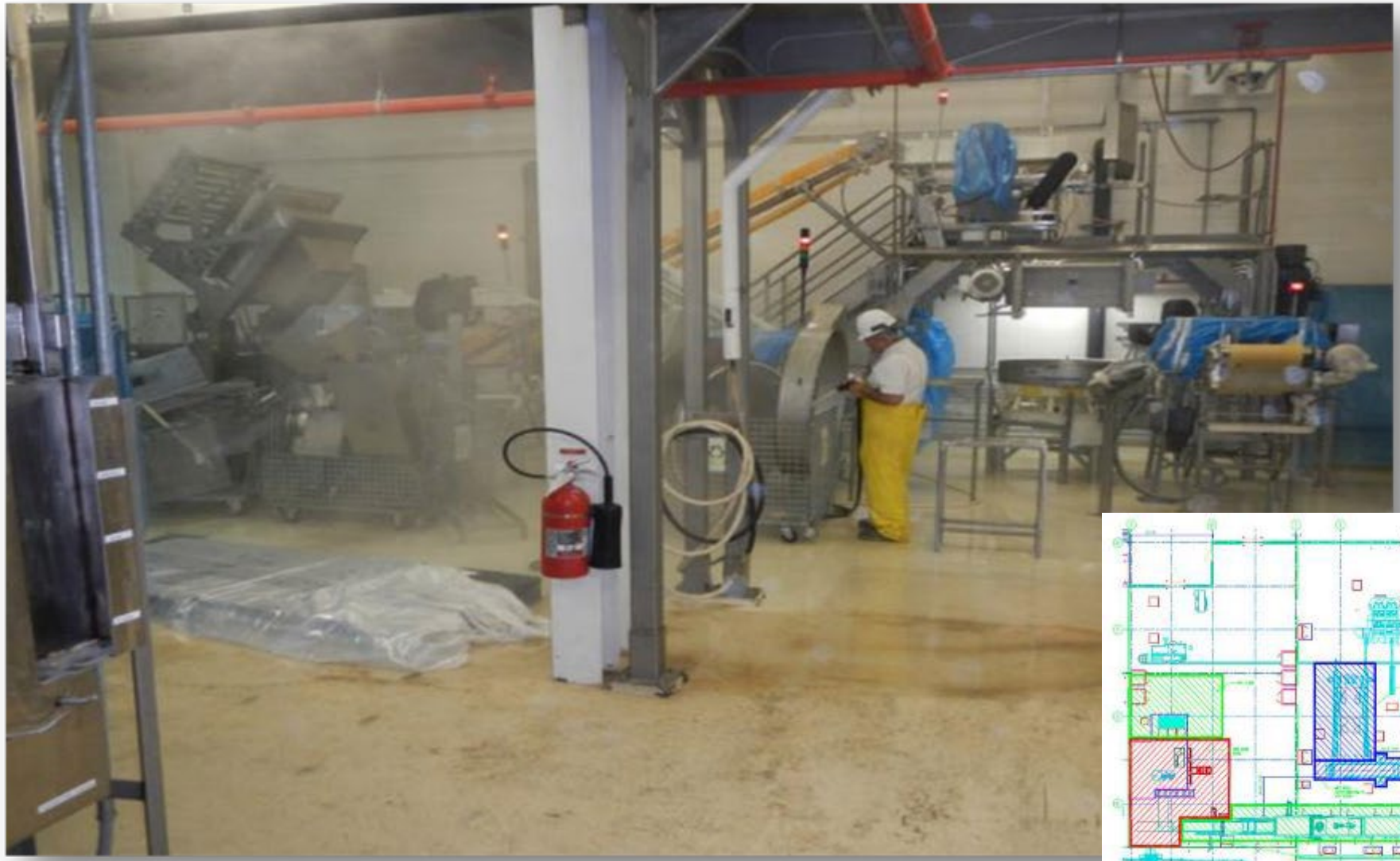
THE SANITARY DESIGN WORKSHOP

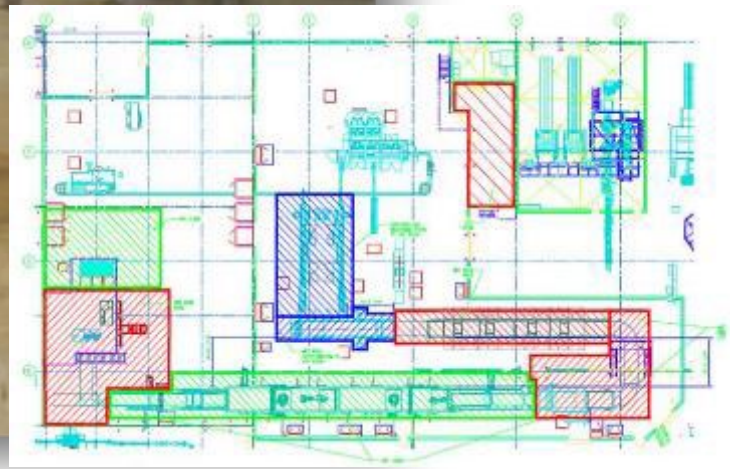
Sanitary design is integral to food safety.

Wet/Dry Zoning Conflict

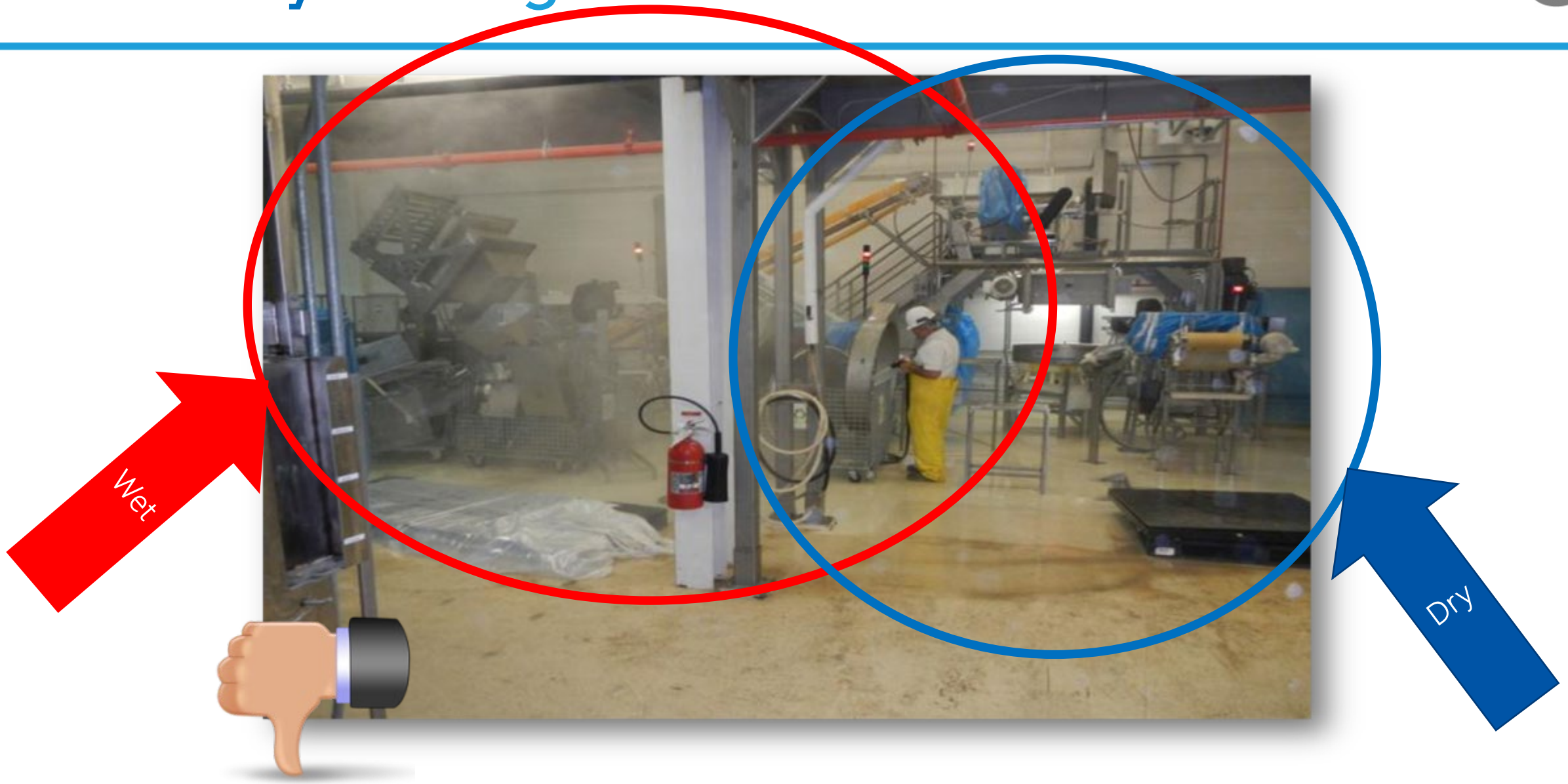


Sanitary Design
Principle 1: Hygienic Zones

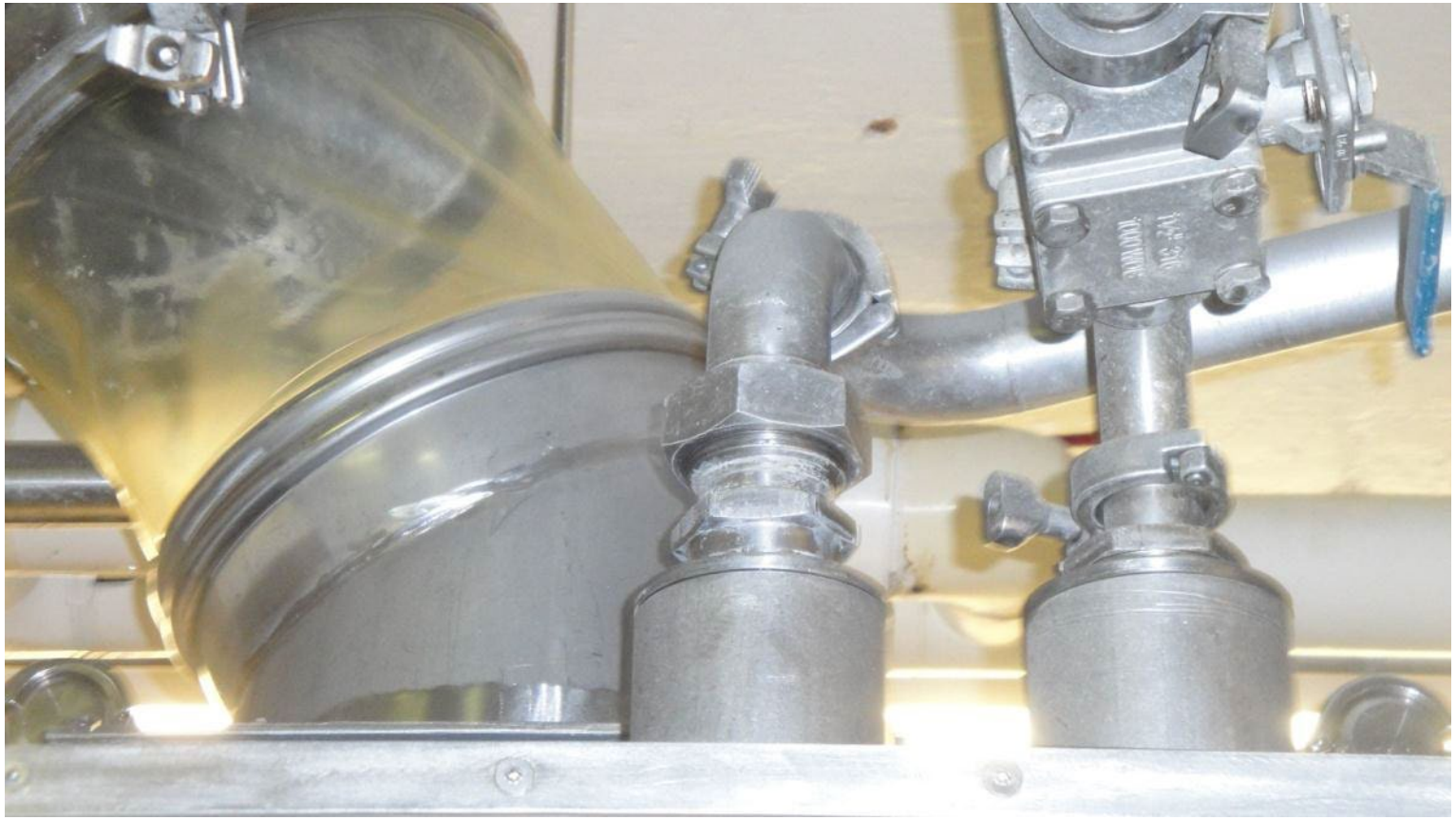




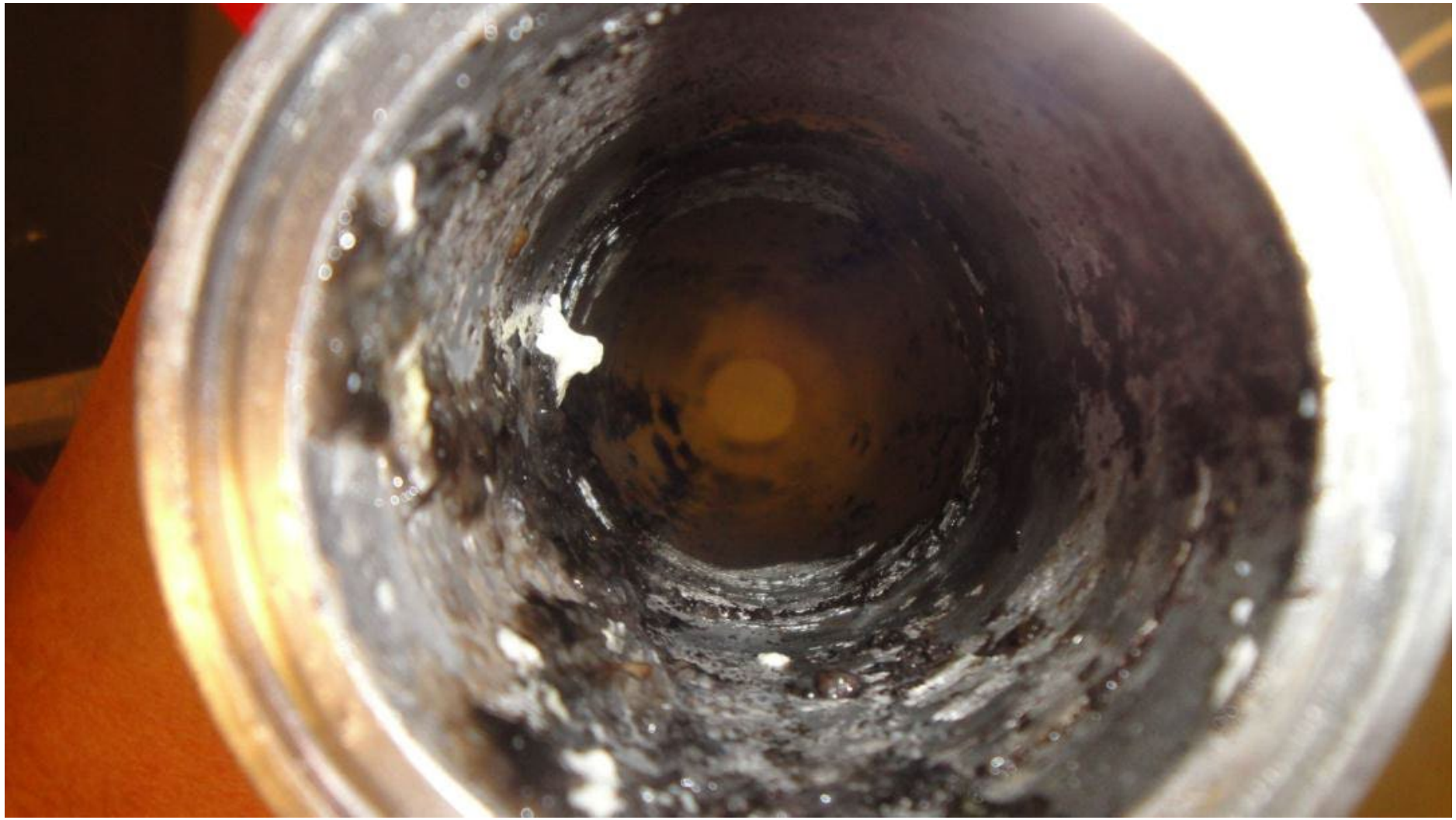
Wet/Dry Zoning Conflict



Poor Wet/Dry Separation



Infeed Pipe – Mold Growth



Leaking Pipes

Key Learnings

- Clearly define clean expectations to cross functional teams
- Wet/dry zoning is needed
- Component level of disassembly
- If you get it wet, you must 4x4 and validate
- If it is dry, keep it dry – treat water like glass
- If you wet clean, get it dry quickly, then keep it dry
- Mechanical action is critical – focus on remediating low flow areas
- Spend time on the plant floor auditing and reviewing practices
- Visual inspection is everyone's best sanitation tool!

Objectives Met?

- Introduction of basic design principles
  - Case study reviews
- Definitions and expectations
  - Learn/Do/Teach
- Resources

I used to be addicted to soap...

But I'm clean now.

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