

SUSTAINABLE CLEANING SYSTEMS:

Reducing Environmental Impact of CIP

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A GLOBAL ISSUE



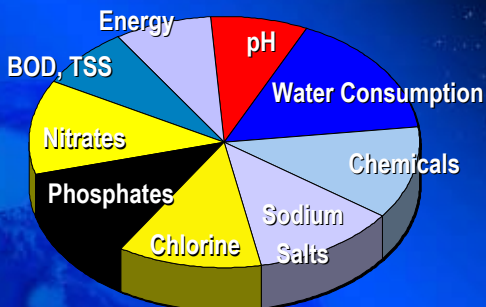
CIP (Clean In Place)

- Cleaning Steps
 - Pre-Rinse
 - Recirculated detergent wash
 - Post-Rinse
 - Sanitize

What Has Changed?

- Environmental awareness
- Process equipment size
- Complexity of process design
- Processed foods / Wide distribution
- Regulations
- Centralized (point-source) discharge

Environmental Factors



The Solution To Pollution is NOT Dilution



Effluent Load

- Process residue in the form of BOD, TSS, FOG (Fats, Oils, & Greases)
- Volume
- pH

Water

- Critical Resource
- Lifeblood of the CIP system
- Pre-rinses
- Wash water make-up
- Post-rinses
- Sanitize water

Power Consumption

- Often ignored
- Electrical power - supply / return pumps
- Steam
- Condensate return

Chemical Consumption

- Caustic -
 - Sodium hydroxide
 - Potassium hydroxide
 - Surfactants
- Acid step
 - Nitric
 - Phosphoric
- Sanitizers
 - Chlorine
 - Quaternary ammonia
 - Peracids

pH

- Process residue - whey, citric, etc.
- Caustic discharge - high pH
- Acid discharge - low pH

Chlorine

- Sanitizers
- Chlorinated Caustics

Reducing The Impact

- Design CIP with the process
- Reduce CIP recirculation tank size
- Apply current technologies
- Evaluate Performance
- Fine Tune
- Back to Basics

Product Recovery

- Residues of product - Source of BOD / TSS
- Uses for:
 - Reprocess (Ice Cream, Butter, etc.)
 - Sell (Whey Protein Concentrate, etc.)
 - Animal Feed
 - Land Spread
 - Landfill
- Methods
 - 1st CIP Pre-rinse
 - Conductivity
 - Optical
 - Time / Flow (HTST product separate)

COW WATER

- Condensate from Evaporators
- Permeate from UF / RO filtration
- Proper storage to prevent contamination
- Isolated from water supplies
- Uses:
 - Pre-Rinses
 - Wash water make-up
- Gallon used is a gallon saved - in & out

Recovered Solutions

- Recovered wash and rinse water for Pre-Rinses
- Re-use of wash water
 - Depends on soil load
 - Depends on allergens
 - Smaller tanks
 - Satellite CIP tanks
 - Not heated in tank

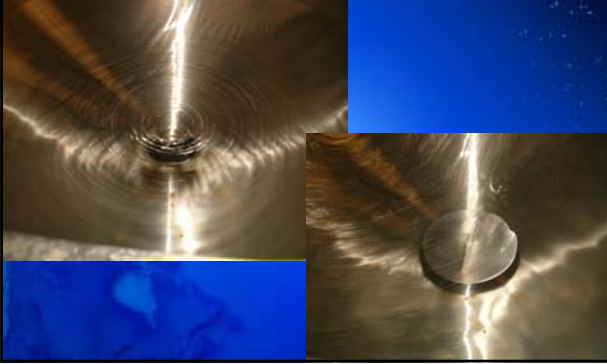
Liquid Ring Return Pumps

- Evacuates tanks
- Reduces water
- Reduces chemicals
- Reduces time
- Reduces steam
- Improves cleaning
- Reduces down-time

Vortex Breakers

- Tanks designed for process - not CIP
- Too often ignored - lack of awareness
- Reduces time
- Reduces water
- Reduces chemical
- Reduces steam
- Improves cleaning
- Improves sanitizing

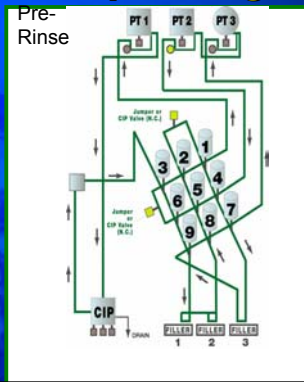
Vortexxing



Phase Separation

- Product Recovery - Pre-rinses
- Wash start
- Wash end
- HTST discharge
- Design into process
- Eliminate air blows
- Evaluate Performance
- Fine Tune

Single Pass with Valve Sequencing



Piping Design

- Single pass product recovery and pre-rinse
- Automate valves
- Valve sequencing
- CIP lines with tanks - sometimes

Solids / Caustic Reclaim

- High capital cost
- High operating costs
- Limited effectiveness
- Verify ROI
- Methods
 - Filtration
 - Flocculation
 - Sedimentation
 - Centrifugation

Multi-Use CIP

- Single-Use
- Re-Use
- Rinse Recovery
- Discharge circuits with high soil loads

VFD's

- Variable Frequency Drives
- Delete throttling valves
- Balance the system
- Reduce power consumption
- Reduce noise
- Verify flow rates

NEW DETERGENT TECHNOLOGIES

- Enzymes
- Surfactants
- Single-Phase detergents
- POAA Sanitizers
- Process additives

Challenge - Mars Spaceship

- Closed system
- Effective
- Energy Efficient
- 100% Renewable



It's Our Planet

Questions ?