Challenges in Dairy Processing Applications: CIP

Reduce Waste and Increase Efficiency During Clean-In-Place Processes
Minimizing waste and reducing the cost of utilities while ensuring highest product quality is a challenge in the dairy processing industry. The ability to maximize efficiency during cleaning and sanitization processes while ensuring the health and safety of consumers is key. Clean-in-Place (CIP) procedures ensure that process equipment and pipework is clean/sterile, ready for the next process to be run.

### DAIRY PROCESSING APPLICATIONS: CIP

A typical CIP station design: the system is usually highly automated.

In small dairies the CIP station is commonly centralized. In larger plants, the CIP station is replaced by smaller units located close to each group of processing equipment. Use of the correct sensing technology at each stage is important since there are a number of challenges with the procedures. Some of the key problems are highlighted here, along with the Emerson solution.

#### Product leftover within the pipes becomes waste during the CIP process

**Problem**
If sensors intrude into pipework, recovery of valuable product — that would otherwise be lost as waste — may not be possible since the cleaning process ('pigging') may damage the instrumentation.

**Solution**
Rosemount™ X-Well™ provides accurate non-intrusive process temperature measurements without thermwells or process penetrations that would impede pigging. Easy to install with quick response time, and suitable for rapid flow rates.

#### Utility steam heating adds costs when not managed properly

**Problem**
During the CIP program, steam is used extensively for sanitation, which is reflected in a facility’s energy usage. Large energy usage translates to high costs if not properly managed.

**Solution**
The Rosemount 3051S MultiVariable™ Flow Transmitter reduces variability by providing compensated mass flow measurements of saturated steam. The transmitter integrates high performance pressure and temperature measurements to simplify installation and reduce costs.
<table>
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<th>Problem</th>
<th>Solution</th>
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<td><strong>Problem</strong>&lt;br&gt;Heavy vapors above liquid lead to inaccurate readings in CIP tanks</td>
<td><strong>Solution</strong>&lt;br&gt;The line powered Rosemount 56 Dual Channel Transmitter can be connected to both the Rosemount 225 Toroidal Conductivity and 403 Contacting Conductivity Sensors. Toroidal sensors are ideal for the high conductivity, and potentially harsh conditions, in CIP chemical addition. Contacting sensors have the accuracy and speed to quickly determine when the CIP cycle has completed.</td>
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Problem
During the CIP program, it is important to be able to detect whether there is milk, water, or caustic chemicals in the system. Access to this information helps ensure as little as possible wastage during changeover from CIP back to production.

Solution
The Micro Motion® H-Series Hygienic Coriolis Flow and Density Meter Sensor allows dairies to identify different fluid densities. This allows operators to rapidly detect the difference between product, rinse water, and cleaning solution, ensuring an efficient changeover to the next process.

Problem
Inability to differentiate between milk and water hampers efficient process changeover

Problem
CIP processes require a certain turbulence to maintain cleanliness

Solution
CIP processes require a certain turbulence to maintain cleanliness. Liquids moving too slowly can leave behind undesirable chemicals and spoiled product.

Solution
The Micro Motion H-Series Hygienic Coriolis Flow and Density Meter provides the most accurate measurement of velocity to help maintain the highest degree of sanitation. It calculates volume flow rate, flow totals, and concentration measurement for process control and provides reliable performance even under extreme process conditions.

Problem
Liquid moving through pipes during the CIP process must maintain a certain velocity for optimal cleanliness. Liquids moving too slowly can leave behind undesirable chemicals and spoiled product.

Solution
The Micro Motion H-Series Hygienic Coriolis Flow and Density Meter provides the most accurate measurement of velocity to help maintain the highest degree of sanitation. It calculates volume flow rate, flow totals, and concentration measurement for process control and provides reliable performance even under extreme process conditions.

Problem
Rapid cycling with aggressive steam and cleaning medias creates a difficult operational environment for valves. This application lends itself to problems with seal life, consistent on/off shutoff, and tight footprint requirements. Food safety must also be maintained without compromise in these harsh conditions.

Solution
The Asco™ 290 Angle Seat Valve utilizes an ultra-compact actuator to provide high flow for rapid cycling that can withstand steam and other aggressive cleaning agents. The Series 290FB is designed to comply with FDA CFR21 and (EC) 1935-2004 regulations for auxiliary fluids, making it an ideal choice for CIP systems in dairy cleaning.

Problem
Valves that are not actuating properly jeopardize the entire system

Problem
Unscheduled maintenance inhibits use of clean process lines

Solution
Aventics™ Smart Pneumatics Monitor (SPM) allows a low-cost foray into Internet of Things (IoT). Securely monitor the health and efficiency of CIP systems using any web-based browser device.

Problem
Unscheduled maintenance inhibits use of clean process lines

Problem
CIP components will wear at different rates based on operating temperature, system contaminants, and usage. Variable mean time to failure creates unexpected maintenance for system troubleshooting.

Solution
Aventics™ Smart Pneumatics Monitor (SPM) allows a low-cost foray into Internet of Things (IoT). Securely monitor the health and efficiency of CIP systems using any web-based browser device.
### Troubleshooting downtime requires an experienced maintenance crew

#### Problem
CIP systems need to run throughout multiple shifts. Facilities are not necessarily equipped with maintenance experts during second or third shifts. Processes could be down much longer than anticipated due to troubleshooting inefficiencies.

#### Solution
The Asco Numatics™ G3 or 580 Series electronic platform communications module provides localized diagnostics to pinpoint sensor or valve failure.

### Centralized expensive stainless-steel boxes create long air lines

#### Problem
Equipment wash down requirements in the food and beverage industry require CIP systems to protect electronics. Replacing damaged equipment is costly and increases downtime.

#### Solution
The Aventics CL solenoid pilot valve series enables customers to adhere to equipment wash down requirements. This series is IP69k rated to meet global washdown regulations for the food and beverage industry. Machine builders can increase performance and decrease expensive enclosures.

- Trust your measurement quality: the most accurate, reliable, and long-lasting instruments in the world.
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- Be assured you will receive exceptional service, no matter what you need or wherever you are.

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