Customer Success Story:
Corn Syrup Processing

Market Served
Food and Beverage

New filtration system yields sweet benefits for corn syrup producer

Location:
USA

Segment:
Food and beverage

Challenge:
Improve production process and minimize injury risk, while reducing labor-intense cleaning process.

Solution:
Replace aging, inefficent filtration system with an MCS-500 mechanically coupled high flow strainer to reduce costly maintenance and downtime.

Results:
The filtration process has become more stable, resulting in less product loss, little to no maintenance intervention, and decreased labor and maintenance costs.

"The customer wanted Eaton to implement its latest technologies to improve their process, reduce labor, improve safety and eliminate frequent cleaning. We had the insight needed to recommend an appropriate solution to accomplish their goals."

Jim Lago,
Regional Sales Manager, Eaton

Background

If you ate something sweet today, chances are pretty high that you consumed corn syrup in some form. So, what is corn syrup?

Corn syrup is used in foods to soften texture, add volume, prevent crystallization of sugar and enhance flavor. There's also high fructose corn syrup, which is manufactured from corn syrup by converting a large proportion of its glucose into fructose, thus producing an even sweeter compound.

One of the world's leading producers of corn sweeteners, including corn syrups, high-fructose corn syrups, maltodextrin, crystalline fructose and dextrose, was looking for ways to improve its production process to reduce product loss, decrease maintenance costs and minimize injury risks. Specifically, the company evaluated its existing filtration system and was seeking an improved solution that included a less labor-intensive filter cleaning process.

Challenge

Corn syrup manufacturing is a multi-step process with unique challenges at each stage. After the incoming corn is inspected and cleaned, it is steeped for 30 to 40 hours to begin breaking the starch and protein bonds. The third step in the process involves coarsely grinding the corn to separate the germ from the rest of the kernel. The remaining slurry, consisting of fiber, starch and protein, is finely ground and filtered to separate the fiber from the starch and protein.

The starch is then separated from the remaining slurry in hydrocyclones, which separate particles in a liquid suspension. Finally, the starch can be converted to syrup. The company approached Eaton for help with the filtration system used in the syrup conversion process.

The Eaton tubular filters that had been installed in the plant in the 1970's proved to be rugged and dependable but were due for an upgrade.

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"We met with the refinery manager and process engineer to discuss the current filters and plans to upgrade the process," said Jim Lago, Eaton regional sales manager. "The customer wanted Eaton to implement its latest technologies to improve their process, reduce labor, improve safety and eliminate frequent cleaning. They were an existing Eaton customer, so we were familiar with their process, existing equipment and challenges, and had the insight needed to recommend an appropriate solution that would accomplish their goals."

Addressing potential safety hazards was of utmost importance while implementing the new process. During processing, thick fluids are often heated to increase the speed and efficiency in which they move through the process. The materials running through the tubular filters often reached temperatures of up to 140 °F (60 °C) and posed a burn hazard to equipment operators if leakage occurred through gaskets or other connection points. Frequent maintenance and filter cleaning added further risk, by increasing exposure to the hot fluids.

Another factor to be considered when identifying the right filtration solution was the required flow rate of up to 2,500 gallons per minute (9,464 liters per minute). With 150,000 gallons (567,812 liters) of hot, sticky fluid moving through the process every hour, this factor created a further challenge and a need to increase the system's capacity.

Maintenance costs were also a sticking point for the customer. With the existing system, filters needed to be cleaned three times a week by an outside crew. If an unexpected issue arose, these cleanings were even more frequent, resulting in more downtime and expense. Frequent filter maintenance also increased the loss of valuable product and potential loss of an entire batch of corn syrup.

Solution

A mechanically coupled high flow strainer was recommended for the job.

This technology provides quick and easy access for maintenance, reduces potential leaks and requires fewer moving parts. Other benefits include:

- Minimal purge for low-waste operation
- Easy in-line installation
- Continuous 24/7 operation
- Maintenance-friendly design resulting in lower labor costs
- Eco-friendly. No filter material to purchase, change or landfill
- Available in optional ASME Code

Results

The customer proceeded with installation of the MCS-500 mechanically coupled strainer on a trial basis to gather data and measure success. After several months, the overall results exceeded the customer's expectations.

The multiplex system design features a multi-station configuration that allows customers to have the flexibility to add additional capacity in the future. The customer opted to purchase five filters to start, with room to add a sixth if it needed to increase flow in the future.

Since the MCS-500 strainer has been in operation, the filtration process has become more stable, resulting in less product loss, little to no maintenance intervention, and decreased labor and maintenance costs.

Also, other areas of the plant have taken notice of the positive outcome and expressed interest in learning how the solution could meet similar needs with their applications.

Those are pretty sweet results.

MCS mechanically coupled strainer

The MCS-500's magnetically coupled actuation eliminates the need for dynamic seals. This technology provides quick and easy access for maintenance, reduces potential leaks, and requires few moving parts while providing a long service life.

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