



Ronningen-Petter DCF
Self-Cleaning Filter

Midwest Ethanol Plant Finds Unexpected \$60/day Savings by Reusing Their Caustic

A Midwest Ethanol plant reaped the rewards when they installed a Ronningen-Petter self-cleaning filter on their caustic based CIP (clean in place) system. Due to an increase in production, the customer saw soaring caustic usage costs. To make matters worse, in late 2005 caustic costs had increased 60 – 70% over what they were when the system was installed. Clearly, the customer had to find a way to reuse the caustic to bring their costs down to a manageable level.

ETHANOL PROCESS:

As part of the ethanol production process, water, enzymes and corn are cooked and then combined in large fermentation tanks. When the fermentation part of the process is complete, these tanks are pumped out to the distillation system to separate the ethanol from the stillage, or by-product.

Because ethanol plants typically have many fermentation tanks the process is essentially continuous. The systems are optimized so that one tank is offline for cleaning every 1 - 4 hours. This allows the other tanks to be cleaned at some point along in the fermentation process.

This clean up is extremely important as it must take place in a very short

time period -- typically less than one hour. It also must be done very efficiently to ensure a clean tank prior to refilling. If this is not done in the proper manner, costs escalate and product quality/safety is compromised. **Important:** Once contamination occurs, it is then necessary to stop the production line to determine where the infraction has occurred.

SITUATION:

To begin, the actual cleaning up of a fermentation tank is a three step process.

1. The tank is first drained prior to flushing. After the initial flushing, a drain is opened to allow the bulk of the solids to exit the tank.

2. The drain is then closed, and the wash water is recycled to completely flush the fermentation tank.

3. The final step is to flush the entire tank out with a 6–10% caustic stream to remove any leftover spent corn particles.

As the corn particles are collected in the caustic stream, they absorb a portion of the caustic so it becomes necessary for the ethanol plant to continuously monitor the strength of the caustic. Caustic is added through a caustic control valve to maintain peak cleaning efficiency.

Unfortunately, the spent particles in the system increased in proportions relative to the Ethanol plant's production increased. As the plant increased production, the consumption of the caustic was not accounted for, making the caustic addition rates fluctuate widely. This resulted in additional costs without



necessarily benefiting the cleaning.

RONNINGEN-PETTER SOLUTION:

The Ethanol plant installed a Ronningen-Petter DCF-1600 Twin Self-Cleaning Industrial Filter on a recirculation loop off of the caustic make-down tank. **Note:** the filter could also have been sized to take the full flow from the make-down tank prior to the fermentation tanks if necessary.

The DCF filter was designed to run continuously, while the caustic solution was used intermittently when the fermentation tanks were flushed. Temperatures were typically in the 180° F range.

Interestingly, this particular Ethanol application can see high amounts of solids depending on the flushing loop and human error. The filter was able to handle the spikes of solids seen shortly after start-up of the caustic rinse loop, and was able to make it through upset conditions caused by improper valve sequencing.

RESULTS:

Within the first week after the installation of the DCF-1600 Twin Self-Cleaning filter, caustic usage was stabilized and immediate savings were realized. **After the first 60-days of operation the customer saw an average savings of \$ 60.00 per day.**

-- by Ask Filter Man --

