

IMPROVING PROFITABLE ETHANOL PRODUCTION

Goal: Lower residual starch

Badger State Ethanol is a dry mill ethanol production facility producing 58 million gallons of ethanol per year. The company, located in Monroe, Wisconsin, also produces co-products such as distiller grains, corn oil, and carbon dioxide.

The key to successful ethanol production lies in the ability to achieve optimal yield, which Badger State has been able to focus on by using precision. Since opening in 2002, the Hydroheater has been essential to maximizing shear and producing higher ethanol yield thanks to its ability to perfectly mix steam and process liquids at precise temperatures. Doug Friedrich, Badger State Ethanol's Operations Manager, explained that the Hydroheater has helped them reduce their residual starch, thereby increasing their profitability and creation of consistent co-products. "We left the Hydroheater off for three fermenters and quickly realized that it

was very beneficial to have running. Our residual starches jumped from 4% up to 7.5% without the Hydroheater."

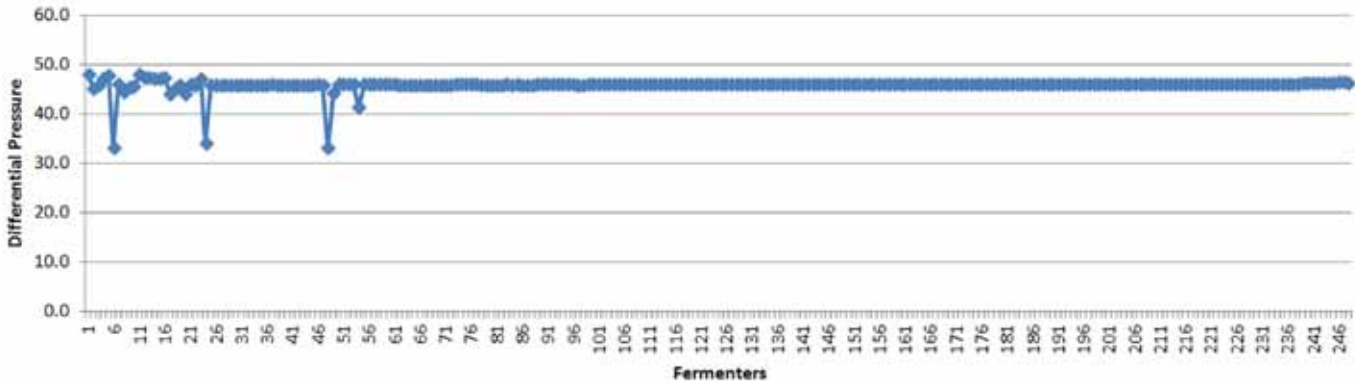
With residual starch levels at 4%, having a higher percentage results in lower yield and essentially wasted starch. Reducing residual starch increases profitability through reduced waste and opens another revenue option through creating consistent co-products.

Goal: Increase Control by Automating Pressure Drop

Badger State was looking for a way to have more control over their pressure differential. Friedrich installed alarms indicating when the pressure differential was too high or too low. Throughout a shift, employees would manually adjust the Hydroheater, sometimes up to 20 times, to ensure that the differential pressure was within the desired range. Although the Hydroheater was working efficiently, the multiple manual adjustments became a frustration for maintenance employees and could have compromised Badger States desire for precision. Precision is such an important topic for Badger State because it ensures optimal yield and desired starch levels, which ultimately results in greater profitability. After discussing their challenges and ideas with Hydro-Thermal, The Autopilot was a natural recommendation because it allows tighter control without manual adjustments.



Average Hydroheater Pressure per Fermenter After Auto Pilot



Immediately after the Autopilot was installed, Badger State’s maintenance staff realized how beneficial the Autopilot was for their operation. Friedrich explained, “The staff loves it. Once the Autopilot was installed, then it became hands off. We didn’t have to mess with it at all. We went from having the differential pressure range from 42-48, to being within a tenth of a psi. It now averages from 46 to 46.1 over the time it takes to fill one fermenter tank. So, now, we have significant control difference and improvement on the differential pressure. Consistency is the key for any plant, especially during these times. Consistency equals efficiency and that is what the Autopilot did for us.”

How It Works

An Autopilot system performs differential pressure (DP) changes automatically by monitoring the slurry pressure before and after the heater. Changes are made to the position of the combining tube based on measured DP and compared to the set point DP. The result is a constant and more accurate DP across the heater.

In essence, by controlling DP, the Autopilot allows ethanol plants to remove a variable from their process and gives them the flexibility to increase or decrease production levels while still creating a consistent product with the Hydroheater. Through a strong business relationship and looking for the most effective and efficient solutions, Badger State and Hydro-Thermal have improved product quality and the ethanol production process.

SAVE increase yield & product consistency **INCREASE PROFITS**