

# Micro Motion® Coriolis Flow Meters Save Time and Money for Ethanol and Sweetener Producers

## BENEFITS

- Reduced process setup resulted in increased throughput
- Reduced capital expenditure and increased operational profits
- Improved consistency in conversion yield
- Improved process of tracking hazardous chemicals



## APPLICATION

The process setup is a corn wet mill. The corn refinery prepares starch slurry for conversion to sweetener for use in food products or as feedstock for fuel ethanol. Starch or amyllum is a polysaccharide carbohydrate consisting of a large number of glucose units joined together by glycoside bonds. Starch is produced by all green plants as an energy source, and it is a major food source for humans. Pure starch is a white, tasteless and odorless powder that is soluble in water or alcohol. Starch can be used as a thickening or gluing agent when dissolved in water and heated, which produces wheat paste.

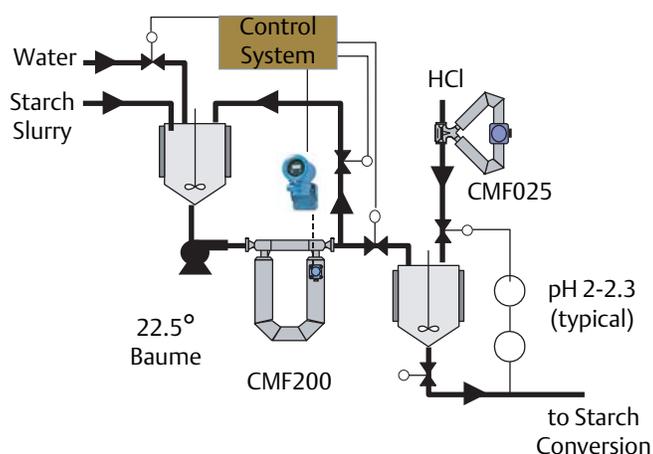
In the initial process of a corn wet mill, the starch is separated from other components of the kernel such as the germ and pericarp (outer covering). Downstream processes use enzymes and acids to convert the starches to sugars in a process known as saccharification. The Baume (percentage solids) and the pH of the starch are critical for a predictable conversion. Incoming slurry is variable, and the Baume and pH measurements need to be adjusted to optimize the starch-to-sugar conversion.

## CHALLENGE

The incoming slurry is adjusted in intermediate tanks, at which time the following activities occur:

- A sample of the slurry is analyzed for Baume
- Water is added and mixed

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- The level of pH is measured
- Hydrogen chloride (HCl) is added with a positive displacement (PD) pump

This process is repeated until the optimal pH level has been reached.

The main challenge is that it is a batch-oriented process instead of a continuous one, which can affect the quality of the end product output and consume a lot of time. This process also requires numerous tanks to avoid interruptions elsewhere in the process. Hydrogen chloride is expensive and hazardous, making it a high investment process with risks to process and people. Inaccurate measurement can have a very large impact on the ability to control costs.

### SOLUTION

A new system setup using Micro Motion's Coriolis flow meter technology automates the process, decreases investment cost, increases safety for personnel, and better controls the cost. The new system includes a CMF200 sensor with density monitoring to measure the Baume on-line. Water is added and the slurry flow recycled until the Baume is within specifications. The water is thus dynamically adjusted to maintain Baume measurements. Once the slurry is within specification, it is pumped to the second tank where hydrogen chloride is accurately added and controlled with a CMF025 sensor. This solution had a positive impact on both direct and indirect cost and human safety.

The advantages of this new solution are:

- On-line Baume enabled continuous flow, which reduced process upsets and eliminated time delays due to lab sampling
- Reduced the number/size of tanks required for Baume adjustment which lowers the capital costs and leaves a smaller process area footprint
- Improved conversion yield due to repeatable slurry consistency
- Reduced the usage of HCl and improved the tracking of hazardous chemicals
- Improved personnel and process safety

