



Crafting Success: Using H₂O Innovation's High Brix Technology to Elevate Craft Beer Brewing Processes

APPLICATION: Beer Crafting

LOCATION: Anaheim, CA

TECHNOLOGY: High Brix Reverse Osmosis

COMMISSIONED: Fall 2022



BACKGROUND

In the ever-evolving world of craft brewing, innovation is the key to staying ahead of the competition. In 2021, a California brewery named Bottle Logic sought ways to enhance its brewing processes. Inspired by the high brix concentration technology's success in the maple syrup industry, the Bottle Logic team reached out to H₂O Innovation, patent holders of the technology. Their proposition was both compelling and intriguing: could the high brix concentration process, which involves taking sap and concentrating it to a high level, be adapted to the world of artisanal beer production?

This led to the initiation of a pilot project with La Grange Pardue, a local brewery located near H₂O Innovation's facility in Ham-Nord, in the fall of 2021. The brewery, keen on experimentation, willingly accepted H₂O Innovation's proposal to test the waters with a smaller-scale machine. The pilot project was a resounding success, prompting H₂O Innovation to submit a proposal to Bottle Logic for a full-scale machine. The Hypermash machine was delivered in the summer of 2022, and the system was commissioned in the fall of the same year. Bottle Logic's primary goal was to reduce the boiling time involved in the production of their strong, dark beers with the ultimate focus on achieving the best flavour profile.

SOLUTION

The Hypermash concentrates the input liquid, the beer wort, up to 35 °Plato. Because the output liquid is much more concentrated, this allows a significant reduction in the time required to boil the liquid. To attain this concentration level, the Hypermash employs a smart reverse osmosis (RO) system. This smart RO system reads the sugar content of the input liquid and adapts in order to provide the highest concentration possible while complying with the process specifications. The system dynamically adjusts the output concentration level based on the input °Plato, minimizing operator interactions, and ensuring product consistency.

CHALLENGE

A challenge arose during the process design: because the extracted wort had a temperature of 150-170 degrees Fahrenheit and the membranes specifications required temperatures not exceeding 110 degrees Fahrenheit, the input liquid needed to be cooled down before entering the Hypermash. Meanwhile, the output liquid needed to be warmer so as to minimize boiling time.



Beer produced with Pilot Hypermash at La Grange Pardue, aging in bourbon barrels

CHALLENGE (continued)

An Innovative Solution

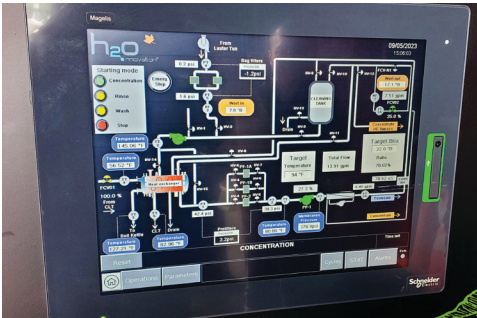
To make this happen, H₂O Innovation designed the patented process of integrating a multi-step crossflow heat exchanger. This device cools the wort at the inlet using the colder output liquid. Because both liquids meet through the heat exchanger, the output liquid's temperature is also raised at the contact of the warm extracted wort. The cross-flow heat exchanger thus facilitates the transfer of heat between the liquid exiting the membranes and the incoming wort, reducing boiling time and conserving energy. The smart RO system also automatically manages temperatures to ensure that the concentrated wort is kept as hot as possible while still adhering to membrane specifications.

RESULTS

The use of the Hypermash in the production of Bottle Logic's high ABV (alcohol by volume) beer yielded significant cost savings on two fronts. First, it significantly reduces the time required for boiling, which was the intended objective from the outset. Since the wort concentration level was optimized, the boiling step is kept to a minimum for hop additions. Whereas the brewery's previous recipe involved five hours of evaporation to reach the desired sugar content level, the new technology has reduced boiling time to one hour only, which results in substantial time savings and less natural gas consumption.

The second noteworthy cost-saving aspect of the technology resides in the efficiency enhancement. When brewing beer, hot water is typically added to the grains for a certain period, which is followed by the extraction of the sweet liquid. Sparging, the process of rinsing the grain to obtain more sugars, is not a viable option for high gravity wort. This is due to the dilution of the overall volume, which would further lengthen the already excessively long evaporation step. With H₂O Innovation's high brix technology, however, the brewers can sparge and extract all the sugars available from the grain, which results in an impressive 25% increase in yield.

H₂O Innovation's Hypermash system has transformed the brewing processes Bottle Logic uses in the production of its high ABV beers, which has resulted in significant cost savings and increased production. The Hypermash and this project as a whole stand as testaments to the power of innovation in advancing the craft beer industry and beyond.



The Hypermash HMI controls touch screen



The team testing the process at La Grange Pardue micro brewery in Ham-Nord, QC



Hypermash High Brix RO