Crafting A Better Brewery

By Luke Simpson, Associate Editor, Chem.Info

Visually, the new Hilltop Brewery owned by the New Glarus Brewing Company is stunning. Nestled on a hilltop just past the town of New Glarus, Wisconsin, a cluster of colorful buildings with jagged rooftops rise up from beautifully landscaped gardens. Things get even better inside.

At the end of 2007, the brewmaster and co-founder, Dan Carey, moved most of the brewery's production out of the original riverside facility, which had reached capacity at 65,000 barrels per year. Fruit beers and the organic pale ale are still produced and bottled at the older, organically certified facility, with the twenty-or-so other beers now being produced at the 100,000 barrel capacity Hilltop facility. But volume is not the name of the game for Carey.

"Competing with the larger breweries on volume has failed for many other breweries, putting them out of business. Some of the larger breweries run below capacity, and we could have hired them to make our beer if we just wanted to increase our output — it would have been cheaper than building a new facility, but it wasn't what we wanted to do." Instead, Carey and his wife Deborah, the president of New Glarus Brewing Company, built a brewery with all of the machinery that allows them to brew beer that is unique and affordable, while providing jobs to more than 50 people in the local community.

The Human Touch When choosing equipment for the new brewery, Carey opted for a balance between hands-on brewing and full automation.

"It's extremely expensive to have a fully automated system, and it's not possible if you're brewing twenty different beers. The process is traditionally hands on, and doesn't always lend itself to automation. We've integrated as much as possible, but we used common sense," Carey says.

For example, a Krones Botec system monitors and controls various brewing conditions and the flow of beer as it moves through the production process, but the pipes that deliver the liquid to the finishing tanks and bottling area are manually connected and disconnected.

A number of automated quality control mechanisms are also in place in the bottling area, with optical sensors checking labels, liquid levels and the weight of bottles before allowing them to continue down the line. If any of the conditions are not met, a mechanical arm pushes the offending product off of the line. But amongst the bottling automation is a strict regime of gas and liquid tests that are performed hourly, by hand using "old-school" scientific equipment such as a Zahm and Nagel Air Tester, which measures CO_2 gas and air content.

Choosing The Right Equipment Deciding where to spend money proved to be one of the most difficult parts of designing the brewery. Carey chose three pieces of machinery that work together to save time and energy without sacrificing quality.

Brewing has traditionally been a trade-off between speed and efficiency. In this case, efficiency is the amount of flavor that is extracted from the barley during the lautering process. But a high-tech lautering system called Pegasus — built by the Krones Company — uses a circular, donut-shaped tank and specially designed mixing knives to maximize the extraction of flavor in the shortest amount of time.

The resulting liquid, known as wort, is then transferred to a Stromboli brew kettle to be boiled. This part of the process can be extremely energy intensive, but not with this particular kettle.

“Our largest energy saving is due to the Stromboli kettle, which produces a very gentle wort boil such that the primary energy requirement is cut substantially,” explains Carey.

New Glarus' vapor condenser energy recovery system.

Mounted above the brew kettle is an energy recovery system in the form of a vapor condenser. Steam from the kettle is condensed and used to heat the wort before it enters the kettle. The heated water is also stored for use in cleaning processes. By utilizing efficient boiling methods, energy recycling and other green practices, Carey estimates that the brewery demands an astounding 50 percent less energy than other similarly sized breweries.

Clear About Beer Carey’s attention to detail is exemplified by the way New Glarus beers are finished. Most breweries use a filter to achieve the desired clarity, but Carey opts for a centrifuge, which is cheaper to operate through reduced labor costs, and more importantly it allows him to tailor a crystal clear beer or extremely hazy ale.

The drawback to this flexibility is the brewery's need to have all of their ducks in a row. If protein, sediment or yeast levels are incorrect, the centrifuging process will not be as effective.

Another trick that Carey has up his sleeve is the use of bottle fermentation, which is used for about 75 percent of the New Glarus brands. Besides the fact that it is the traditional method for fermentation, it also extends the shelf life of the beer.

Liquid Gold Wastewater Sewerage and wastewater from the brewing process are fed down to a small water treatment facility near the front gate of the property. Housed in a red barn that blends in perfectly with the rural surroundings, the facility processes 25,000 gallons of water per day using a two membrane biological reactor system.

The local council charges for wastewater disposal based on the amount of phosphorous, biological oxygen demand (BOD) and total suspended solids (TSS) in the water. By the time the wastewater leaves the brewery's treatment facility, the levels of phosphorous, BOD and TSS are all less than 8 ppm, saving the company tens of thousands of dollars per year in wastewater disposal costs.

"This facility easily pays for itself," says Randy Barr, plant maintenance manager at the brewery. "And we built the facility so that it can be expanded to process 60,000 gallons per day with the addition of a third membrane."

Competing Against Overheads Even with literally hundreds of breweries in Wisconsin and the surrounding states — from the smallest craft breweries to the mighty MillerCoors, New Glarus chooses not to advertise. Instead, they rely on word of mouth to create a buzz about their beer, which is only sold in Wisconsin.

This is achieved not only through the quality of their product, but also with a tourist-friendly brewery where the public can sample beers and speak with the brewers. Carey thinks that this interaction sends a powerful message to otherwise skeptical consumers by showing them where the beer comes from and who is making it.

The main obstacle for the New Glarus Brewing Company is not competition, but increased costs for energy, labor, raw materials and taxes. With the new Hilltop Brewery in place, the company is in a much better position to run a lean, green operation that is less susceptible to fluctuations in overhead costs. Now they can concentrate on filling the niche market for craft beer in Wisconsin.

So is making money even a goal for Carey? "If we are a responsible employer and community member, our employees will make good product and our customers will drink it — then we will make money."

Source URL (retrieved on *07/10/2014 - 2:24am*):

http://www.chem.info/news/2009/10/crafting-better-brewery