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The real deal: improving efficiency in the brewing of craft beers

Craft brewery, Northern Europe

When an independent brewery in Northern Europe was looking to replace the heat exchanger it used for cooling wort – a central part of brewing operations – they chose an H4 from Alfa Laval's Hygienic line. They are now producing their signature wild yeast beers with higher hygiene and greater efficiency than ever.

Popularity of craft beers

Since beginning production in 2012 this brewery has focused primarily on beers fermented with wild yeast and bacteria. They all contain 100% natural ingredients, many are organic and the majority are also vegan. About 30% of the brewery's output is exported to Japan, Italy and Spain, while the remaining 70% is sold on the home market.

"The brewing industry suffered a downturn in demand during the pandemic and has yet to fully recover," says the brewer, "but we are gradually getting back to pre-pandemic figures. The good news is that the current trend for naturally produced, authentic and interesting products is as relevant to beer as it is to other areas of life. People want the real deal, and that's what we give them."

CASE STORY

Hygiene is the top priority

In all beer brewing operations, hygiene is the number one priority. “The reason is simple,” explains the brewer, “if the beer gets contaminated, it can’t be used, which means time, money and product all go to waste. That’s why we take every possible measure to avoid contamination by, for example, cleaning the equipment carefully between production runs and working – as far as possible – with a closed system to prevent human contact with the product.”

When the brewery started studying its options for a new heat exchanger, the hygiene factor was a given, but it was not the only one. They were also looking to improve performance.

“We had been using the same heat exchanger for a decade and were not completely satisfied with its cooling efficiency,” explains the brewer. “Moreover, our energy consumption was high, especially during summer months when the cooling water entering the system is warmer to begin with. That meant the heat exchanger had to be run at low speed which slowed operations down. We hoped to find a new one that would help us address these issues.”

Reduced wort cooling time by 25%

Major energy savings

Significantly reduced water consumption

Meeting and exceeding expectations

As the range name suggests, hygiene is key in the design of Alfa Laval H4. After using the new heat exchanger for over a year, the brewer confirms, “The plates are indeed very easy to clean! In fact, we haven’t had any issues with cleaning or contamination since we started using it.”

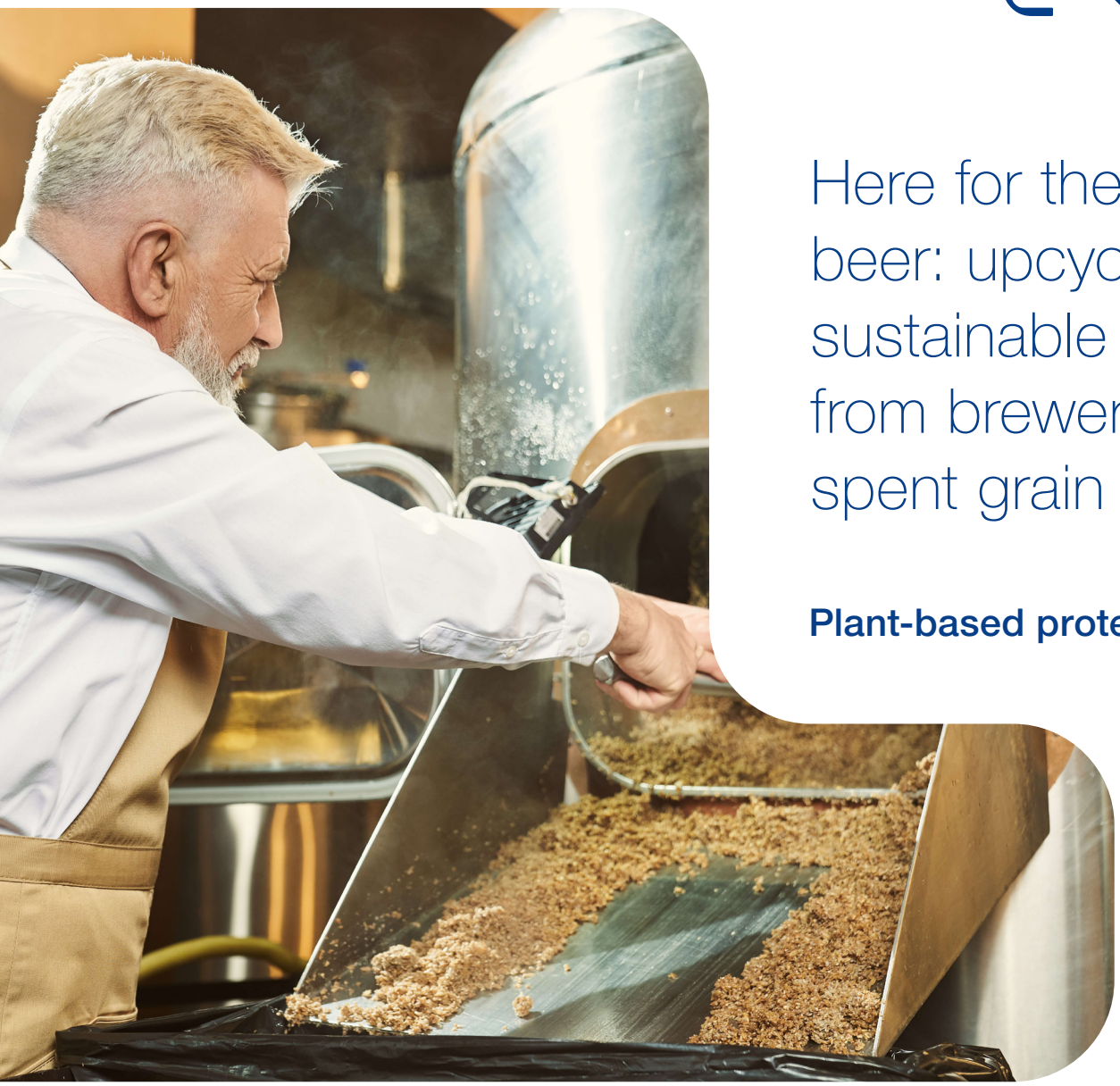
“The new equipment has reduced wort cooling time by 25%, and significantly reduced water consumption. We’ve also enjoyed major energy savings since the temperature of the outgoing water is higher, and therefore requires less energy to prepare it for brewing.”

When it comes to the other criteria, the brewery’s expectations have actually been exceeded: “The new equipment has reduced wort cooling time by 25%, and significantly reduced water consumption. We’ve also enjoyed major energy savings since the temperature of the outgoing water is higher, and therefore requires less energy to prepare it for brewing.”

According to Alfa Laval, these benefits are also thanks to the new plate design which optimizes flow distribution and improves heat transfer efficiency, enabling a reduction in the consumption of water, cleaning media and energy.

Quality products and a helpful team

Looking ahead, the brewer hopes to be able to invest in other processing equipment from Alfa Laval in the years to come. “High quality products are of course the main reason for choosing Alfa Laval,” he says, “but other things matter too. For example, having good contact with the people and being able to rely on them for rapid technical support when needed. The Alfa Laval team has been extremely helpful every step of the way – something we really value as a small company.”



Here for the beer: upcycling sustainable protein from brewer's spent grain

Plant-based protein, US

Sustainable sources of high-quality protein are essential in meeting the ever-increasing global demand for healthy, affordable, and nutritious food. Alfa Laval's expertise within protein makes it an ideal technology and solutions

Innovation in this arena is exciting and fast-paced, and one of the latest newcomers to the market is a US-based business, which has not only developed a sustainable plant-based protein, but which uses a waste product from the brewing process as its feedstock.

EverGrain™, a wholly owned subsidiary of global brewing giant Anheuser-Busch InBev, has developed a cutting-edge process to extract high-quality protein isolate from spent grain from the beer brewing process.

The resulting product – EverPro® – is then sold as an ingredient to food companies for incorporation into a variety of products, including sports nutrition shakes and coffee drinks. Its high nutritional value, mellow taste and market-leading solubility in beverage application make it ideal for boosting the protein content across a range of consumer product categories.

"EverPro is a nutrient-dense plant-based protein, which is sustainably produced from Barley that is grown and made in the USA," says Greg Belt, CEO of EverGrain.

"It is completely water soluble with a clean taste, making it a very versatile ingredient and suitable for numerous products including ready-to-drink and ready-to-mix beverages, such as protein shakes and coffees, as well as smoothies and energy bars."

And with sustainability at the core of its operation, EverGrain, is turning what was previously dried and sold as low-value animal feed into a sustainable source of high-quality, highly nutritious, plant-based protein.

“With this cutting-edge process, we can harvest barley’s hidden nutritional capacity – helping us serve up not just another protein, but a better protein,” says Steffen Muench, EverGrain’s Head of R&D. “And what’s more, through upcycling, we can do all this using the land we already have – not one extra acre is needed to utilize all the nutrients saved in barley for the good of people and planet.”

Commercial production of EverPro started in June this year at EverGrain’s brand-new facility in St Louis, Missouri, following years of research and development with industry and research experts.

Separation and fluid handling technology for the installation has been supplied by Alfa Laval, which included six large decanters, reverse osmosis systems, valves, pumps, and tank cleaning equipment.

Foodec:
Alfa Laval Foodec decanter centrifuges are ideal for industries where delicate food and beverage products are processed – and where easy cleaning is crucial.

Membrane filtration systems:
Alfa Laval designs, manufactures and installs complete cross-flow membrane filtration systems.

EverGrain has a continued high focus on process optimization and plans are in the pipeline for the construction of a pilot facility where improvements in overall yields will be developed alongside reductions in water use.

Finetuning is essential in the highly competitive protein isolate marketplace and Alfa Laval is well placed to provide EverGrain with technical expertise going forward, says David King, Food Separation Director for Alfa Laval in the US.”

“We have expert knowledge in separation, evaporation and membranes that goes back decades. We can help them to become as technologically advanced and commercially efficient as they can be and supporting them with our service reach and expertise around the world.

“This is just the start of their journey. The global reach of AB InBev means that EverGrain really does have the capacity to feed the world – taking an inedible waste product that was previously dried and sold as animal feed and turning it into quality protein.”

Upcycling potential

Brewer’s spent grain accounts for up 85 percent of leftovers from the brewing process. According to one estimate, up to 20 billion pounds or approx. 10 billion kg of spent grain is produced as a by-product from beer production in the USA every year. It is essentially only the sugars in the grains which are spent during the brewing process, while remaining fibres, proteins and other nutrients can be extracted and converted into human food.

About EverPro®

EverPro, created by AB InBev’s sustainable ingredient company EverGrain, is the world’s first commercially available upcycled barley protein. EverPro was deliberately formulated and is scientifically proven to have unmatched solubility and viscosity levels compared to whey or pea and is at or above parity in absorption and digestibility. Makes it a great fit for sports and nutrition beverage applications. Because EverPro is made using a proprietary process to upcycle barley protein from brewer’s spent grain (BSG), it emits lower carbon and uses significantly less land and water, it is one of the most sustainable proteins on the planet and is certified by the Upcycled Food Association. EverPro’s first ever large-scale facility came online June of this year in St. Louis, MO.

Using Alfa Laval technology, Jackie O's Brewery cut production losses in half and saved time

Athens, Ohio, USA

What is the history of Jackie O's Brewery?

My mother was diagnosed with cancer right when we bought the brewpub uptown, and she passed six months later. So, in her honor, we named this Jackie O`s Pub and Brewery, her name was Jackie Oestrike.

My house was always an open welcoming place for anybody, any color, any gender, whatever you may be. At Jackie O`s, we strive to be a very welcoming and open facility. We also hope to be stewards of our environment. We have been operating in and only in Athens, Ohio, for the past sixteen years.

Through that, we've become a part of this community through employment, purchasing power, and all the causes that we support. What can Alfa Laval do for your craft beer production? It is a 20 bbl brewhouse.

We've got several 40 bbl fermenters and 120 bbl fermenters on site. Right now, in the building we have Brew 250 Plus with ProCarb as well as a Flexitherm Mini Flash Pasteurizer. Alfa Laval is always part of the conversation when it comes to buying new equipment at this point. We looked to the most innovative leaders in the industry, in terms of what they are doing to help breweries along the way. Before we got the Brew 250, our losses were between 18 and 24% on IPAs, the majority of what we do back here.

Since we have gotten the Brew 250 on site, our losses have dropped to about 10 to 12%. So, we`ve seen pretty significant changes within our loss. When that product hits the brite tank, it has been centrifuged, so it is clean - as clean as it can be. It's also carbonated, so we don't have to run it through a carb stone and do that whole process. It is basically 97% of the way there, ready to package.

What impressed you most about Alfa Laval technology?

Before we had the Brew 250 and the ProCarb, we would have beers in the brite tanks for three to four days. Today, it is one or two days max. When you cut a couple of days out of the process, you save on labor, process time and money. When we were looking for a new piece of equipment, we compared different pieces of equipment to each other. The Brew 250 Plus is bottom-fed and hermetically sealed with zero DO pickup.

The Brew 250 has done what it is advertised, allowing all those wonderful aromas and flavors to stay within the product while not harming the product in any way, and that's not something that we thought was possible with a centrifuge. From fruited wheat to hazies to double IPAs, we can run anything through the Brew 250 and get the results we want on the back end. It does work, and that's the bottom line. It is like this stuff just sells itself.

What do you think about working with Alfa Laval?

When we work with Alfa Laval, we feel that we are going to get what we want. When we want to increase this or we want to decrease time - we get the support we need, and it is always very professional and very timely.

It is really nice to be able to have people who know what they are doing, understand the machines that you are calling about and are professional when they show up on-site.

Primarily, what I enjoy most about working with Alfa Laval is the people I speak with. It is more like a little collab or a little party in a weird way that it is not all that fun to do the work, it is pretty mundane and arduous in some ways, but it is almost like having an old employee back or something like that. It is fun!

Why Alfa Laval Brew 250?

Polisher for small breweries and craft brewers

- Up to 180 hl/h
- Hermetic design means practically zero risk of oxygen pick-up
- Low power consumption
- Basic and easy to operate
- Skid-mounted separator and system
- Turbidity triggering of solids discharge
- Capacity control by inlet turbidity
  (included in upgraded Plus version)
- Siemens or Allen Bradley Automation
  (included in upgraded Plus version)

Why Alfa Laval ProCarb?

- Boost productivity with rapid clarification and carbonation
- Save space with no need for extra equipment
- Reduce oxygen pick-up with advanced centrifuge design
- Get precise process control with easy-to-operate system

Brew 250

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

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CASE STORY

Tank cleaning upgrade cuts water consumption by 17%

Multinational brewery focuses on better use of resources

In light of increasing pressures on freshwater resources, a leading US-based brewery group has committed to increasing water efficiency and cutting water consumption in its operations.

One of the water-saving measures focused on optimizing the tank cleaning process. The installation of new rotary jet heads from Alfa Laval reduced water consumption for tank cleaning by as much as 17%.

Look to tank cleaning for substantial water savings

Water is the number 1 ingredient in beer, consuming millions of liters of clean freshwater every day. In response to the increasing water challenge, a leading American brewery group has set out to reduce water consumption in its operations.

One of the obvious places to look for water savings is in the water-intensive tank cleaning process.

The brewery uses large fermentation tanks where active yeast converts sugars into alcohol. The size and horizontal layout of these tanks present a special challenge in the cleaning process and calls for advanced technology to ensure proper cleaning of all surfaces between brewing cycles.

Upgrade of jet heads saved massive amounts of water

Inspired by a similar project in China, the brewery group decided to upgrade the original Alfa Laval GJ 4 units with new TJ40G rotary jet head units.

The TJ40G uses less water than the GJ 4 and completes the full cleaning pattern faster. The lower water usage combined with the faster cleaning time saves roughly 760 litres (200 gallons) during the final rinse and sanitizing steps.

After the first months of operation, the new TJ40Gs have proved to return water savings of 17%. The total water savings for the fermentation tanks are estimated to be around 5.7 million litres per year (1.5 million gallons).

“We have worked with the leading American brewery group for more than 30 years, and we are pleased that we can now help the customer reduce the operating costs and at the same time achieve their sustainability goals by increasing the water efficiency in the tank cleaning process. As a valuable side effect, the reduced water consumption also drives savings in chemicals and energy used for pumping, heating, recovery, re-use, and treatment of cleaning water”, says Andrew Delaney, General Manager Tank Cleaning at Alfa Laval US.

Plug and play installation

The old and the new jet heads use the same inlet connections. The installation time was less than one hour per tank, comprising three jet heads per tank. The replacement of jet heads took place in between fermentation cycles and caused no extra downtime in the process.

The free rotation and the integral ball bearings of the TJ40G extend the maintenance intervals by 50% compared to the older GJ 4 units.

The positive results of the first installation of new jet heads pave the way for further updates of the tank cleaning equipment at the brewery’s other locations across the US.

Alfa Laval TJ40G Rotary Jet Head.

Facts about the upgrade project

Alfa Laval TJ40G Rotary Jet Head units are designed for hygienic applications and provides automated cleaning of vessels between 50 and 500 cubic metres liquid (13,000 and 132,000 gallons). The design of the advanced jet heads is optimized for cleaning of brewing tanks and for food and dairy processes. TJ40G is FDA approved. The upgrade of tank cleaning equipment is part of Optimize™ by Alfa Laval, which aims to enhance the water and energy efficiency of hygienic industries.

5.7 million
litres (1.5 million gallons) of water saved per year

The water savings correspond to estimated CO_2e savings of more than

100 tonnes

CASE STORY

Upgrading brewery deaeration system improves craft beer

Vocation Brewery, Yorkshire, UK

Process optimization goes hand in hand with sustainability at Vocation Brewery, one of the UK's largest independent craft breweries. When adding a deaeration system, the brewery wanted to enhance product quality and efficiency while reducing the environmental impact of its operations. Alfa Laval Aldox™ Mini deaeration module helps boost productivity and product quality by producing high-quality deaerated and carbonated water and raw liquor for the brewing process.

Process optimization goes hand in hand with sustainability at Vocation Brewery, one of the UK's largest independent craft breweries.

From its humble beginnings in 2015, Vocation Brewery has become one of the UK's largest independent craft breweries. Two years later, the brewer invested in an Alfa Laval Brew 80 disc stack separator to use after the fermentation process. Today, the company produces over 10 million pints of stout, pale ale, IPA and lager a year for distribution to 40 countries worldwide.

"Integrating the separator into our process was incredibly straightforward due to close collaboration with the Alfa Laval engineering team," says Matt Howgate, Director of Brewing at Vocation Brewery.

> "The separator and staff were top-notch, so when we were looking to invest in a new deaeration processing line five years later, I had only one company in mind."
>
> Matt Howgate, Director of Brewing at Vocation Brewery

Increased capacity, higher yields, uncompromising quality

To determine whether adding an onsite deaeration plant was the right choice for the craft brewery, Matt toured a few other breweries. The brewer chose the Alfa Laval Aldox™ Mini for its high separation efficiency, compact footprint, large surface area to separate gases from the liquids, ease of use and advance control system.

"Seeing an onsite deaeration system at work showed us how having our own deaeration plant at Vocation Brewery could take our business to the next level, increasing production capacity and overall yield from each brew without compromising on quality," explained Matt. "It's unusual for a brewer our size to install a deaeration system onsite. It's mostly the large international breweries that decide deaeration is a must."

After fermentation, it is imperative to deoxygenate any water or raw liquor that comes into contact with the beer since any dissolved oxygen can have adverse effects on the taste and stability. Initially, Vocation Brewery purchased and installed the Aldox Mini to finetune its craft beer to ensure better-tasting beer before packaging the product.

"We saw the Aldox Mini achieved more efficient oxygen removal at low flow rates and a higher quality of deaerated water and raw liquor," Matt continued.

Better quality control and more sustainable pipeline purging

The brewery has since expanded its use to dilute high-alcohol beer to its normal strength, using deoxygenated water to correct fluctuations in the alcohol-by-volume measurements. Deaeration helped improve the quality control of Vocation Brewery's product portfolio.

Vocation began to flush its lines with deaerated water rather than carbon dioxide, reducing the dissolved oxygen content in water and raw liquor and safe-guarding the beer. Doing away with the conventional use of boiled water and carbon dioxide to purge piping systems makes the process more sustainable.

Higher productivity with rapid deoxygenation

Before installing the Aldox Mini, the brewery used a stripping gas (CO_2) to produce deaerated water, which required more time and left more dissolved oxygen in the water. In less than five minutes, the Aldox Mini reduces the dissolved oxygen in the water below 10 ppb, enabling the brewery to produce higher quality beer in less time.

"We've significantly ramped up our onsite production of deaerated water," notes Matt with a grin. "Producing up to 30 hecto-litres of deaerated water per hour is a huge step up from what we used to produce. That more than meets our requirements now and leaves room to expand in the future."

Alfa Laval Aldox™ Mini

How to contact Alfa Laval

Up-to-date Alfa Laval contact details for all countries are always available on our website at www.alfalaval.com

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