



Cheers!

Words: Katrin Hanger | Pictures: Marcel Mayer

combined head and power plant

Undoubtedly, if the Oktoberfest were held 70 times a year it would keep a lot of people happy. As well as bumping up beer sales to about 538 million liters. To produce that amount you would need not just hops, water and yeast but around 86,000 tonnes of malt. That is precisely how much the malt producer Durst Malz makes at its malting works in Gernsheim every year. The malt is dried with the aid energy produced by two modular CHP plants supplied by MTU Onsite Energy.

Have you ever heard of an employer that offers its staff an in-house aromatic sauna? Temperatures up to 85 degrees Celsius, an atmosphere infused with fragrances redolent of roasted malt and magnificent views of the Odenwald forest from the top of the tower. Sounds like a glorious healthspa experience. But actually we are in the core facility of the Durst Malz malting works in Gernsheim am Rhein in the German state of Hessen. This is where the third of the ingredients allowed in the making of beer according to the German Reinheitsgebot ("Purity Law") of 1516 in addition to hops and water is made, i.e. malt. Malt is made from grain, primarily barley, and is the ingredient mostly responsible for the flavor of beer. This "aromatic sauna" is where the malt is dried before being stored in silos up to 50 meters high or sent out to breweries.



Founded in 1824, Durst Malz has developed over nearly two hundred years from a family business to a leading malt producer. Since October 2011 it has been part of the French malt-making group Soufflet, the second largest malt manufacturer in the world. The head offices of Durst Malz are in Bruchsal-

Heidelberg and there are additional sites in Castrop-Rauxel and Gernsheim. Every year Durst Malz produces roughly 200,000 tonnes of malt, of which 86,000 tonnes are made in Gernsheim. "Here in Gernsheim we only process barley," reveals plant manager and master brewer Berthold Klee. In a display cabinet in his office there are several bottles and cans of the Japanese beers "Sapporo" and "Kirin". Major German brewers also buy the malt for their beers from Durst Malz. And the company exports to countries including Namibia, South Africa, Guatemala and the USA.



Barley germination the decisive stage

Klee has no time for any more explanations just now. There is a cargo ship carrying 1,000 tons of barley in its hold waiting to be unloaded at the company's own wharf. The in-house laboratory has already given the go-ahead. "They check the barley for grain size and test its moisture and protein content. However, the decisive factor is the capacity of the grain to germinate," explains the six-footer. Germination is the decisive stage in making the barley suitable for use in brewing. During germination, enzymes are formed which help to convert the starch contained in the barley into malt sugar in the brewing process. In the subsequent fermentation process, the malt sugar is turned into alcohol with the aid of yeast. "Although the original grain contains enzymes, they are nowhere near enough to convert the starch into malt sugar," Klee explains. The rest of what he says is suddenly drowned out by a deafening noise. There is a droning and rumbling coming from the ship's hold. Incalculable quantities of the ochre-colored grains disappear at lightning speed up a gigantic vacuum pipe swinging vertically above the cargo. The vacuum delivers 60 to 80 tonnes of barley an hour to one of the round storage silos via a conveyor belt. "The ship will be empty in one and a half days," shouts Klee in an attempt to make himself heard over the din.

When the barley is moved from the steeping tub to the germination tower it has a water content of 45 percent Konrad Lord, production manager

Steam bath and aromatic sauna

If you want to find your way to Durst Malz, there's no need for sat nav – just scan the horizon. The slim silos that store the barley and the finished malt reach as high as 50 meters skywards and can be seen from a long way off. From the silos, the barley is conveyed to one of the three germination towers, which are about three times the diameter of the silos. The germination tower is the core facility of the malting works because it is here that the barley is made into malt. The process starts at the top and ends at the ground floor of the tower. We take the lift to the ninth floor where Klee wants to check on production with production manager Konrad Lord. "Be careful, it's wet in here," he warns when we are on the top floor, before opening the heavy door giving access to the inside. The most obvious sight is a large circular area containing 250 tonnes of barley. The ceiling is covered with droplets of water and air humidity is high. It is like in a steam bath. "This is what we call a germination box," explains Klee, his eyes concealed by steam-covered glasses. "There are two more of them on the seventh and fifth floors." By this time the sheets in his pad are starting to curl up from the damp. Before the barley starts germinating here, it is soaked in water in large steeping tubs. It has a water content of 45 percent when it is moved to

the germination box and it is left there to germinate for six days. To make sure it germinates as evenly as possible, it is kept constantly moist and aerated and regularly turned. “Basically, what we are doing, is no different from when someone waters seeds in a tray on the window-sill at home, allows them to germinate and then uses them to add flavor to the salad,” Klee reveals. “Except that we stop the germination process after six days and then dry the grain out. And, of course, we are talking about entirely different scales,” Lord adds. He takes a sample with a long scoop. Out of every grain a new, whitish shoot is emerging. “Tomorrow, this barley will be ready, so we will stop the germination process and move it one floor down for drying,” the production manager continues.



Third floor of the germination tower. “Nice and warm in here,” observes Klee. Another heavy door leads into the aromatic sauna. We are met by the sweet smell of malt and the welcoming warmth of 65 degrees Celsius. Though for a relaxing spa experience it is rather too noisy. Two fans loudly blast 152,000 cubic meters of air an hour through the kiln, as it is known, to dry the malt. There is another kiln on the ground floor of the tower. The temperature gets as high as 85 degrees Celsius there. The moisture content, meantime, drops from 45 to just four percent. Drying malt gives the room a caramel-colored coating. This is precisely where the two natural-gas fueled combined heat and power (CHP) modules supplied by MTU Onsite Energy come into their own. “We need an enormous amount of heat for the drying process,” explains Klee. A water boiler supplies up to six megawatts. It is helped out by the two Type GC 357 N5 CHP modules, which produce around one megawatt of thermal energy. To operate as energy-efficiently as possible, the malting works also uses “waste products” to heat the air, for example by recovering heat from the CHP plants and recycling the exhaust air from the drying process. The latter is used to preheat the fresh air for the kilns in a heat exchanger before the CHP modules are brought in to raise the temperature above 60 degrees Celsius. Only at 85 degrees, the maximum temperature in the drying process, is energy required from the heating boiler. The roughly 700 kilowatts of electricity that the energy modules generate in addition to the heat is fed into the plant’s internal power grid. “A malting works requires a very large amount of energy, so it is the ideal place to use CHP modules,” the plant manager observes. As well as 800 cubic meters of water a day – by comparison, a family of four uses about 150 cubic meters a year – the maltings consumes four to five million kilowatt-hours of gas and 800,000 to 900,000 kilowatt- hours of electricity a month.



CHP modules run almost nonstop

Klee is on his way to the basement of the germination tower where the CHP plants are accommodated. "The 3,000-hour service for the two modules is due today. Since they were installed in July 2011, these plants have been running virtually nonstop for roughly 23 hours a day. They are only switched off when the staff change over the barley in the kiln. We aim to get 180,000 to 200,000 kilowatt-hours a month out of each module." Unfortunately, Klee arrives too late – regional service manager Andreas Häusser from MTU Onsite Energy Augsburg has already finished. "All in perfect order," he declares with satisfaction while cleaning the oil from his hands. So how did Durst Malz come upon MTU Onsite Energy? "Through the building services installers Helmut Herbert GmbH who installed the heating boiler for us. Helmut Herbert have worked closely with MTU Onsite Energy for a number of years," explains the plant manager. "We know that Herbert have very solid and reliable partners so we decided to buy CHP modules from Augsburg to replace our old plants from a different supplier – and we are absolutely satisfied with them." MTU Onsite Energy supplied the central components of the installation – the CHP modules and the associated electrical switchgear. "Each module consists of a gas engine, a generator, an exhaust heat exchanger, exhaust silencer, module controller and power control cabinet. All of that is mounted on a baseframe and ready-piped and wired," elucidates Peter Grüner, Sales Manager, Germany, for Gas Power Systems at MTU Onsite Energy. "As our client, Helmut Herbert then installed the plants at Durst Malz together with all the associated services on site, i.e. air supply system, exhaust system, lubrication oil supply, connection to the natural gas supply, and heating and electrical connections. Commissioning was then carried out by our specialists from Augsburg."

Different for every client

A piercing squeak intrusively interrupts the conversation. Klee is up and off again. A goods train with five wagons is just arriving at the loading point. The tracks run right through the middle of the factory grounds. The consignment is destined for Switzerland. Five hundred tons of barley malt a week are shipped to the Swiss Federation alone. Another 500 tons a month are dispatched by rail to a brewery in the Sauerland. "No client is supplied the same malt as another. Every customer has their own ideas on the characteristics of the end product," the plant manager reveals. As many as 20 different parameters have to be considered, including color, water content, viscosity and pH level.

We need the thermal energy from the CHP modules for the drying process. Plant manager, Berthold Klee The malting works processes 8,000 to 9,000 tonnes of barley a month and production continues 365 days a year, summer and winter. "Output is higher in the summer of course, because people simply drink more at that time of the year." In Germany, the per-capita consumption of beer is about 107 liters. Only water and coffee outdo the brewer's beverage in terms of consumption. So are the weeks leading up to the Oktoberfest the high season for malt production? "No," smiles Klee impishly, explaining that though the event was certainly a gigantic beer swilling occasion for Munich, it was simply subsumed within the normal summer production. To put it in context, visitors to the 2011 Oktoberfest downed around 7.5 million liters of beer. Each year the Durst Malz facility in Gernsheim produces enough malt

for roughly 538 million liters – that is enough for more than 70 Oktoberfests!

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