

Brewery Newsletter



Automatic adjustment of residual extract und yeast quantity before bottling

GEA Diessel and Tuchenhagen Brewery Systems file patent application

The private wheat beer brewery Schneider & Sohn GmbH in Kelheim uses a continuous blending system that provides a mixture of top fermented wheat beer and Speise for the filling process. This system with the "laboratory in the production" automatically analyses and regulates the required apparent extract. GEA Diessel as the manufacturer of the system and Tuchenhagen Brewery Systems as the technology partner have filed a patent application for the system.

The apparent extract in the wheat beer is not consistent due to fermentation and variations in raw materials. In order to compensate for this, more or less pasteurized Speise is added, depending on the extract content.

The apparent extract is determined in the mixture. As this measured value is influenced by CO₂, the CO₂ content in the product is also determined and the measured value for extract is compensated with this value.

The control system is designed as cascade control. The extract control has a secondary ratio control. In this way, flow rate variations (for example during desludging of the upstream centrifuge) are quickly corrected and temporary faults in the mixing ratio are compensated.

A constant apparent extract guarantees that the required CO₂ value is obtained during secondary fermentation in the bottle. Thus, this method helps to ensure the top quality of Schneider Weisse.

Traditional brewing method

Brewing of wheat beer with bottle fermentation is the traditional production method which is still applied in some selected breweries, particularly in Bavaria. With the high-quality bottle maturation a very typical wheat beer aroma is produced. Due to the active yeast in the bottle there is almost no residual oxygen content in the bottle. In most cases, the so-called "Speise" is pasteurized first wort (i.e. concentrated sweet wort).

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State-of-the-art brewhouse technology for Benedictine-Bavarian brewing tradition

For more than twenty years, the Huppmann brewhouse – which had been installed in the brewery in 1983 – has contributed significantly to the excellent quality of the Andechs Monastery beers. In November and December 2006, major parts of the brewhouse equipment were upgraded to the state of the art by Huppmann and the process control system was updated by ProLeiT. "The aim of this measure is to maintain and further increase the quality level of the Andechs Monastery beers and to exploit energy saving potentials", says Alexander Reiss, operations manager at the Andechs Monastery Brewery.



Thanks to the completely modernized brewhouse, things continue to look up for the Andechs Monastery Brewery. Father Valentin Ziegler, cellarer at the Monastery Brewery, and operations manager Alexander Reiss are very satisfied with the progress and the result of the upgrade. (Photo: Michael Westermann)

The brewery with an annual output of 117,000 hectolitres is the cornerstone of the enterprises of the Benedictine Abbey St. Bonifaz in Munich and Andechs. With their profits, the enterprises finance pastoral, cultural and social projects of the abbey, because the Benedictines do not receive a direct allocation of funds from church tax. Today, the Andechs Monastery Brewery produces seven different types of beer. The entire brewing process is marked by the connection of Benedictine-Bavarian brewing tradition and advanced brewing technology. The very traditional working method is characterized by decoction mashing, the two-tank method for fermentation and storage and long storage times of up to six weeks.

A modern brewing process requires optimum conditions on both sides: on the automation side as well as on the plant engineering side. In the last 20 years, a lot has happened in the

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field of process automation. Today, all pumps and agitators are frequency-controlled. In particular, critical processes like mashing-in, mash transfer and mash agitation can be realized very gently with minimum oxygen uptake. Shear forces are avoided to a large extent. In the lautering process, modern control systems allow higher yields, variations in raw material quality are compensated. Intelligent energy cycles with optimized temperature levels require comprehensive systems with central data management and are indispensable today, especially in the brewhouse. Modern recipe and reporting systems ensure production safety and top quality.

Upgrade of all brewhouse sections

In terms of plant engineering, all sections were upgraded with the Huppmann innovations of the last 20 years. The Millstar now has the patented automatic quality system, which automatically balances variations in raw material quality. A level probe in the mash hopper ensures the prevention of air intake. The lauter tun was upgraded to the Lauterstar technology. For this purpose, the wort run-off system and the raking machine were modified. The raking machine is equipped with the Huppmann double-shoe knives which allow intensive treatment of the spent grains. After the installation of an energy storage tank, the energy from the vapours can be used more efficiently in the wort boiling process. The vapours are now primarily used for direct wort heating to just under boiling temperature. At the same time, the wort is very gently heated up to boiling temperature. The Whirlpool/wort kettle is operated with a Jetstar today. The new internal boiler concept with wort circulation below the wort surface improves the homogeneity of wort treatment and provides optimal values in evaporation and substance conversion.

Short upgrade period

The modernization of the hardware of the complete brewhouse including the transition to the brewmaxx process control system involved a shutdown of production for only two weeks in December 2006. Already during the extension of the fermentation and storage cellar of the Andechs Monastery Brewery carried out by Kieselmann from November 2005 to July 2006, the planning for the complete replacement of the process control system for brewhouse, fermentation and storage cellar, yeast cellar, CIP plant and water treatment plant had been underway. Weeks before the brew rest, the installation of the energy storage tank and the related piping had already commenced. Also part of the cabling and some new control cabinets could already be installed at that time in order to keep the shutdown period as short as possible. After the modernization, components like process water tanks and the CIP cycle for pipe cleaning were restarted first to ensure operation in the filling section. Then, the CIP cycles for all cylindro-conical fermenters, cylindro-conical storage tanks, yeast management and brewhouse followed. After commissioning of the CIP cycles, the first milling trials started, followed by the first water brew. After that, the first hop brew removed the last residues of cleaning media. Finally, the first brew of "Andechser Vollbier Hell" was produced. It took not even 3 days from the first milling trial to the first brew of "Andechser Vollbier Hell".

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For the current and future capacity expansions, the ECO-MATRIX® piping system was designed as follows:

- 2 x wort filling pipe, nominal diameter DN 100 (600 hl/h)
- 1 x green beer discharge line, nominal diameter DN 100 (600 hl/h)
- 1 x reserve (expansion), nominal diameter DN 100
- 1 x yeast harvest line, nominal diameter DN 65
- 1 x tank cleaning with ring pipe discharge, nominal diameter DN 65

ECO-MATRIX® system at Kompania Piwowarska S.A., Poland

The success story of the ECO-MATRIX® piping system in the fermenting room continues. In 2006, in the course of the expansion and modernization of Browar Dojlidy (Kompania Piwowarska S.A., SABMiller Group) in Bialystok, Poland, Tuchenhausen Brewery Systems GmbH equipped a complete new fermenting room with the ECO-MATRIX® piping system. Product quality and economic considerations were the decisive factors for the project requirements in all sections. The high requirements regarding system development and design, improvement of product quality and operational safety as well as reduction of product losses and lowering of investment and operating costs could be fully met with the ECO-MATRIX® system.

Project scope

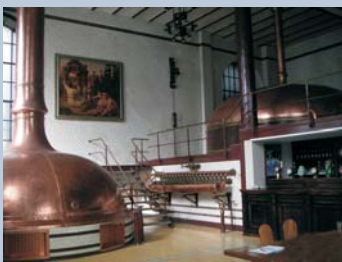
The project included a complete new CIP plant, modification and expansion of the yeast storage and propagation equipment, a new second wort line (600hl/h) from the brewhouse with the related officially approved measuring units, pitching, aeration and cooling as well as the process piping of the new second fermenting room (15 tanks, 4200 hl each) with the ECO-MATRIX® system. To achieve optimum flexibility regarding filling of the existing and the new fermenting room, a fully automatic VARIVENT® valve block was installed for optional interconnection of the wort ways.

Process automation

Automation of the processes on the product side as well as on the CIP/gas side was done fully automatically with the TBS control system OTAS® 7. OTAS® 7 with iFIX is based on the Microsoft Windows XP operating system. It combines the advantages of a safe and innovative 32-bit technology with the openness of the Windows world. The existing control level in the old section was modernized with the current Siemens S7 programmable controllers. In the OTAS® 7 program operation the automatic programs in the plant can be operated and monitored. It is divided into the status overview over active programs, which allows a quick overview of the events in the plant, and the detail view for each individual program, where all relevant data and operating options for this program are available. The existing control system in the old section was also replaced by the more convenient OTAS® 7.

Kompania Piwowarska was fully convinced by the solutions to the project requirements. Thus, the brewery group is going to equip another new fermenting room at Browary Tyskie in Tychy with the ECO-MATRIX® system. The success story of the ECO-MATRIX® piping system will obviously continue this year.

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*Special charm: Copper and historic
ambience in the old brewhouse in
Varese.*

Brewing tradition relies on copper

Copper has been used as material for brewing vessels in the last 150 years. The material and its machining characteristics had a decisive influence on the outer shape of brewing vessels. Numerous old brewhouses with copper covers are still in operation today. The warm colour and the round shape create a traditional ambience with which consumers associate the positive image of the "good old times".

In the past few years, Huppmann has repeatedly manufactured brewhouses for which existing old covers were used again or for which new covers were made. Huppmann is one of the few manufacturers – if not the only one – worldwide that still has these traditional craft skills to produce copper covers for industrial brewhouses. Particularly when it comes to "reviving" the old covers, a lot of instinct is required for the design of the brewing equipment. For in most cases not only the brewing method, but also the building is historic and statics as well as room layout, vessel dimensions and pipe routing have to be adjusted to the building.

In January 2006, Varese brewery, a brewing facility of Carlsberg Italia, decided to upgrade the still existing old copper brewhouse to the state of the art with Huppmann technology. The pictures show the "best side" of the historic brewhouse. Together with the Carlsberg brewers, Gerd Delitz, Area Sales Manager Central Europe, managed to house the new equipment for a capacity of up to 2 million hectolitres of cold wort. Today, a good 70% of the beer brewed in Italy is produced in Huppmann brewhouses.

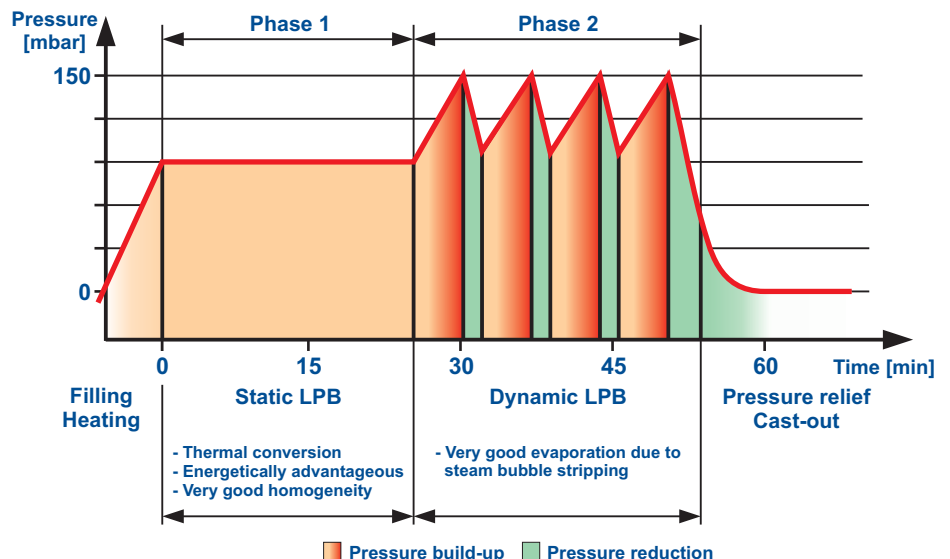
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Optimum combination: Jetstar and dynamic LPB

Can wort boiling be combined with the Jetstar and dynamic low-pressure boiling and what are the benefits of this combination? In the past few months, the Huppmann technologists have examined this issue very closely and obtained interesting results: both systems complement each other in an ideal manner.

The special feature of the Jetstar internal boiler is the subjet opening. With an electric actuator, the outlet opening can be opened or closed to circulate the kettle content below the wort surface or over the wort spreader. With the subjet opening, the wort is circulated very homogeneously during the heating phase and temporarily also during boiling. Pulsation of the wort in the boiler is prevented by the discharge below the wort surface. This results in less thermal stress on the wort and significant extension of CIP intervals.

Only after the intense and homogeneous conversion process with the Jetstar, the undesirable aromas are removed from the wort by means of dynamic low-pressure boiling. This is supported by the stripping in the pressure relief phase with intense formation of steam bubbles in the entire wort volume in the kettle. With the combined working method undesirable aromas are optimally removed, even with very low total evaporation rates. Values of less than 4 % can be guaranteed. In practice, several breweries are already boiling with a total evaporation of about 3 %.



The boiling process

Heating: The wort is preferably heated with a wort heater which is operated with hot water from the energy storage tank. To reach boiling temperature, the wort volume in the kettle is now circulated through the open subjet of the Jetstar and gently heated to boiling

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temperature. This method is also used if no energy storage tank is available and the wort must be heated in the kettle.

Boiling – Phase 1: In this phase, the content of the wort kettle is circulated at minimum overpressure through the lower outlet opening of the Jetstar. The temperature remains constant – the evaporation rate is minimal. Due to the slight overpressure, thermally induced conversion processes like cracking of DMS-P and uniform isomerization of hop constituents in the wort are accelerated. The required reaction time (boiling time) is reduced significantly. Dead zones in the wort kettle, which occur in almost all internal boiler systems, are prevented by the formation of a nearly perfect piston flow.

Boiling – Phase 2: In this phase, dynamic low-pressure boiling takes place. The subject is closed and the wort is distributed over the two-level wort spreader. Boiling takes place under slight overpressure at a temperature of just over 100 °C. In defined intervals, the pressure in the kettle is reduced, which leads to intense formation of steam bubbles. This stripping effect can be compared to water steam washing and improves the evaporation of volatile components in the wort.

Post-boiling: The kettle content is depressurized to atmospheric pressure and circulated over the spreader of the Jetstar until the requested original gravity is adjusted.

The Jetstar can be used for wort volumes up to 1500 hectolitres. Thanks to the highly integrative design, it is possible to retrofit the Jetstar to any wort kettle. New Huppmann plants are always equipped with Jetstar and low-pressure wort kettles. Depending on the requested savings in total evaporation, the payback period is only a few months.

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