State-of-the-art bre Benedictine-Bavari

AUTOMATISATION | 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.

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"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. 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.

Process control system and plant equipment working hand in hand

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 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 pur-

Foto: Thomas Schmid

whouse technology for an brewing tradition

pose, 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 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

Overview of the brewhouse upgrade

- New empty level probes, level and temperature measuring instruments for all brewhouse vessels
- Millstar wet mill:
  Installation of new crushing rollers; new safety concept for maintenance work; new measuring instruments for flow, pressure, temperature and level measurement; application of Danfoss frequency converter VLT type FC300 for feed roller and Mohno pump
- Mash vessels:
  New agitator paddles with frequency control via Profibus-controlled frequency converters; modification of the mash distribution system for mash intake from below
- Lauter tun:
  Modification of the wort outlet, new raking knives, new spent grains flap
- Whirlpool kettle:
  The existing external boiler was replaced by the Jetstar boiling system; new vapour condenser and energy storage system
- Modification of the control cabinets in the motor control centre
- Set-up of new local cabinets for electrical and pneumatic equipment and installation of new cable routes
- Replacement of all butterfly valves including pneumatic valve heads
- State-of-the-art process automation with brewmaxx V7
- Complete cabling and installation of new control cabinets

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

(Photo: Michael Westermann)

commenced. Also part of the cabling and some new control cabinets could already be installed at the 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".

Process control system and automation in detail

The existing Braumat system was replaced by the database-based process control system brewmaxx V7 from Proleit with 2 display workstations, one engineering station and one central server. The existing S5 control system was replaced by a S7-416 CPU with decentralized Profibus periphery (ET200 M) and PC level connection via Industrial Ethernet.

The control system upgrade included the malt transport, brewhouse, yeast cellar, water house with energy storage tank, CIP plant with 2 circuits for brewhouse vessels and cellar pipes on the one hand and for yeast tanks, flotation tanks and CCT's on the other hand.

A separate S7-300 control system in the yeast cellar with touch panel operation was removed and the operation was also integrated in the central control system. With the brewmaxx event messenger it is now possible to send selected alarms as text messages to the mobile phones of the brewery's on-call personnel. The new process control system is connected to the brewery's local network via a firewall. This allows to provide teleservice via the internet (VPN connection) and technical support from the Proleit head office. CAD planning and documentation in EPLAN was also done by Proleit. ■

Beer and its history in Italy

BEER HISTORY | Barley, one of the key ingredients of beer, was introduced in Italy by the Etruscans who, at their banquets used to drink a moderately alcoholic fermented beverage they called "pevakh", originally made with rye and emmer and then wheat and honey. In Ancient Greece beer was considered as highly as wine, even becoming the official beverage of the Olympic Games, while in ancient Rome beer was much loved and drunk at banquets and feasts.

A RECENT ARCHAEOLOGICAL discovery, moreover, provides direct evidence of the presence of beer in the northern Italian region of Piedmont, in the middle of the 6th century B.C. Archaeologists excavating a small necropolis at Pombia found an earthenware cinerary urn in a pit grave which, together with the cremated ashes of the deceased, also contained a pottery beaker with abundant traces of fermented sugars, which left no doubt as to their origin: they were what remained of an ancient beverage obtained by fermenting cereal grains with the addition of vegetable flavourings, in brief, a dark and very alcoholic beer.

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