drinktec 09

Hall A4
ProLeiT, stand **624**
GEA Group, stand **314**
Rockwell Automation/Endress+Hauser, stand **428/329**
Technische Universität München, stand **335**

The world's "smallest" fully automated brewery

A fully functional and fully automated mini-brewery has been developed exclusively for the drinktec international trade show by a group of leading global companies. They achieved this feat in collaboration with the Technical University Munich, in Weihenstephan (Centre of Life and Food Sciences, TUM Weihenstephan).

Munich, Germany, drinktec 14.09.2009

How would a brewery look if its production processes were fully automated and integrated into the enterprise IT environment? Some of the world's leading process automation companies – Rockwell Automation, ProLeiT and Endress+Hauser – provide the answer to this question with a miniature brewery, on show for the first time at drinktec 2009.

The smallest fully automated brewery with a two-vessel brewhouse system and a fermentation cellar

The fully functional mini-brewery essentially comprises a two-vessel brewhouse system and a fermentation cellar. The units were assembled manually by GEA and equipped with sensors and measuring instruments from Endress+Hauser. A Logix controller from Rockwell Automation was used to automate the mini-brewery. ProLeiT's brewmaxx process control system allows the mini-brewery to be managed from three separate exhibition stands at drinktec.

The production units

The mini-brewery produces a cast-out quantity of 20 litres and consists of a hot-water tank, a combined whirlpool/wort kettle, a mashing/lautering tun, a wort cooler, and two cylindroconical fermentation tanks.

The 100-litre hot water tank is used for the mashing and sparging process and has a screw-on heating element of 3 kW. In addition, sensors measure the temperature and fill level.

The specially-built mashing/lautering tun has a patented false bottom and is used for the mashing as well as for the lautering process. The tun is equipped with a stirring mechanism for the mashing process and with a temperature and flow sensor.

The whirlpool is used to generate steam during the mashing process and heats up the mash. When the wort is drained off it is pumped into the wort kettle at a tangent, which produces a whirlpool effect.

The Ecoflex plate heat exchanger, specially made by GEA, cools the wort from 95 degrees to 13 degrees in 20 minutes. The wort is then pumped into the fermentation tanks.

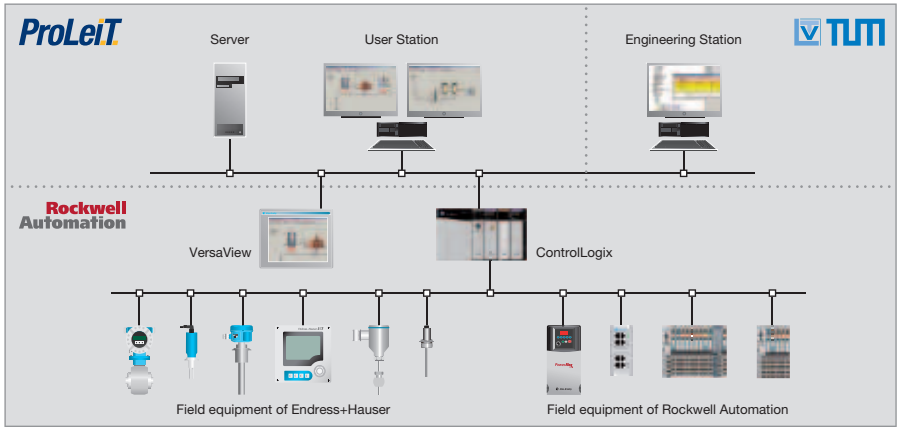
Each of the two cylindroconical fermentation tanks has a capacity of 50 litres and is equipped with jacket coolers as well as temperature and fill-level sensors. The tanks are used to ferment the wort at a defined temperature, which is reached by pumping cooling agents into the jacket coolers.

A joint project of:

ProLeiT · TUM · Endress+Hauser People for Process Automation · GEA · Rockwell Automation

drinktec 09

Hall A4
ProLeiT, stand **624**
GEA Group, stand **314**
Rockwell Automation/Endress+Hauser, stand **428/329**
Technische Universität München, stand **335**



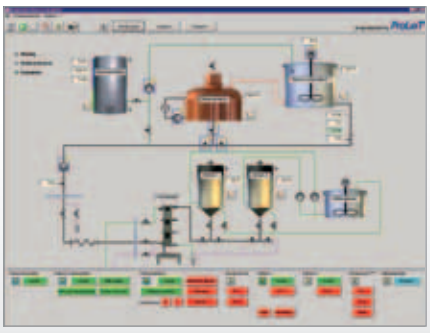
System architecture of the mini-brewery at drinktec 2009, distributed over three booths

Automation

The task of the automation companies – Rockwell Automation, ProLeiT and Endress+Hauser – was to implement end-to-end automation that clearly illustrated process integration from the field level to enterprise management level. The three firms paid special attention to dovetailing their solutions to help make implementation faster and easier. As a result, Endress+Hauser's powerful sensors for capturing process measurements can easily be connected to Rockwell Automation's ControlLogix-based on process automation systems. Predefined program blocks and visualisation templates have been implemented to deliver the measurements available. They also include pre-tested interfaces to help reduce the time needed for interconnecting the solutions. Rockwell Automation's point IOs make it easier to connect the fermentation cellar's actuators and sensors to the control system via an EtherNetIP network. The Allen-Bradley PowerFlex AC drive is also connected to this network and is used to control the speed of the stirring mechanism in the mashing/lautering tun.

The process control system

ProLeiT's brewmaxx process control system includes adjustable parameters and utilises the data provided by the automation elements to control the brewing process. The open client-server structure allows users direct access to the control system via terminals on ProLeiT's and TUM Weihenstephan's drinktec booths. The control system can also be accessed remotely using an Allen-Bradley touch screen (VersaView) on the mini-brewery itself, which is located on Rockwell Automation's stand. This distributed architecture corresponds to breweries' real-life requirements and clearly shows visitors how easy it is to monitor and control process flows.



Process diagram of the brewmaxx control system

A big advantage here is that the brewmaxx recipe management function is both clearly laid out and easy to use. The graphical display of step sequences and process flows – from the brewhouse through to the fermentation cellar – provides users with easy access to other technological and brewery-specific classes, such as the brewmaxx equipment modules. These include automated systems for routing control, tank farm management and a tank cooling system that controls and optimises the fermentation process.

The overall control functionality of the brewmaxx solution has also been extended to include a process-oriented materials management system for batch tracking and tracing.

Rockwell Automation's reporting tool FactoryTalk Vantage Point (formerly Incuity) was implemented to provide users with key figures, reports and the current plant status, even across different process steps. The tool allows users direct access to process data from the controllers as well as from the brewmaxx process control system. The cross-functional reporting solution is browser based. In real enterprises, it facilitates the integration of isolated IT applications with predefined connectors to a wide range of systems.

The joint mini-brewery is a striking demonstration of how dovetailing solution components from some of the world's leading process automation suppliers can help companies implement their projects faster and more easily. Equipped with the newest hardware and software, this fully automated mini-brewery is unique and sets a new benchmark for advanced process automation in the brewing industry. This makes it ideal for training too, and after drinktec the mini-brewery will be made available to TUM Weihenstephan students and staff for teaching and research purposes. ■

A joint project of:

ProLeiT · TUM · Endress+Hauser (People for Process Automation) · GEA · Rockwell Automation