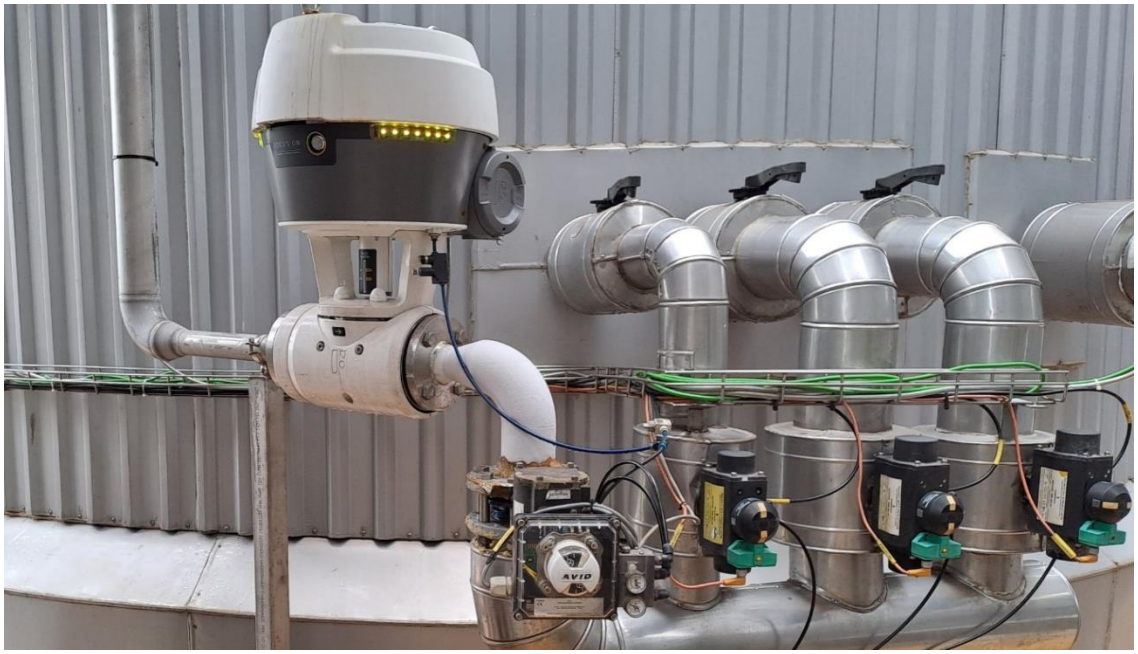


"Optimization of Temperature Control of Fermentation Tanks for beer production"

- Simplification of existing installation by integration of all-in-1 device for measurement and control
- Optimized control by direct 'Temperature as Setpoint' enables fast response, reduces overshoot and minimizes setpoint deviation.
- Implementation of sophisticated diagnostics allows for alarming on: cavitation, valve leakage, flow direction, etc.
- Faster and more stable Fermentation Tank temperature control enables Heineken a more efficient and high quality production of beer.
- Data collection during production enables process analysis and reproducible production.

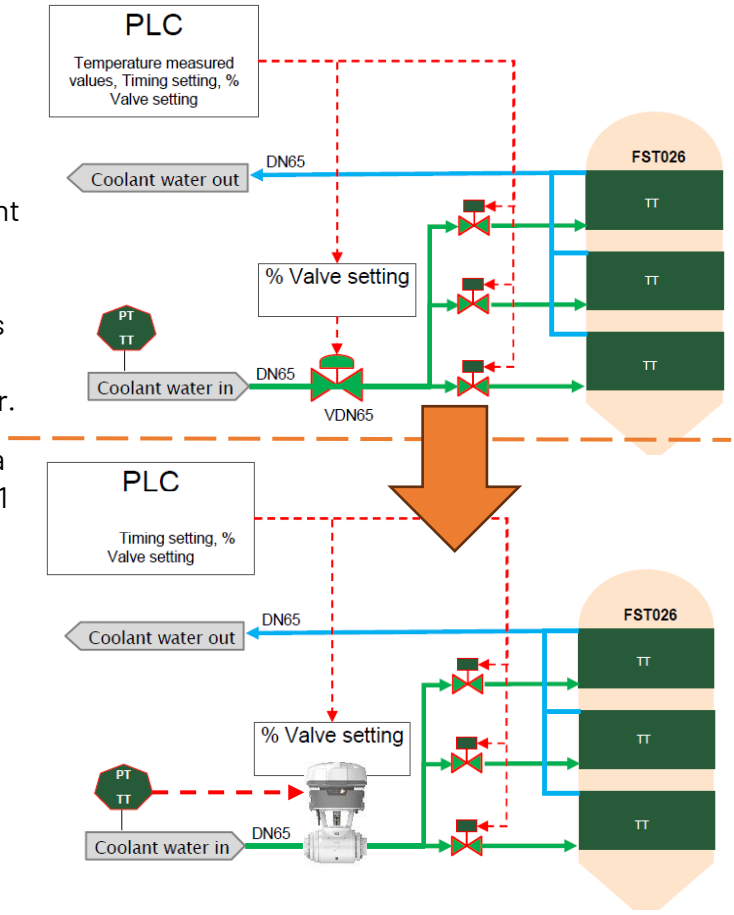
1. Background

Heineken founded on 15th February 1864 by Gerard Adriaan Heineken. The idea of Heineken was to produce beer with the newest techniques and outstanding raw materials. By now Heineken is a worldwide renowned Dutch brewing company, their products are sold in the well-known green bottle with a red star. Heineken exists of 300 different beer brands with a total beer volume of more than 218 million hectoliter of beer. This makes Heineken the biggest beer brewer in the world. Heineken also is the largest producer of ciders globally. Heineken has more than 140 production facilities in over 71 countries.

2. Control Requirements

A beer fermentation tank is a crucial component in the beer brewing process, where yeast converts the sugars, present in the wort (unfermented beer), into alcohol and carbon dioxide. The fermentation tank provides an ideal environment for yeast to carry out this fermentation process. To ensure a consistent and controlled fermentation, the fermentation tank is equipped with cooling jackets filled with glycol or other temperature control liquids. This allows the brewer to regulate the temperature inside the tank. At this Heineken site the cooling jackets are filled with glycol. The flowing glycol plays a crucial role in maintaining the desired temperature of the beer fermentation tank during the fermentation process. It is used as a cooling agent to control and regulate the temperature inside the tank.

Currently the glycol flow is controlled through a control valve that receives a set-point from the PLC. The volume flow is determined by an algorithm inside the PLC that calculates the desired glycol flow based on pressure and temperature measurements from multiple temperature and pressure sensors. The current architecture with multiple parameters and distributed hardware makes this process complex and slow.



3. FOCUS-ON Solution

Heineken concluded to totally revamp the current installation, including new piping, new instrumentation and new control elements. This enabled Heineken to gain the additional benefits of the FOCUS-1 built-in flow, pressure- and temperature sensors including its fast controller.

As the temperature of the fermentation tank is a critical parameter during fermentation, FOCUS-1 uses this as a direct input for the control of the glycol flow. Instead of having a separate temperature sensor connected to the DCS to determine the setpoint of the control valve to control the glycol flow. Now the temperature setpoint can be given directly to FOCUS-1 using conventional communication protocols. The FOCUS-1 internal PID Controller determines the best valve position for the desired glycol flow rate and with that the desired temperature.

4. Customer Benefit

Reliable and stable temperature control of the fermentation tank is vital for brewers to manage the fermentation process ensuring that the yeast can thrive and produce high-quality beer. Maintaining a correct flow of glycol based on the temperature requirement is crucial. A faster and more stable control of the glycol flow results in a higher efficiency and production quality of the fermentation tank. Improved thermal control leads to consistent production of beers with specific flavour profiles and characteristics. Next to the improved control the data collected during production by FOCUS-1 can easily be retrieved and used to analyse and further improve product characteristics and quality. Heineken will use this to even better understand the specific cooling characteristics for different types of beers. This all will result in an even more distinguished taste and flavour experience for its customers.

5. Product used

FOCUS-1

- The Smart Meter Valve for Flow, Pressure, Temperature and, Process Control
- An All-In-One solution featuring, control valve, flowmeter, pressure and temperature sensors and controller including PID and diagnostic functionality and Digital Twin
- All components are standard SAMSON & KROHNE proven technologies used for decades
- Intrinsic redundant design

Contact

Would you like further information about these or other applications? Etc. etc.