

Proline Prowirl 73: exact recording of steam mass

Automated temperature control for tankage

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Vopak Terminal Hamburg GmbH & Co. operates a tankage depot in Hamburg with about 300 tanks with a filling volume of 50 to 25,000 m³ that may be rented by clients from the most diverse industries. Many of the stored media (mineral oils, chemicals, petrochemicals, latex, etc.) have to be stored at specific temperatures. The heating of the individual contents of these tanks is handled with saturated steam that can be dosed and invoiced in a highly accurate manner thanks to the recently integrated Proline Prowirl 73 vortex flowmeters.

Due to fluctuating outside temperatures in the course of the day, the steam quantity has to be adjusted even once the required fluid temperature is reached. This was done manually, twice a day, with the help of three valves directly on the tank. Due to this rough and ready manual control of the temperature, too much steam was fed to the product on occasion.

The optimum processing temperature of the products could not be accurately maintained. Besides, it was not possible to prove the admissible temperature had been adhered to.

In addition, an accurate allocation and invoicing of the exact steam quantity per tank was difficult. To optimize the process, Vopak decided to automate the heating process. In addition to the controlled heating of the media with an accuracy of max. ± 0.3 °C and the display and monitoring of the process parameters in the control room, the steam quantities of each tank were to be recorded and filed to allow a transfer of the respective data to an invoicing system to invoice the customer. EAK Elektrotechnik Andreas Kulp GmbH of Reineck near Hamburg was commissioned to handle this task. Additional software was installed in the process-control system (Siemens S7-400 with WinCC 6.0) that calculates the required steam mass based on the difference between the actual and the target temperatures of the fluid and the preset heating time. The steam mass is chosen to achieve a controlled, even, and careful heating



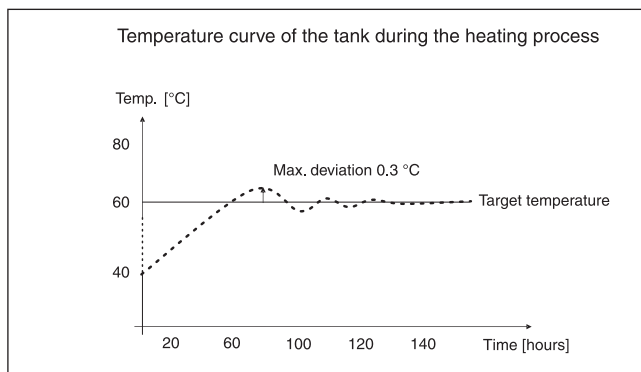
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of the product. An electrical control valve and a Proline Prowirl 73 vortex flowmeter were installed in addition to the already existing temperature chain in the tank.

Thanks to these automation components, the process-control system (PCS) is supplied with the fluid temperature from the temperature-measurement chain integrated into the tank and controls the steam mass with the help of the control valve.

The PCS controls the steam mass until the required temperature is reached.

The steam mass is continually measured by the Proline Prowirl 73 device and forwarded to the PCS by way of the 4...20 mA output. The PCS thereupon uses this information to continually calculate the required steam mass and automatically controls the process until the required fluid temperature is reached.



The PCS controls the steam mass until the required temperature is reached.

In the meantime, this automated temperature control of the fluid was realized for four tanks at the Hamburg tankage depot of Vopak. The controllable heating of the tank contents and the exact invoicing data achieved thanks to the Proline Prowirl 73 device convinced the operators to equip half of their tanks with the new controls in the next few years.

Advantages of the automated temperature control of the media

- a reduction of steam consumption of about 8-12% compared to manual controls
- proof of quality based on a permanent monitoring of the fluid temperature
- exact invoicing and allocation of used steam mass to the respective tank or client ■



Proline Prowirl 73 measures the saturated-steam mass and supplies it to the PCS by way of the 4...20 mA. Top: the electrical control valve.