

Modernisation of the service water circuit

Efficient cooling and service water supply through variable-speed pump technology

Peiner Träger GmbH is a German steel company with its headquarters in Peine (Lower Saxony). The company is part of Salzgitter AG and is one of Europe's largest manufacturers of steel beams and sections. It produces annually around one million tonnes of steel used in construction projects worldwide. The products are widely used in bridge construction and other load-bearing applications, playing a vital role in modern steel infrastructure. One of the company's key focuses is on sustainable steel production.

The modernisation of the East service water circuit was carried out with the aim of further increasing security of supply, reducing energy consumption and cutting operating costs. The existing pumping system generally performed its task reliably, but offered only limited scope for flexibly and automatically adjusting the flow rate to actual demand. Occasional pressure surges occurred when the pumps were switched on and off, placing additional strain on the pipework network and highlighting potential for optimisation. Together with Peiner Träger, a concept was therefore developed that enables a more energy-efficient, reliable and economically viable solution in the long term.

The challenge

In the East service water circuit at Peiner Träger, cooling water is supplied to various production areas. The system is responsible for the service water supply and is one of the plant's central infrastructure systems.

Prior to modernisation, the pump system consisted of a total of six pumps with different flow rates ranging from 250 m³/h to 500 m³/h and up to 1,200 m³/h. The large pumps covered the base load, whilst the smaller pumps were switched on to adapt to fluctuating cooling water demand.

Flow rate control was not automated. Depending on the demand from the connected consumers, the pumps had to be switched on or off manually to maintain the system pressure within a narrow operating window. This mode of operation involved a considerable amount of effort and allowed only limited adjustment to actual demand.

Client

Peiner Träger GmbH

Products

4 speed-controlled Lowara LS 300-500 centrifugal pumps

Result

Conversion of six manually operated pumps to four speedcontrolled pumps, thereby regulating the flow rate to meet demand whilst maintaining stable pressure and completely preventing pressure surges in the pipework network; at the same time, pump maintenance costs were reduced and spare parts inventory was reduced.



East service water circuit

Furthermore, the pressure surges caused when the pumps were switched on led to considerable mechanical stress on the pipework. This resulted in isolated cases of damage to welded joints and, on occasion, pipe bursts.

The solution

The optimisation of the system was planned and technically developed jointly by Peiner Träger and Xylem on the basis of a comprehensive analysis of the operating conditions. A key component of the project was the detailed determination of the minimum, average and maximum flow rates of the service water circuit. Based on this data, a new system concept was developed, designed to significantly improve both operational reliability and energy efficiency. Instead of the six pumps of varying sizes, four identical LS 300-500 centrifugal pumps were installed. All pumps were fitted with variable frequency drives to enable continuous demand-based control.

Thanks to the speed control, the flow rate per pump could be flexibly adjusted between 245 m³/h and 1,630 m³/h. This made it possible to cover the entire range of cooling water requirements without manual intervention.

In addition, as part of the modernisation, selected sections of the pipework were optimised in terms of flow dynamics to reduce pressure losses and further improve the plant's overall energy efficiency.

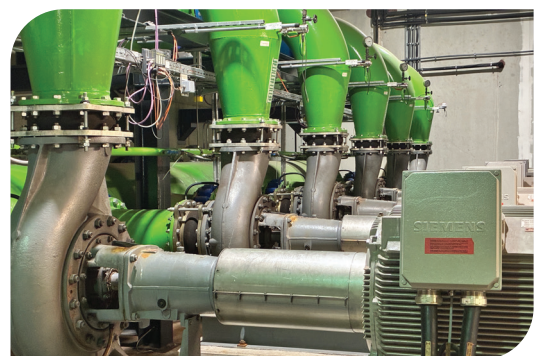
Focus on durability and operational reliability

Peiner Träger paid particular attention to keeping the pump speed as low as possible. The aim was to minimise mechanical wear on the units in the long term and to extend maintenance intervals.

For this reason, larger hydraulic systems were deliberately selected. This meant that the required flow rate could be achieved at a speed of just 930 min⁻¹. The reduced circumferential speed of the impellers has a positive effect on bearings, seals and other wear components, and significantly increases the service life of the pumps.

At the same time, speed-controlled operation enables the pumps to start up and be regulated smoothly. This has completely eliminated the pressure surges that previously occurred in the pipework network.

„Maintenance requirements were significantly reduced, there were no pipe bursts, and the number of spare parts was reduced as only one pump type is now used. That was an added benefit, on top of the energy savings.“



West domestic water circuit

Kai Ortmann, Energy Operations, Peiner Träger GmbH

The result

Following commissioning of the new pumping system, the expected improvements were thoroughly verified. The energy-saving potential calculated by the customer in advance was confirmed by measurements taken during operation.

In addition to the significant reduction in energy consumption, the operators benefited from further positive effects:

- Fully automatic adjustment of the flow rate to actual demand
- Significantly reduced maintenance requirements
- Significant reduction in switching-related stresses in the pipework network
- Higher system availability
- Reduction in the variety of spare parts through the use of a single pump type
- Extended service life of the pumps due to low speeds

Sustainable success

The successful modernisation of the East service water circuit confirmed the effectiveness of the chosen technical solutions. Owing to the proven energy savings, the improved operational reliability and the reduced maintenance costs, two further plant sections were modernised in accordance with the same concept in the years that followed.

Speed-controlled Lowara pump systems are now in use there too, making a lasting contribution to the plant's efficient water supply.

Conclusion

The modernisation of the East service water circuit at Peiner Träger serves as a prime example of how a thorough analysis of operating conditions and the use of modern pump technology can lead to significant improvements in energy efficiency, operational reliability and maintenance requirements.

By converting six manually operated pumps to four speed-controlled Lowara LS 300-500 pumps, a future-proof solution was created which continues to operate reliably to this day and serves as a model for further modernisation projects at the plant.