

CASE STUDY

Complete Modernization of Pumping Station to Handle Today's Wastewater

Faaborg is a city in the central part of Denmark with 8,200 inhabitants. The historic center of Faaborg is one of the best preserved ones in Denmark with its free-standing bell tower of the old town church.

The municipality has been facing an increase in pump blockages in its pump stations during the past few years. There is a clear tendency of reduced water consumption and higher rag content, which results in more frequent pump blockage. The Faaborg pumping station was equipped with a competitor's three dry-installed pumps with totally 565kW (2x245 kW and 1x 75 kW). A modernization of the station including the pumps was needed and reduced the needed motor power by ca 25% to 420 kW (5x75kW+1x45kW).

The Sulzer difference

- Exceptionally blockage resistant pumping of wastewater with high solids and fibrous material content
- Significant energy savings throughout lifetime
- Efficient impeller design with single-vane and multi-vane models to ensure exceptional blockage resistance
- Optimum balance of impeller vane numbers and solids handling based on extensive Computational Fluid Dynamics (CFD)
- Market leading efficiency, without compromising solids and rags handling
- Reduced life-cycle costs, especially energy consumption, operation time and downtime costs

“ We have appreciated very much the effective workforce plan and fully keeping the schedule during the construction phase. This has been a real challenge as stopping the pump station was never an option. ”

Michael Rasmussen, Waterworks Manager

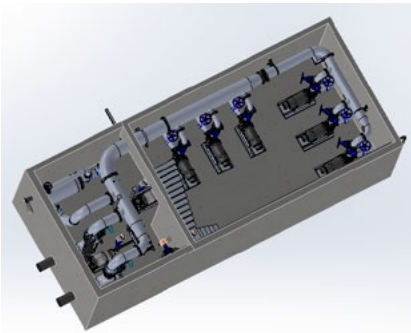
The challenge

The main challenge was to ensure the full functioning of the pumping station during the modernization process of eight months. Only one pump at a time could be taken out of service during the rebuilding phase. Stopping the operation was not permitted, and this created a number of challenges, such as:

- Sealing of pressure pipes
- Switching between new and old pressure pipes
- Installation of highly advanced pump control and communication module
- Switching between pump sumps
- Backup installations if something went wrong

The solution

The authorities started an investigation to ensure the best possible energy management, high reliability as well as a non-blocking pump operation. As a result, Sulzer Denmark was asked to modernize the pump equipment of the main terminal pumping station in Faaborg. The work comprised the total renovation of the existing main terminal pumping station, including the replacement of pumps (closed channel type), piping, control equipment, etc.



Layout of the Faaborg pumping station



Sulzer submersible sewage pumps type ABS XFP

Sulzer recalculated the duty points of the pumps, using two years of flow data from the existing installation, and consequently selected the submersible sewage pumps type ABS XFP CB Plus with premium efficiency motors. These pumps are designed to handle today's wastewater and offer improved efficiency due to IE3 level motors.

Customer benefit

Reduction of the needed motor power by ca 25%, from 565 kW down to 420 kW. With the new XFP CB Plus pumps, the customer has the advantage of a blockage free pump with market leading efficiency. The CB Plus Hydraulics is based on extensive Computational Fluid Dynamics (CFD) research and testing.

The hydraulic radial impeller design comes with an adjustable bottom plate with intercepted slotting that ensures efficient rags handling throughout the lifetime of the pump.

Due to abrasion, the gap between the impeller and wear plate will increase. The clearance between the impeller and bottom plate can be set back at the site, and this resets the hydraulic efficiency to "as good as new".

Product data

The station is equipped with five submersible sewage pumps type ABS XFP 155J CB2 PE750/4 and one XFP105J CB2 PE450/4.

The complex control panel has been designed for an optimum pump protection, controlling and monitoring the six pumps with VFDs delivering into the 3 pressure pipes.

The PLC controls the Frequency Drives (VFDs) and the number of operating pumps. It is programmed to operate the pumps close to the best efficiency point and with the lowest possible energy consumption, depending on the waste water level in the sump.

Pump operation

Start level	No of pumps	Frequency	Flow
3.1 m	5	47-50	580-720 l/s
3.0 m	4	45-50	400-605 l/s
2.7 m	3	47-50	190-435 l/s
2.6 m	2	45-50	140-210 l/s
1.1 m	1	46-50	50-138 l/s

Contact

kenneth.larsen@sulzer.com
oliver.guglielminetti@sulzer.com

Applicable markets

Municipal and industrial
wastewater collection

Applicable products

Submersible sewage pump
type ABS XFP

The PLC also monitors the condition of the pumps and the system in general. This helps the customer to plan the maintenance of his system.

Features and benefits

- High-efficiency CB Plus impeller design with two vane models to ensure exceptional blockage resistance
- Solids passage >100 mm
- IE3 motors
- Full monitoring package incl. vibrations sensors

For more information on our products and solutions for wastewater treatment, please visit sulzer.com.