



The high-efficiency SHP1 propellers achieve substantial energy savings and a high heat transfer rate.

Heavy-duty agitators save energy in sulphur melters

PhosAgro is the biggest manufacturer of phosphate-based fertilizers in Europe. The largest site is the chemical cluster in Cherepovets, Russia, where sulphuric acid is produced locally from elementary sulphur.

By Patrik Kolmodin, Product Line Manager Agitators, Sulzer

Two new sulphur melters were added to the PhosAgro plant during a recent expansion project. It was essential to use agitators to manage heat transfer in the melters to ensure the plant's capacity.

The challenge

Both melters were designed with six steam heating coils, and heat transfer was essential to achieve the required melting capacity. The design temperature for the melted sulphur was 130°C. A proposed agitator had a 200 kW motor with three impellers, where the lower one was a pitch blade turbine. The main challenges were:

- High heat transfer requirement
- Heavy-duty application
- Corrosive environment in the gas phase
- Large ambient temperature range between -47°C and +40°C

The solution

Sulzer calculated that a motor capacity of 132 kW would be enough instead of 200 kW. This could be achieved with a Scaba agitator and high-efficiency SHP propellers on two levels. Computational fluid dynamics (CFD) analysis proved that the propellers were correctly positioned and that no pitch blade turbine was needed.

Because the agitators operate with a variable frequency drive (VFD), the decision was made to install a 200 kW motor but to operate it at 132 kW. The additional power is only a reserve for extremely cold conditions, and the normal operating speed is a maximum of 132 kW. This gives extra safety but still substantial energy savings.

Product data

The Scaba agitators are engineered for heavy-duty operation at a high

operating temperature. Their design comprises a rigid mechanical construction, strong bearing frame and an industrial Nord gearbox. The shaft is a solid 240 mm shaft made of carbon steel, with a stainless steel lining. To withstand the great ambient temperature range, a gearbox with double heaters for extremely cold days and a cooler for hot conditions was selected.

The gas phase can be aggressive, and all in-tank parts above the surface were therefore made of Alloy 904L with an additional rubber lining. Alloy 904L is a highly alloyed austenitic stainless steel, based upon 20% chromium and 25% nickel content. It was specifically developed for use in applications containing dilute sulphuric acid.

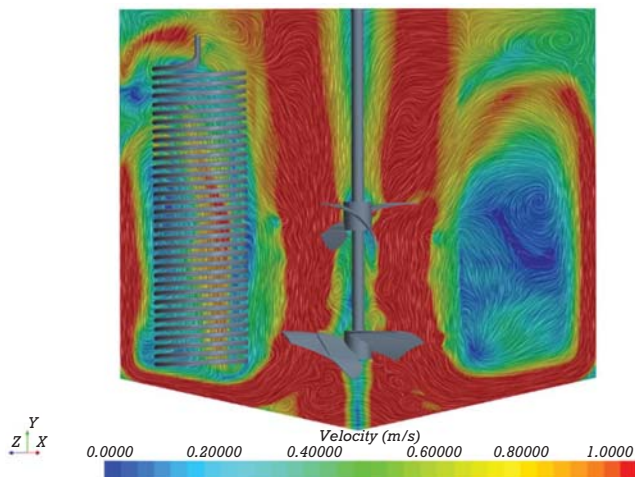


Scaba 240FVPT-Sff agitator operates smoothly at the PhosAgro Cherepovets site in Russia.

Customer benefit

- Engineered agitator of heavy-duty design
- Great energy savings thanks to high-efficiency hydraulics and accurate design system
- Smooth operation with very low vibrations
- Designed to withstand the local weather conditions with extremely low and high temperatures
- Quick and easy installation, safe operation, easy maintenance and service

Sulzer's prediction of the agitation level proved to be correct, and the two Scaba agitators save a significant amount of energy. The agitators are of heavy-duty design, and it is impressive to see these large units operate so smoothly with very low vibration levels.



Performance was evaluated with a CFD analysis that confirmed the specifications.