

Pumps keep mines dry – Increased efficiency and safety in mine water management

Pumps play a critical role in all mining operations and are, therefore, among the most important equipment in a mine. In this article, Mikael Hjelm, globally responsible for business development in mine water management at Sulzer, explains why.



When a mine is established, the pump system is designed based on the volumes and quality of the water that will be handled, the expected service life of the mine as well as its size and depth. The service life of the mine determines whether temporary or permanent pump solutions are chosen.

Mikael Hjelm

Water enters mines from different directions as rain, meltwater, or groundwater. The operation of a mine also requires that water is supplied to various processes.

“Large volumes of water must be transported to and from several processes in a mine. If the pumps stop, the mine will flood, so it is critical for the continuous operation of a mine that the pumps are working as they should. The most important task of the pumps is to keep the mine dry,” says Mikael Hjelm, who has more than 30 years’ experience of pumping solutions for mining.

In an underground mine, there can be hundreds of pumps in different applications, for example drainage pumps, process pumps or high-pressure

pumps. Drainage pumps are often used to transport water from the mining and blasting area via various sumps to the mine's main sump that is generally located at the lowest point of the mine. From there, the water is pumped with large drainage pumps to the mine's main pumping station. There, multi-stage high-pressure pumps are used to transport the water in one or more steps to the ground level. In very deep mines, high-pressure pumps are used, often horizontal multi-stage pumps.

In less deep mines, end-suction process pumps can be employed, either as single units or arranged in series to reach higher heads. The pump type for such an application depends very much on the quality of the water that is pumped – whether it is clean or contains solids. Multi-stage pumps are often the preferred choice when the water is clean, and end-suction process pumps are selected when the water contains solids.

In opencast mines, a combination of different technologies for water transport is used, ranging from drainage or process pumps to high-pressure multi-stage pumps or other technologies, much depending on the flow and head required as well as on the consistency of the liquid.

Pumps, mixers, and agitators are needed in many processes and applications in a mine, and Sulzer can offer a wide range of suitable products and solutions.

The pump technologies are relatively similar to the ones used 30 years ago, but as mines become deeper to find more ore, the pumping heads grow. Deeper mines also place greater demands on the management of the water flow in the mines, and safety aspects have become very important.

For the time being, the metal recycling industry is growing. Valuable materials are recycled from domestic appliances and mobile phones, e.g., copper, tin, silver, gold, iron, zinc, and palladium. The recycled metals are of “finished quality” and do not require the processing steps of conventional mining.

Today, the focus is on sustainability and energy costs. Higher efficiencies, a longer service life, and improved material technology are called for. In mine water management, requirements are imposed on efficient management and resource utilization, on water purification processes, and on reuse. The ever-deeper mines also require higher pump capacities than in earlier days.

“Modern pumps are often designed to reach high pressure heads. A good example is Sulzer's latest launch in this field, the XJ 900, a 90-kW drainage pump that can manage a pressure head of more than 200 m. We also



XJ 900 high-capacity dewatering pump

have multi-stage pumps that can handle a head of almost 2'000 m. The innovative design of the XJ 900's hydraulics enables two pumps in one. No time-consuming or costly replacement of impellers and diffusers is required to convert a high-volume pump to a high-pressure pump and vice versa. The XJ 900 can be converted with a few simple steps, quickly and smoothly,” Mikael Hjelm states.

The digitalization and automation of mines also affect pump companies. Sulzer follows developments closely and can provide several different solutions for the remote monitoring and controlling of pumps. In that area, Sulzer offers one of the most sophisticated solutions on the market with the built-in AquaTronic unit that integrates electronic intelligence into drainage pumps. It ensures correct motor rotation by automatically adjusting for wrong phase order.



XJ pump with AquaTronic



The unit also protects the motor by stopping the pump in case of overcurrent, overheating, low or high voltage, or a missing phase. In addition to this, AquaTronic is equipped with a diagnostics program that shows how the pump has been working, and faults can be easily diagnosed.

A further development is Sulzer Sense, a wireless condition monitoring system that is easy to apply and use on both new and existing equipment. Customers can easily connect a large number of pumps to a network that gives the operator the opportunity to track the condition of the product, view the equipment trend data, access the latest technical product documentation, and identify spare parts. This information is easily accessible on a computer or a mobile app.

“We need to adapt to new conditions. Mining companies are automating and digitalizing their mines and autonomizing most vehicles and equipment for increased efficiency, productivity, and safety. In the long run, the number of employees working down in the mines will decrease. Instead, the operation will be managed from control rooms at ground level. This is where we can help companies with digital solutions to control and monitor their equipment,” Mikael Hjelm wraps up.

Read more <https://www.sulzer.com/en/shared/applications/mine-water-management>

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