

A Xylem dewatering solution is going strong at an Alliance coal mine six years after installation

THE EFFICIENT WATER MANAGEMENT SYSTEM OVERCOMES SOLID-LADEN MINE WATER AND A LOW ROOF HEIGHT

Challenge

Alliance Resource Partners, L.P. faced a two-pronged water challenge at one of its many underground mines. At the South Mine of the company's Gibson County Coal in Indiana, solid-laden water needed to be pumped out of the mine, and a dewatering system needed to be installed in an area with limited space. Multiple pumps had to fit into a mine void less than eight feet high with a narrow, 20-foot entry span.

Moving mine water to the surface requires a pumping system able to withstand constant wear and tear for many years. What's more, this solution had to be able to filter and treat water so that it could be reused for washing contaminants from the coal product.

The right pumping system can reduce downtime, service and maintenance costs, and it can decrease utility costs by enabling onsite water reuse. Similarly, reliable dewatering pumps allow labor to focus on more productive tasks than "pump watch" or pump maintenance.

Alliance had brought Xylem on board a number of years earlier to design a dewatering solution for its North Mine, also located in Gibson County. This system was operating efficiently and reliably, supporting smooth operations on site, so the company turned to Xylem once again, this time for its South Mine.

Solution

Working closely with the Gibson County Coal team, Xylem designed and installed custom pump solutions throughout the construction of the South Mine.

"With these pumps in place, the mine was able to send 1,000 gallons of water per minute upwards with a vertical lift capability of 560 feet."

The first step of designing the dewatering solution was devising a way to move unwanted water a significant distance up from the underground mine sump to the mixing chamber on the surface, for solids removal and pH control.

The process began with numerous sumps designed by the Gibson County team, located at low spots throughout the mine to collect the raw water. Xylem installed a series of rugged but lightweight Flygt submersible pumps – ideal for the extreme conditions of underground coal mining, and approved by the Mine Safety and Health Administration for dewatering – to move the mine water from the small collection sumps to the main sump site.



Xylem developed a customized dewatering solution to support production ranging from three to seven million tons of medium-sulfur coal per year.

PROJECT HIGHLIGHTS:

- Designed and installed a dewatering system that fit multiple pumps into an area with limited space: a mine void less than eight feet high with a narrow 20-foot entry span.
- Devised a customized dewatering solution to support production ranging from three to seven million tons of medium-sulfur coal per year.
- Installed Goulds Water Technology vertical turbine pumps that move 1,000 gallons of water per minute up a vertical lift of 560 feet.
- Several years since installation, the solution's reliability and efficiency has stood the test of time, saving many man hours in pump supervision and maintenance.

SOLUTIONS:

- Goulds Water Technology seven-stage vertical turbine pumps (powered by 200hp motors and Randolph G200 right-angle drives)
- Goulds Water Technology single-stage vertical pump (powered by a 15hp hollow-shaft-motor with automated controls)
- Flygt 2610 MSHA-permissible mining duty submersible dewatering pumps (powered by 1.9hp motors)
- Flygt 2201 submersible pumps (powered by 58hp motors)
- Xylem-designed custom float barges, platform and catwalk
- 12-inch high-density polyethylene pipe

At this main collection site, Xylem installed two more pumps – seven-stage Goulds Water Technology short set vertical turbine pumps – that fit perfectly into the limited space.

“Our customized system incorporated Goulds Water Technology vertical turbines with 90-degree right angle drives and C-face, high-efficiency motors. This reduced both the installed height and the need to have an extra five to seven feet of excess vertical clearance for standard vertical hollow-shaft motors,” said Rod Lydle, Sales Engineer for Xylem.

The Goulds Water Technology vertical turbines also feature state-of-the-art 316 stainless steel cast impellers and vesconite bearings, enabling them to run maintenance-free for years in the tough mining environment.

With these pumps in place, the mine was able to send 1,000 gallons of water per minute upwards with a vertical lift capability of 560 feet. However, pumping the water to the surface was just one element of this water management project.

At the mixing chamber, the mine water was diluted by fresh water and transported by an additional vertical turbine pump, first to a fine refuse impoundment site for filtering impurities, then to a settlement pond for storage, and finally to the preparation plant for washing coal. At the settlement pond, Flygt submersible pumps floating on Xylem custom barges – designed to ensure that the pumps are always at the proper submerged level – ensure that the preparation plant receives clean washing water.

Result

Every mine has a different set of operating conditions. However, Xylem’s extensive product range, smart technology and unmatched application expertise enable our team to design specific solutions to effectively and efficiently move and manage water, whatever the issues.

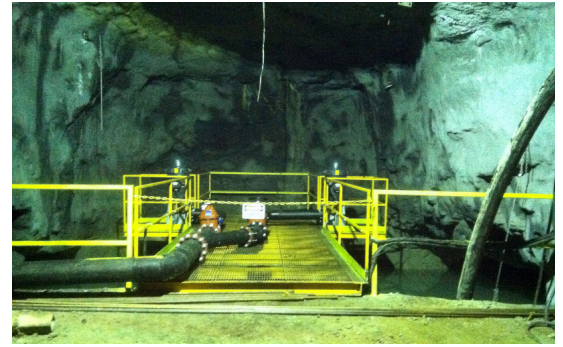
“Our South Mine is a busy, tough operating environment but the pumps have lived up to the challenge, saving many man hours in pump supervision and maintenance.”

In this case, Xylem engineers created a customized dewatering solution that met all the project parameters to support production ranging from three to seven million tons of medium-sulfur coal a year. Since the Goulds Water Technology vertical turbines were installed six years ago, they have pumped water reliably and efficiently, minimizing manpower hours needed to oversee their operation.

The system moves unwanted water from underground sumps to the surface, and transports the mine water through a series of steps to remove impurities so that it can be reused for cleaning the final coal product.

Xylem’s broad portfolio and extensive experience solved the challenges posed by underground mining operations, including limited space for pumps powerful enough to lift the water to the surface.

“The solution’s reliability and efficiency has stood the test of time. Our South Mine is a busy, tough operating environment, but the pumps have lived up to the challenge, saving many man hours in pump supervision and maintenance,” said Jay Emery, Engineering Manager for Gibson County Coal.



The dewatering system designed by Xylem incorporates Goulds Water Technology vertical turbines that move 1,000 gallons of water per minute up a vertical lift of 560 feet.



Seven-stage Goulds Water Technology short set vertical turbine pumps – with 90-degree right angle drives and C-face, high-efficiency motors – fit perfectly into the limited space. This reduced both the installed height and the need for an extra five to seven feet of vertical clearance that standard vertical hollow-shaft motors require.



Goulds Water Technology vertical turbine with automated controls on a Xylem-designed custom platform with catwalk supplying water to the preparation plant for washing coal.