Coal Mining **Case Study -** West Virgina, USA

Company Profile: Underground longwall coal mine located in the state of West Virginia, USA that produces 5-million cubic tons of coal annually. The mined coal is used to supply a coal fired power plant that produces critical electricity to the Northeastern United States.

Industry: Coal Mining

Product Produced: Coal

The Story

An underground coal mine in West Virginia USA like many mines, has a challenge dealing with groundwater infiltration. This mine averages 10-gallons of water infiltration per minute, which if not managed will lead to production and safety issues from accumulating water at the cutting face, roadways, and other low-lying areas.

Compounding the ground water infiltration is the use of lake water from the surface, which is pumped down into the mine and used for coal dust suppression. Coal dust suppression is critical to maintaining safe air quality in the mine, and reducing the opportunity for explosions. When water and coal dust combine, the mixture creates a slurry that needs to be removed. The coal slurry is pumped back onto the belt with air-operated double diaphragms pumps (AODD) and removed from the mine on the belt. AODD pumps are also used to empty mine tailing sumps and for groundwater.

The Challenge

Pumping abrasive and acid coal slurries and acid mine water is challenging for many pumping technologies. The incumbent pumps used were primarily ARO® branded PD20 2” heavy cast iron ball valve AODD units. The ARO ball valve units struggled to consistently pump the acidic water and coal slurry, and on average ran for less than a week prior to needing service due to a wide area of failure modes per the customer. The most common failures were clogging, valve ball wear, housing degradation and diaphragm failure. The water in the mine was also mineral rich and created a buildup on the metallic pump leading to reduced performance and failures. Each repair when the pump came out of the mine averaged $700.00 USD per failure.

The ARO® pumps are also very heavy at 147.4 lbs.(66.9 kg), and not ergonomically designed (no handles or carry points) making pump mobility taxing on the miners. In some cases, they need to place the pumps on their backs and take them back into the mine long distances. With varying ceiling heights, pump mobility can be very cumbersome and difficult leading to safety concerns. The mine was facing costly pump safety and reliability issues and was in search of a better solution.

“ I CAN REALLY SEE THE VALUE OF THE CLEAN OUT CAPS. WE CARRY BASIC TOOLS UNDERGROUND, AND CAN EASILY REMOVE THE CAP TO INSPECT THE PUMP OR REMOVE ANY BLOCKAGES WITHOUT HAVING TO TAKE THE PUMP BACK TO THE WORK SHOP”
-GENERAL MINE FORMAN

Requirements

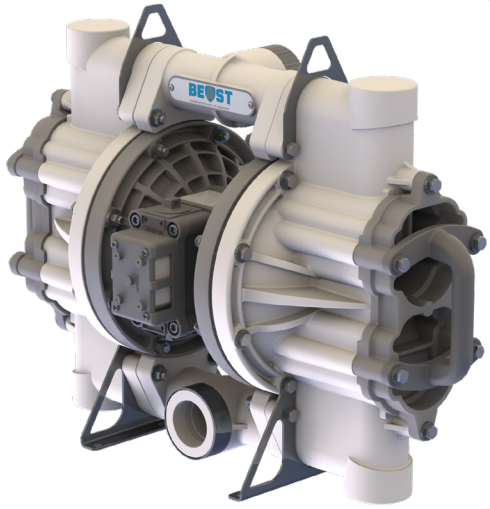
- Pump to handle solids and abrasive slurries
- Chemical resistance to acidic low PH mine water
- Pump that is easily portable
- Enhanced pump reliability / Reduced repair cost and frequency
- Pump body material that is less prone to excessive mineral buildup

Solution Overview

The customer met with the local authorized Sandpiper pump distributor to discuss alternatives. From that meeting it was determined that a "BEAST" 2" Polypropylene solids handling flap valve unit would be the best option to exceed the customers requirements. A Sandpiper pump unit was given to the General Mine Forman for his team to try in various mine dewatering allocations such as belt-head slurry transfer, and general localized mine dewatering. The "BEAST" 2" Polypropylene flap valve pump delivered the following solutions for the customer based on their feedback of over 4 months in operation:

Extended Reliability: From <7 days to now over 4-months and counting without any product failures.

- **Easily Portability:** Addition of ergonomic carry handles, and the lightweight design at 57.0 lbs. (26 kg.) for ease of mobility.
- **Solids and Slurry Handling:** The top suction bottom discharge flap valve design eliminated the issues with clogging when pumping chunks of coal and coal slurries.
- **Abrasion Resistant:** Stainless steel flap valves and seats resist abrasion from coal slurry unlike ball valve units.



- **Chemical resistant:** Polypropylene pump housing provide excellent chemical resistance against the acidic mine water.
- **Reduced Mineral Buildup:** Smooth Polypropene castings resist mineral buildup compared to metallic units with rough housings.
- **Ease of Maintenance:** Fluid clean out caps make removing clogs and maintenance simple and quick.

For additional information please contact Warren Rupp, Inc

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