Peristaltic Pumps Offer Protection in Mining Operations

This design overcomes the challenges of exploring and extracting valuable resources.

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The challenges to creating a successful mining operation—whether digging for gold, cement, coal, petroleum products or salt—are both daunting and numerous. Specifically, the technological challenges run a wide gamut:

- *Material handling:* This requires reliable and highly efficient equipment that needs minimal maintenance and can operate in production areas that require frequent blasting to free ore.
- *Processing:* Equipment must deal with crushing and grinding rock, as well as the leaching and flotation of complex or difficult-to-treat ores.
- *Environmental issues/waste management:* Mine operators must have systems that will adequately handle and remove tailings, waste rocks and leach piles. They must also control acid drainage and heavy-metal releases to prevent damage to surrounding freshwater and groundwater supplies.
- *Water management:* Operators have been working to identify sources of water supply during the extraction process to avoid competing with other industries (such as agriculture and manufacturing) for this precious resource. One alternative is using saline water that comes from the ocean or underground sources. Saline water, however, can mean a high wear rate on equipment.
- *Safety:* Only equipment certified for use in explosive atmospheres and with potentially hazardous products can be reliably and safely used in mining operations.

Mine operators should consider positive displacement peristaltic (hose) pumps as a way to defeat the challenges inherent in the exploration and extraction of the world's most valuable and important mined commodities.

The Big Squeeze

The operational characteristics of peristaltic pumps have remained basically unchanged for nearly 140 years. The pump's operation uses alternating contraction and relaxation of the hose, produced by the turning of a rotor outfitted with rollers, also called shoes.

The flexible hose has smooth walls. It is attached to the pump casing and as the shoes compress it, the fluid moves through the hose. As the hose returns to its resting shape following the squeeze by the shoes, it creates an almost full vacuum that is able to draw the next amount of fluid into the pump casing through the inlet piping.

Figure 1. An example of an advanced peristaltic pump shows a seal-free design that eliminates leaks and product contamination, which enables it to handle some of the toughest pumping applications in the mining industry. (Graphics courtesy of Abaque, part of PSG)

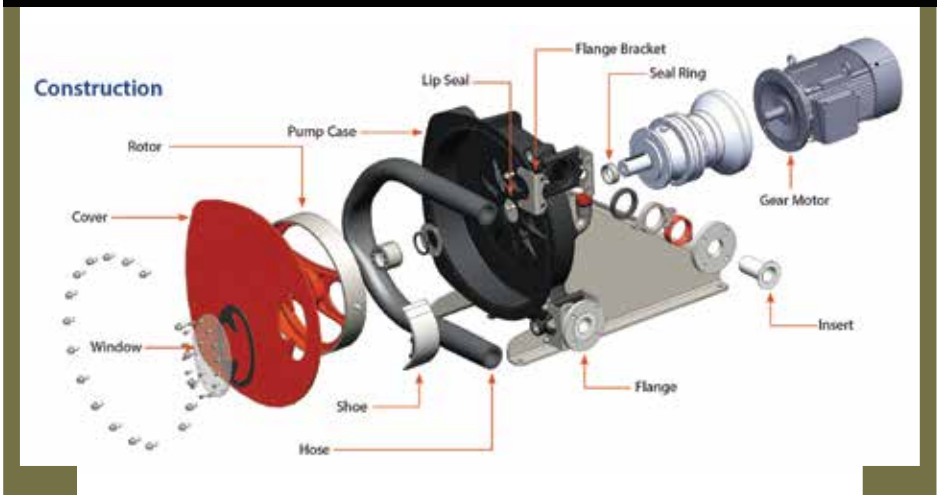
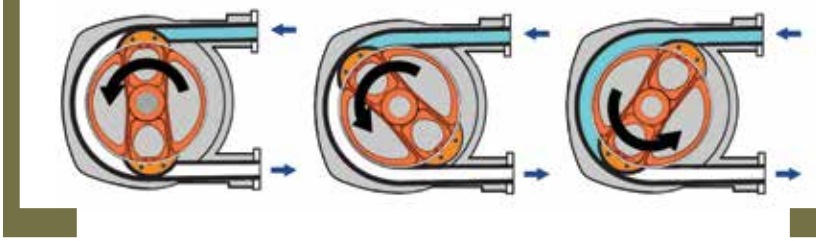


Figure 2. The design and operation of peristaltic pumps enable them to deliver a constant rate of fluid displacement and maintain high volumetric consistency, even after millions of pumping cycles.



The shoes and hose are protected by a lubricant that cools the pump casing, eliminating any temperature spikes that could be damaging.

The design and operation of peristaltic pumps enable them to deliver a constant rate of fluid displacement and maintain high volumetric consistency, even after millions of pumping cycles. Other operational characteristics include the ability to run dry for extended periods, self-prime, handle small solids and abrasives, and offer low-slip product flow. Peristaltic pumps are also seal-free, which eliminates any leak or cross-contamination points.

These operational features make peristaltic pumps ideal for mining operations that require the transfer of abrasive or viscous slurries and the handling of fluids that contain large pieces of particulate matter, such as rocks or pebbles. The pump's simple method of operation and ability to remain volumetrically consistent enable it to be used in 24/7 operating cycles, which are common in mining operations. Most peristaltic pump models are equipped with reversible-operation capabilities, which provide the versatility to pump in both directions. ATmosphères EXplosibles (ATEX)-certified and Conformité Européenne (CE)-certified models are regulated for use in potentially explosive or hazardous atmospheres.

There have been significant upgrades in the type of hose materials used. These have been critical innovations because the hose is the only component that comes in contact with the pumped medium. By choosing the proper hose material, mine operators can safely pump a wide range of fluids without the threat of leaks or spills.

Next-generation hose types can cut down on "hose fatigue" that can result in failures. Hose materials that are incompatible with certain chemical compounds, susceptible to cracks during operation or prone to rupture when handling particle-laden fluids should not be used. Hose materials that can eliminate leakage concerns include:

- *Natural rubber:* Ideal for use with diluted acids and alcohols, with excellent abrasion resistance
- *Ethylene propylene diene monomer:* Possesses a high chemical resistance to concentrated acids, alcohols and ketones
- *Hypalon:* Strongly resistant to chemicals, temperature extremes and ultraviolet light
- *Buna-N:* Highly wear resistant to oil products ■

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