

Doubling the hose: slurry pipeline pumps



Image caption: Figure 1: Four sets of double hose–diaphragm tailings pumps; Figure 2: Multisafe double hose–diaphragm pump in quintuplex design with an overall diagnostic system maximum flow rate of 1,000 cubic meters per hour.

Today, slurry pipeline systems often operate at much higher solid concentrations than previous installations. This results in high demands on the mechanical equipment, including positive displacement pumps.

Hydraulically activated double hose–diaphragm pumps offer decisive advantages over traditional diaphragm pumps. At the heart of this pump are two hose diaphragms that are arranged one inside the other.

The two diaphragms fully enclose the slurry and ensure redundant, hermetical sealing between the wet and drive end. Both hose diaphragms are activated by the piston by means of hydraulic fluid. In step with the piston stroke, they are subject to pulsating action, comparable with that of a human vein. The cylindrical shape of the diaphragm favours the flow behavior and avoids the settling of solids.

One of the distinct advantages of this design is its linear flow path. This makes it especially conducive to the handling of aggressive and abrasive solids carrying fluids and slurries, even at high viscosity. The pump offers unique operating reliability. Even in the event that one of the hose diaphragms leaks or fails, the second hose diaphragm will ensure that the product will not come into contact with the pump casing, and that pump operation can be maintained until the next planned shutdown of the unit.

For high-flow rates, highest efficiency and lowest irregularity is achieved by means of single-acting five-cylinder pumps (see Figure 2). Quintuplex configuration not only allows for uniformities comparable with that of centrifugal pumps, but also contributes to a reduction of valve wear and life-cycle costs to an extent that has not been feasible thus far. Even without pulsation dampeners, residual pulsation is reduced to 5.1 per cent p to p (versus 23 per cent of single-acting three-cylinder pumps, and 32.5 per cent of single-acting four-cylinder pumps).

For additional back-up of fail-safe characteristics, Multisafe pumps utilize an overall diagnostic system for permanent condition monitoring of essential components and parameters (see Figure 2).

With slurry pipelines, inevitable variations of the dry solid contents play a decisive role. They not only influence the thickness of the product, but likewise result in fluctuations of the working pressure. Redundancy of pulsation dampening equipment with Multisafe quintuplex configuration is advantageous. This is because the negating of manually or automatically operated dampening devices is a great benefit, as they are usually mandatorily employed when operating at variable discharge pressures.

In recognition of outstanding benefits of Multisafe double hose-diaphragm pumps, Feluwa has recently been awarded the contract for the supply of three sets of quintuplex pumps for tailings disposal at Baja's prestigious Boleo mining project, located in Baja California Sur, Mexico. Each of these pumps is specified to handle 750 cubic metres per hour at a pressure of about 53 bar along a slurry pipeline of 6km. Seawater is used as carrier fluid, which requires the use of corrosion resistant materials.



Appeared in issue:  Pipelines International — September 2011