

The case for AODD pumps in filter-press



AODD pumps are a popular choice in filter-press systems because they offer reliable high-pressure operation and product containment, while being safe and easy to maintain. They are also capable of handling a wide range of slurries and chemicals that are a staple of the process.

The water and wastewater industries often make use of pumps in order to send slurry to a filter press for the separation of solids and liquids. Traditionally, either piston diaphragm pumps, hose piston pumps, or progressive cavity pumps have been used for this role. Peter Schüten, the Sales Director for PSG/Almatec in Germany, delves into another type of positive displacement pump that is being used: the air-operated double diaphragm pump.

Peter Schüten, Sales Director, Germany, PSG/Almatec

The first filter presses were invented in the 1850's in Great Britain and were tasked for use in the process of separating seed oils. It wasn't until the 1950's, however, that the technology fully matured and became a viable and reliable choice in a number of industries. One that has welcomed the filter press as a key component in its various operations are the water and wastewater industries.

The filter press is ideal for water and wastewater industry applications because of the large amount of separation of solids and liquids that are required to take place. In general, a slurry that combines both solid and liquid components must be separated. As the slurry is introduced to the filter press, two chambers are filled with the resulting formation of thick slurry "cakes." As the chambers fill, the pressure inside

the filter-press system increases and when the chambers reach capacity, the liquid is filtered out with the aid of streams of compressed air or water in a process known as "dewatering," leaving behind solid slurry or sludge cakes for disposal. One of the major advantages of this process is that instead of having to dispose of large amounts of wet slurry, the user ends up with a flow of neutralized water and

ess systems



compatible with the many abrasive or corrosive fluids

The challenge with pumps in filter press applications

Because of their method of operation—high-pressure injection of slurries into chambers that form cakes while the remaining liquid drips through filter clothes—filter presses require good filtration and pressure-producing and -handling capabilities. The pressure in the system must be constant, so that the flakes that form the slurry cakes are not destroyed. This means that anywhere between eight and 15 bar (116 and 218 psi) of pressure are generally necessary.

This level of pressure can be generated in different ways, most commonly through the use of a positive displacement (PD) pump. One common PD pump technology used in filter-press applications is the piston diaphragm pump. The pump's operation, however, has some inefficiencies in filter-press applications. Mainly, they can be very expensive as they are typically electrically actuated, while their membranes are hydraulically actuated. So, they will always require the presence of an air-pressure vessel, which is needed to ensure that the slurry's flow rate is equalized, and the use of a maximum pressure switch.

A second popular PD-technology choice is the progressive cavity pump. Again, progressive cavity pumps require electronically controlled engines, or a cyclic system in which an air-pressure vessel is used to "load" the pump. Progressive cavity pumps perform well where there are very large quantities of sludge, but in small to medium-size systems, they are limited due to their high sensitivity to abrasion and dry-running.

To some extent, hose piston pumps, which operate similarly to piston diaphragm pumps, are used, but instead of membranes, the slurry flows through hoses. Hose piston pumps are also electrically actuated and require

high amounts of maintenance due to the frequent need for hose replacement. Their operation also creates high amounts of pulsation within the pumped fluid.

The types of ancillary liquids that need to be pumped, for example, as a way to neutralize the sludges, during a filter-press operation must also be considered. In many cases, these liquids—which can include milk of lime, which can be very abrasive, and various types of alkalines—cannot be released into the environment, which necessitates the need for a reliably leak-free pumping technology.

The solution: AODD pumps

While other PD-pump technologies have shortcomings when used in filter-press applications, the AODD pump does not come with such concerns. The design of the AODD pump does not require electricity, with its operation carried out through the use of standard compressed air. Special high-pressure AODD pump models build up a delivery pressure of 15 bar (218 psi), needed for many filter-press applications. Using a high-density polyethylene construction, which is seven times more resistant to abrasion than polypropylene and more resistant to wear than iron, aluminum and steel, the pumps are compatible with the wide array of chemical formulations used in water and wastewater treatment processes.



AODD pumps offer a solution to challenging filter press applications, particularly in the water and wastewater industries.

a comparatively small amount of filter cake, which noticeably reduces disposal costs.

A key piece of equipment in the filter-press process is the pump that sends the particulate-laden slurry into the filter press. For many years, positive displacement pump technologies like the piston diaphragm pump, hose piston pump, and progressive cavity pump were used for slurry transfer. However, this article will illustrate that there is another type of positive displacement pump technology—air-operated double-diaphragm, or AODD—that has been proven to outperform competitive technologies in water and wastewater filter-press applications.



Air-operated diaphragm pumps have a number of characteristic advantages for filter-press feeding. Conventional positive displacement pumps with electric drive and control elements do not have these properties, which are specific to the design of AODD pumps, and which include run-dry capability, good controllability and a gasket-less mechanical design, to mention a few. Operating against closed discharge is also possible. There are no drives, no rotating parts and no rotary shaft seals. The compressible drive medium permits gentle delivery with attenuated pressure peaks. Start-up is simple and the space required is considerably less than in the case of piston-actuated diaphragm pumps or eccentric screw pumps.

AODD pumps in high-pressure design can be ideally combined with filter presses, as their automatic pressure/volume adjustment clearly indicates. At the beginning of the filtering process, the low filter resistance

causes delivery of a large volume, so that the empty filter press is rapidly filled. The rising fill level causes the volume to reduce automatically until the required standstill is reached (where it equals volume zero) at the maximum permitted pressure without any control elements or safety elements protecting against dry-running and excessive pressure or speed control. Unlike mechanically driven diaphragm pumps, at this stage the AH Series pumps stop and do not consume any further energy. This built-in control feature permits operation over the complete range of delivery

volumes without any risk of excess pressure developing.

The water and wastewater industry is a global one that affects the lives and well-being of the world's residents on a daily basis. The filter press has been a great friend to the industry as it provides the best way to separate solid-laden liquids during the dewatering process. But a filter press only operates at its best when the components used to deliver the slurry are the most efficient and reliable. While other pumping technologies have been tried, the clear winner in optimizing filter-press applications is the AODD pump.

About the author

Peter Schüten is the Sales Director for Almatec, a manufacturer of air-operated double-diaphragm (AODD) pumps. Almatec, which is based in Kamp-Lintfort, Germany, is an operating company within Dover Corporation's Pump Solutions Group (PSG). Schüten earned a mechanical engineering degree from the Duisburg University in Germany. He has been working within the pump industry for more than 12 years, and has held various positions within the PSG company during those years.



Peter Schüten Sales Director, Germany, PSG/Almatec