Sealing the Deal

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Sealless sliding vane pumps eliminate the multiple fluid-handling issues that can hamper manufacturing operations.

The ultimate dream of a facility manager at any manufacturing plant is to install a piece of equipment and then—except for instances of planned maintenance or for a performance review—forget about it. Unfortunately, when considering the pumps that may be used in manufacturing operations, too many times that dream can turn into a nightmare of malfunctioning or inefficiently operating equipment, product leakage, excessive downtime, safety concerns and headache after headache for a plant manager.

Above: Sealless sliding vane pump transferring polymer dispersions

Right: Sealless sliding vane pumps on an MDI isocyanate transfer

Consider the following examples:

- A chemical manufacturer was using progressive cavity pumps for the transfer of polymer dispersions that are used in the production of polymers found in synthetic plastics and elastomers. The efficiency and safety of the operation, which was occurring in an ATEX atmosphere, was constantly hampered by seal leaks on the progressing cavity pumps, as well as damage to the pump's stators that was occurring during accidental dry-running of the pump.
- A mag-drive internal gear pump was chosen by a manufacturer to transfer methylene diphenyl diisocyanate (MDI), which is used as a reactant with polyols during the manufacture of polyurethane. The pump needed to run non-stop, 24 hours per day, seven days per week at a rate of 1,000 rpm. These operational parameters proved to be too much for the mag-drive gear pump to handle as it was susceptible to clogging by the MDI, frequent breakdowns, excessive maintenance costs, high energy consumption and flow rates that would fluctuate in relation to the viscosity of the MDI.

When this happens, facility managers can struggle to identify a solution that can eliminate these untenable operating conditions. Fortunately, an available pump technology offers the field experience, reliability and ease of maintenance to put an end to these operational nightmares.

Sliding into Sealless

Positive displacement sliding vane pump technology or, more specifically, sealless sliding vane pump technology is the solution. In general, sliding vane pumps meet a manufacturing plant's needs in the types of applications mentioned above because of their mechanically and energy-efficient operation that is a result of the pump's self-adjusting vane design. This design, which has been tested and proven in the field for more than a century, guarantees a fixed displacement volume with minimal variances in pressure. Sliding vane pumps also provide the ability to handle thin liquids at high pressures, dry-run capabilities, wear compensation, low shear, smooth flow, easy maintenance and like-new performance during the life of the pump.

Sealless sliding vane pumps feature all these benefits and then take them to the next level. The new generation of sealless sliding vane pumps does not incorporate a traditional magnetic drive into their operation, but these pumps still deliver leak-free performance without the need of magnets, mechanical seals or packing.

In place of magnets, sealless sliding vane pumps use an innovative double-bellows design that houses an

Sealless sliding vane pump cover

The vanes of the sealless sliding vane pump

eccentric shaft. This design results in improved pump-shaft sealing since the shaft-sealing system does not need to be cooled separately from the pump's operation. Additionally, many shaft-sealing solutions can generate heat and are able to dry-run for only short periods of time.

In the design of the sealless sliding vane pump, the shaft is rotated by a crank system that moves the stainless-steel bellows in a circular motion. This is crucial in enabling the pump to meet its shaft-sealing needs and maximizes its operational capabilities. For instance, the sealless design forces the pump's entire flow rate to cross the pump's drive chamber, meaning that the shaft does not require any additional cooling fluid and that the flow rate is maintained at required levels. Also, sealless drive pumps have individual means of lubrication that reduce occurrences of energy- and efficiency-robbing friction. Finally, in common applications, sealless sliding vane pumps do not require any type of power monitoring, though the pumps can be outfitted with a temperature sensor for use in harsher operating conditions.

Applying Solutions

Looking back at the previously mentioned operational examples, the existing cavity and internal-gear pump technologies were replaced with sealless sliding vane pumps, and improved results were experienced immediately.

In the first situation, the sealless pump solved the leakage issues that were being experienced by the progressive cavity pump, while the pump's ability to run dry for up to 10 minutes protected the stators, even in an ATEX atmosphere.

In the second instance, the sealless pump solved the clogging, maintenance, energy consumption and flow-rate issues that were dogging the gear pumps that were in use. Additionally, an inspection of the pump after 3,200 hours of operation (190 million rotations) revealed that the sealless drive was still in perfect condition and that vane wear was just 15 percent of the maximum allowable wear rate. This translated into a potential vane lifespan of more than 21,000 hours, or 1.2 billion rotations. In addition, compared to the gear pump, which required complete replacement of wear parts (rotor and idler gear) in the workshop, sealless pump vane replacement can be performed onsite without removing the pump from piping.

Since its invention in 1899, sliding vane pump technology has been proven as the best, most efficient way to move fluids in a wide array of manufacturing applications. The reputation that sliding vane technology has in the marketplace has only been enhanced by the development of the new generation of sealless sliding vane pumps. Incorporating these pumps into fluid-handling applications has already been proven to eliminate the operational difficulties that can drain so much time, energy and capital from manufacturing facilities, while also resulting in a decreased frustration level for facility managers.

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