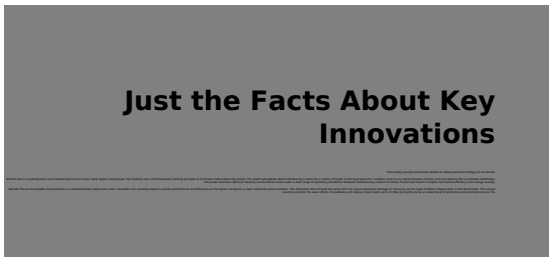
How the Right Pump Brings Efficiency and Much Greater Energy Savings

The latest design advancements in sliding vane positive displacement pump technology can reduce energy consumption while optimizing performance. Here's a review of what's possible

By Bill Bohr



In today's competitive marketplace, all companies, regardless of their business, are concerned about the bottom line. Around the world, energy costs continue to rise as demand increases for greater profitability through cost controls. In other words, the reduction of energy consumption is a key component in controlling costs. Higher energy costs impact the bottom line of every company, particularly processing operations where in the manufacturing sector pumps represent 27 percent of the electricity used by industrial systems.

Pumping systems are a major energy consumer and a vital necessity to every plant's operation. A wealth of advice on saving energy through proper pump selection and improving pumping systems is available through the Department of Energy's Industrial Technologies Program (ITP) and through the Hydraulic Institute's Pump Systems Matter initiative (www.pumpsystemsmatter.org). The energy-saving information provided by these two institutions is easy to understand and covers both centrifugal and positive displacement pumps. The major premise supported by each institution is that in order for operations to improve energy savings significantly, they must take a systems approach, shifting the focus from the performance of individual components to that of the entire system. This approach will enable operators to improve reliability, performance, and efficiency of their overall pumping system, which in turn results in not only greater energy savings but also higher productivity and optimized performance and profitability. This means utilizing the best technology (centrifugal or positive displacement), properly sized with the appropriate piping design and control valve configurations, to ensure the highest efficiency for the application.

Although the operating principles of positive displacement and centrifugal pumps differ widely, both types can be used to serve the same applications in many cases. In these instances, certain positive displacement pumps may offer substantial opportunities in the effort to improve processes and productivity as well as

maintenance and energy cost savings. Positive displacement pumps generally require less NPSHA than centrifugal pumps, and they may offer more flexibility relative to dealing with varying changes in pressure and flow requirements of continuous-type processes. Also, positive displacement pumps maintain higher efficiencies throughout the viscosity range. Therefore, in the overlap where both types of pumps can operate, a positive displacement pump's high mechanical efficiency can offer improved energy savings.

But not all positive displacement pumps are created equal. There are significant differences between the varying positive displacement pump types, which include internal gear, external gear, lobe, one-screw, two-screw, three-screw, peristaltic, and sliding vane models.

In recent years, significant design advancements have given sliding vane technology a decisive advantage over other positive displacement pump types, specifically with regards to optimized performance, low-shear capability, lowest life-cycle cost, and energy efficiency.

By design, sliding vane pumps operate with high volumetric efficiency and low slippage, allowing application at substantially lower viscosity than other positive displacement pump types. Along with benefits such as quieter operation, longer service life, and reduced maintenance requirements, sliding vane technology may also result in significantly reduced energy consumption.

Perhaps one of the most important advantages of sliding vane pumps is the fact that their self-adjusting vanes automatically slide out of slots in the rotor to adjust continuously for wear and maintain near-original efficiency and capacity throughout the life of the pump. Gear, lobe, and screw-type pumps gradually diminish in efficiency as clearances increase due to the wear of the metal parts. As a result, there is increased "slip" and volumetric inconsistency. In order to compensate for the reduced performance, the pump speed needs to be increased, which not only further accelerates pump wear but also increases energy consumption. By eliminating the need to increase the pump speed over time, sliding vane pumps are inherent energy savers. According to the Hydraulic Institute's "Testing for Pumping System Efficiency Tip Sheet," a study of industrial facilities commissioned by the Department of Energy says a pump's efficiency can degrade as much as 10 percent to 25 percent before it is replaced. In addition, efficiencies of 50 percent to 60 percent are quite common. However, because these inefficiencies are not readily apparent, opportunities to save energy by repairing or replacing components and optimizing systems are often overlooked. With self-adjusting sliding vane technology, this energy-robbing problem is eliminated.

In conclusion, sliding vane technology not only reduces energy costs but also creates a more efficient pumping system. This leading-edge technology solves everything from seal, suction, product shear, and volumetric efficiency problems to offering unique benefits such as leak-free assurance, line stripping capabilities, metering and non-pulsating flow &#151 all while saving energy. The sliding vane principle offers efficiency at low flow rates and allows for higher operating speeds and pressures on low viscosity fluids compared to other types of positive displacement pumps. It's also capable of low flow, high head applications on low viscosity fluids where centrifugal pumps can't run. Other advantages are low initial equipment costs and easy installation and maintenance.

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