

Advent and Use of Motor-Speed Technology Makes Sliding Vane Pumps Even More Energy-Efficient



By Tom Stone, Director of Marketing

Thanks to the Energy Policy Act of 2005, which was signed into law by President Bush in August of that year, increased scrutiny has been placed on the manufacturing sector and its use—or, in some cases, misuse—of energy.

According to “Improving Pumping System Performance: A Sourcebook for Industry,” a joint effort between the U.S. Department of Energy’s Energy Efficiency and Renewable Energy (EERE) Program and The Hydraulic Institute, poor design and improper system operation are the root cause of inefficient, energy-wasting pumping systems.

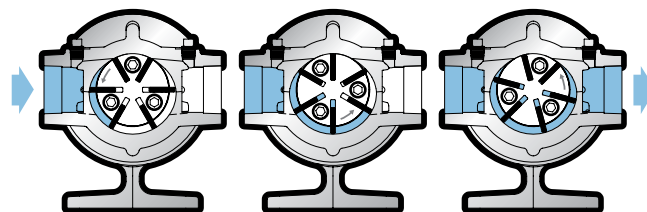
This inefficiency is critical when you realize that about 27% of all the energy consumed by motor-driven equipment in manufacturing facilities in this country is used to operate pumps, as noted by the “United States Industrial Electric Motor Systems Market Opportunities Assessment.” This means that any inefficiency in a pumping system, combined with the large amount of energy used by the system, will only exacerbate what has the potential to become a critical energy shortage in this country.

Realizing this, manufacturers of pumps and pumping systems have turned their attention to increasing the energy efficiency of their products. One particular type of pump—

positive-displacement sliding vane—has been proven to outperform the others (mostly gear and lobe) when it comes to increasing energy efficiency.

This is because the design of a sliding vane pump inherently makes it energy-efficient. Sliding vane pumps operate through the use of a number of vanes (Figure 1) that slide into or out of slots in the pump rotor when driven by the pump driver. As the rotor revolves, fluid enters

Figure 1 *The sliding vane principle*



the pumping chambers from the suction port. The fluid is then transported around the pump casing until it reaches the discharge port, where it is forced out into the discharge piping. This type of design guarantees fixed displacement volume with minimal pressure variance, meaning that energy-wasting slippage, cavitation and turbulence are

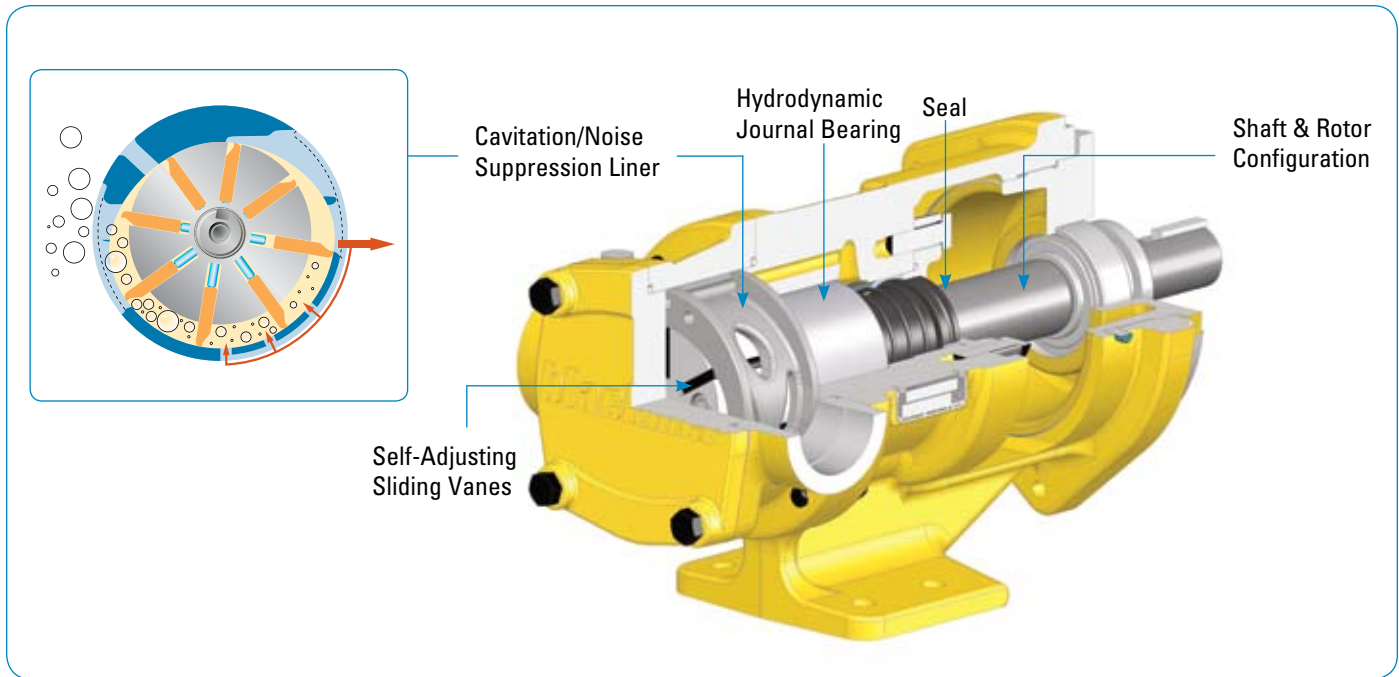


Figure 2

minimized, and high volumetric efficiency is maintained, all of which have a positive effect on energy costs and manufacturing efficiency.

Moving Ahead

While sliding vane remains the best choice for the increasingly energy-conscious manufacturer, recent advancements in sliding vane technology have moved it even farther ahead of the pack. If your goals are increases in efficiency, productivity and flexibility—and whose aren't—then an investment in sliding vane pumps with motor-speed technology can be the right choice.

One of the leading proponents of this advanced sliding vane technology is Grand Rapids, MI-based Blackmer®, which is now offering its line of ProVane® Motor Speed Vane Pumps to the manufacturing community. Due to their unique design, ProVane® pumps increase performance capabilities, offer longer service life and can be used in a wider range of process applications. Among their design benefits are:

Motor Speed Operation

The motor speed design enables operating speeds up to 3,600 rpm with capacities to 100 gpm while eliminating the need for a gear reducer, resulting in less complexity, lower upfront costs, and reduced energy usage, downtime and maintenance costs. Motor speed sliding vane pumps are capable of handling viscosities up to 5,000 SSU (1,100

cP), operating temperatures up to 240°F (115°C), working pressures to 350 psi (24.1 Bar) and differential pressures to 125 psi (8.6 Bar).

Compact Profile

Because of their design, motor speed sliding vane pumps require a smaller footprint than regular sliding vane models, allowing for greater mounting flexibility and installation within confined spaces.

Mechanical Seal

Motor speed sliding vane pumps are designed for use with a variety of commercially available sealing options to address specific application requirements. One requirement for only one mechanical seal significantly improves uptime reliability and reduces the potential leakage and loss.

Cavitation/Noise Suppression Liner

Cavitation is a physical barrier to efficiency that can severely impact a pump's performance as the liquid changes to a vapor inside the pump chamber. This effect decreases flow through the pump and can cause substantial damage to the pump as the vapor bubbles collapse back to the liquid state. Cracking and popping noises indicate cavitation, which can lead to expensive repairs if left uncorrected.

According to the Department of Energy Industrial Technologies Program's Sourcebook for Industry, the effects

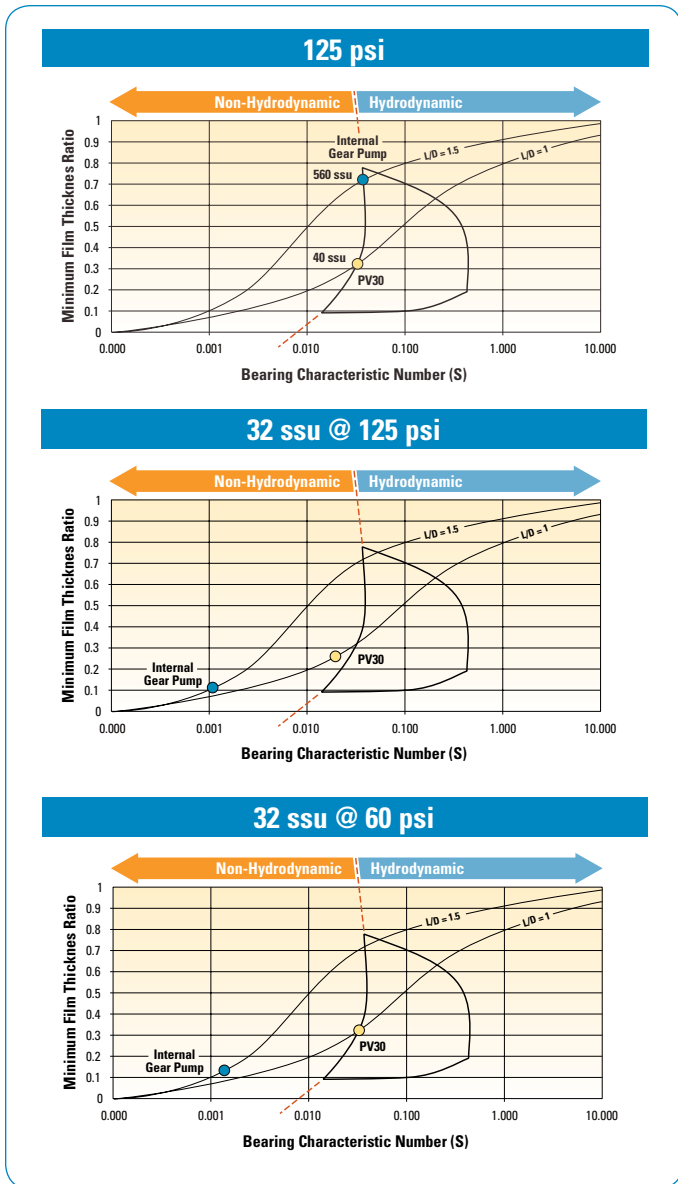


Figure 3

of cavitation include increased maintenance costs, slip, capacity loss as well as poor system performance. Centrifugal pumps are susceptible to these factors as well as “internal recirculation,” a performance-degrading-effect that occurs at low flow rates, which can damage the impeller and rotor.

Unique to vane technology, a Cavitation Suppression Liner minimizes the pump’s wear effects and noise associated with cavitation. This patented solution helps to reduce the potential for slip and capacity loss, ensuring the highest level of efficiency and energy savings.

Hydrodynamic Journal Bearing

The Hydrodynamic Journal Bearing feature designed in the ProVane Motor Speed Vane Pump is based on a unique fluid boundary forming principle that eliminates shaft-to-bearing contact to significantly improve overall pump efficiency and reliability.

The shaft hydroplanes above the bearing surface on a cushion of liquid. In this hydrodynamic condition there is no metal-to-metal contact or wear so bearing life is extended indefinitely (Figure 3). The pump maintains optimum bearing characteristics even under a wide range of operating conditions. Reduced shaft/bearing contact minimizes friction and results in higher mechanical efficiency and smart energy cost savings.

ProVane pumps are engineered to achieve hydrodynamic mode (full film operation—the point offering the lowest bearing friction and least wear) faster than any other pump in its class to preserve bearing life.

Ease of Maintenance

In addition to its energy-efficient design, Sliding Vane pumps can be serviced with piping attached, allowing for quick and easy maintenance. If vanes become damaged, replacing them can be accomplished by simply removing the outboard head assembly, sliding out the old vanes, inserting new ones, and reinstalling the head (Figure 4). In a matter of minutes, the pump is back in operation. Simple vane replacement requires no special tools. An optional Relief Valve is also available to help protect the pump in a high-pressure buildup situation (Figure 5). Capable of holding pressure under variable flow and pressure conditions, the valve offers an additional level of protection for pump operation.



Figure 4

Conclusion

The ground-breaking, energy-efficient design of ProVane Motor Speed Vane Pumps make them a natural for Blackmer's Smart Energy Program. This program emphasizes the ability of Blackmer's positive-displacement pump lines to increase the energy efficiency of manufacturing plants where pump systems are in operation.

Simply put, motor speed sliding vane technology offers numerous advantages in the quest to reduce energy consumption and cost in these increasingly energy-conscious times without sacrificing performance, making them the perfect positive-displacement pump choice for applications that specify motor speed operation and a compact profile.

Questions can be addressed to Blackmer at (616) 241-1611. For more information regarding Blackmer's Smart Energy program, go to www.blackmer.com.

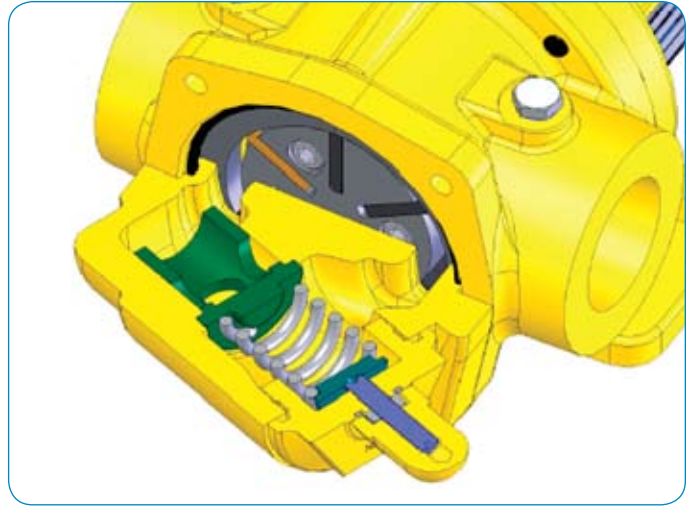


Figure 5



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