Protecting flushless mechanical seals in hostile environments
As our marketplace evolves, more and more companies recognize that growth demands change. Changes continue to occur in the process industry, including refining and chemical, as well as in most other markets we serve. Consolidation, one of the largest and most visible changes, continues to occur with customers, such as the Exxon-Mobil merger as well as numerous others.

Flowserve’s Flow Solutions Division (FSD), the leader in user alliances, recognizes the unusual challenges and unique requirements so common among customers during merger integration activities as well as during other transitions, especially as supply contracts and protocols are modified. Our alliance program is indicative of—and in direct response to—the user’s desire to focus on core production efforts while reducing their total cost of operation. The alliance process focuses on reducing total cost of ownership for the user by increasing the reliability of their equipment, minimizing inventory and improving resource utilization.

Users are also looking at asset management agreements for seals, valves and some pumps. This encompasses a wide range of activities, from simple repair contracts to agreements that encompass inventory management, equipment maintenance and new equipment supply.

Flowserve is committed to supporting our customers as they make this transition and, in fact, is leading the seal industry in this direction. With about 200 user alliance sites in place already, Flowserve has proven its capability to multiply equipment mean-time-between-failures from two- to five-fold, while reducing the customer’s overall investment in assets and maintenance activities. We’ve been doing this for more than 12 years, but have really seen the trend accelerate in the past few years.

FSD understands that meeting the unique demands of our growing customers requires more than leading-edge technology. It requires superior service that provides high-quality products locally. And it requires us to be the most responsive supplier in the industry. To ensure this, we maintain aggressive research and development programs, which have yielded over a dozen new products in the past few years.

Designs that incorporate high reliability, robustness and that result in lower inventory needs, such as the LS-300 Mechanical Seal, or our Synthetic Lubrication Device Seal Support System, reflect our commitment to innovation. Our development efforts have broadened from the original focus on pumps to innovative seals for all types of equipment. These include compressors, turbines, mixers and agitators, reactors, fans, blowers, filters and dryers, as well as many other types of specialty equipment.

Flowserve also has active projects that expand the tools we use to support alliances. These are focused on Web-based solutions that enhance existing reliability databases linked with diagnostic tools to insure massive amounts of data are turned into useful information.

To provide support locally while supplying fully engineered seals in less than 72 hours, Flowserve uses an extensive network of quick-response centers with integrated engineering and manufacturing capabilities. Flowserve’s major facilities are ISO 9000 accredited, and we pride ourselves on our continuous efforts to drive costs down below industry averages while providing high-quality products and services.

We hope this issue of Face to Face helps spell out Flowserve’s Flow Solutions Division commitment: To lead the mechanical seal industry into the 21st century by aligning ourselves with our customers’ ever-changing needs.

Tom Ferguson
Vice President, Sales, Marketing & Technology
Flowserve Flow Solutions Division
A unique, cartridge-based multiple dynamic lip seal design makes the LS-300 ideal for highly viscous applications in positive displacement and progressive cavity pumps.

The seal is designed to run dry without the need for an external flush or lubricating barrier fluid, which can contaminate or dilute the process media.

The seal’s preset cartridge design speeds installation and reduces the chance for installation error, and it’s easy to repair in the field.

Features/benefits...
- Preset cartridge helps eliminate seal setting errors.
- Triple-lip design effectively seals process from atmosphere.
- Lip material is designed for long dry running operation.
- Design is interchangeable between standard and universal bracket Viking pumps with just a gasket change.
- Standard barrier ports provide optional leak detection or an external fluid barrier when solidifying or polymerizing products are pumped.
- Optional repair kit complements ease of field repair.

Materials of construction...
- Gland sleeve, retaining plate and spacers are 316 stainless steel.
- Rotor sleeve surface is chrome oxide.
- Dynamic lips are reinforced PTFE (standard); food grade is optional.
- Elastomers: Fluoroelastomer, AFLAS, Perfluoroelastomers, PTFE Encapsulated Fluoroelastomer.

Operating parameters...
- Maximum pressure: up to 150 psig (10 bar)
- Temperature range: 65 F to 300 F (-53C to +149C)
- Maximum speed: 700 fpm dry (3.5 mps)
- Viscosity range: 400 to 60,000 SSU
- Shaft size from .075” to 2.953”

“"We use the LS-300 on a transfer pump for our chemical applications. It really does its job and was easy to install. Our applications—some of which are highly flammable—call for consistent equipment performance in harsh conditions, and we can count on the LS-300 to perform reliably.”
—Ray Parkinson, Rotating Equipment Specialist
Huntsman Chemical
Dayton, Texas

“We use the LS-300 on our positive displacement pump in a resin application for the coating industry. Our application is unique in that at room temperature, the resin can become a semi-solid, and face seals won’t hold together. This type of seal holds up much better. Before installing the LS-300, we had one pump changeout per month. The LS-300 has been a workhorse—it’s been in place on the same pump for the last year and a half.”
—Dan Disabato, Plant Engineer
Reichold Chemical
Valley Park, Missouri

LS-300 Field Installations

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<tr>
<th>End User</th>
<th>Process Fluid</th>
<th>Viscosity</th>
<th>Pressure</th>
<th>Temperature</th>
<th>Speed</th>
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<tr>
<td>Lilly</td>
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Face to Face www.flowserve.com
Making the team work

A shared vision and skill set leads to maximum MTBF

One way to save money is by reducing the installed cost of equipment. However, buying on price is a losing proposition because price is forgotten as soon as poor quality becomes apparent.

Is this how it should be?
In a hypothetical chemical plant, operations believes it should produce product to meet increased demand, no matter what. The operators adopt the concept as their mission and new operators receive on-the-job training through word of mouth.

Some processes clog piping, control valves and pumps. The operators then steam the lines daily. Even inadvertent operator mistakes, such as closing a valve in the suction line or momentarily stopping the flow of flushing fluid, have a ready response.

When the operating department cannot prevent the periodic need to shut down a line for bouts of extensive maintenance, it blames the maintenance department, citing inadequate repair as the root cause.

The other side of the story
Maintenance repairs the operating assets only after the system no longer functions. Using the same on-the-job training, the maintenance department knows the “quick fix.” They think nothing of using a pipe wrench to turn a shaft, using a pocketknife as a primary tool and making do with any tool at hand. The maintenance department blames operations for the failure, citing abuse of the equipment as the root cause.

Who is right?
To some extent they, both are. With cutting edge technology, destructive practices undermine any benefit it may provide. One of the keys to operating a mechanical seal is protecting the precision with which it was fabricated. Make no mistake about it, process upsets can apply excessive pressure to the seal or halt the flow to a pump, which then runs dry. But studies indicate that most persistent pump and seal problems are ultimately related to workmanship in the maintenance shops and operator error on the production line.

One cannot operate a pump without its seal. The two are intertwined in form, fit and function and must manage the process as a team. Together, they provide the service that one expects from precision components in a mission-critical application.

Effective problem mitigation
Similarly, when operations and maintenance join forces in a training program focusing on proper use of pumps and seals, they can effectively minimize maintenance and maximize mean-time-between-failures. They become effective because they know the seal designer’s intent and how the seal was intended to work. But knowing takes training.

Everyone needs to know what a pump and seal can and cannot do within the context of the system. They need to know what effect their actions have on performance. Maintenance needs training in repair procedures consistent with the use of high-precision components.

Classes and seminars at the Flowserve Training Facility present the most advanced techniques for purchasing, handling, installing, adjusting and operating its entire line of mechanical seals. For more information, contact the Educational Services Group at (800) 446-0401 or esg@flowserve.com.
Maintenance in mines and extraction facilities is a difficult proposition. Most ore beds are found in remote locations that lack supporting infrastructure. Just as it is costly to transport ore any distance, it is costly to send maintenance technicians to the site of a pump failure.

Mining liquors have a significant suspended solids content—as much as 80 percent. The industry standard pump seal has been packing, which needs clean water to cool and flush the gland. The introduction of water creates a problem because ore concentration involves separating the solids from the water.

At Falconbridge Ltd. Kidd Creek Division in Timmons, Ontario, the annual maintenance cost for just one Residue Leach discharge pump was $7,482 (Canadian currency), including parts and labor, reports Jeff McGlynn, Certified Engineering Technician. He said, “In addition, we added two million liters or 1/2 million U.S. gallons of gland water annually to our process.”

There’s got to be a better way

In the ideal world, mining pumps would operate without flushing water. Mechanical seals offer the best way to achieve this goal. The traditional mechanical seal in the process industry uses hard-faced seals at nearly steady state operation using abundant clean flushing fluid.

In contrast, the fluid handling systems in minefields operate irregularly. There is rarely any clean water available. The pumps frequently run dry. When that happens, the seal faces experience full-face contact. Friction at 1,800 rpm destroys seals outright or induces thermal shock and the failure mode becomes even more calamitous if suspended solids are present.

A possible workaround

The major maintenance issue is preventing seal failure that accompanies irregular pump operation in a hostile process at a remote location. One solution is to coat seal faces with lubricant in a reliable manner that does not depend on a grease gun wielded by a roving maintenance technician.

Chemical compatibility

Typical ore extraction fluids range from sulfuric acid to sodium hydroxide. Only an uncommon lubricant withstands the onslaught of both. One material that does the job is specially-formulated Flowserve synthetic lubricant.

The ideal solution

In the absence of a flush system and suitable field wiring, it is possible to lubricate seal faces exactly when needed, over extended time frames and without human intervention. Falconbridge found its ideal solution to making mechanical seals flushless in a battery-operated, automatic grease dispenser that delivers a precisely controlled volume of ultra-stable lubricant on a precisely timed schedule. Two AA batteries drive an electrochemical reaction, which generates nitrogen that forces lubricant into the seal. It is called the Flowserve SLD—Synthetic Lubrication Device Seal Support System.

McGlynn reports that installing the SLD reduced gland water costs by $4,689 (Canadian currency), parts and labor by $3,654, and the reduced load on the motor saved an additional $326 per year. He added, “We monitor our actual running hours on several selected pumps and this unit is approaching 13,000 hours on continuous service with no significant problems.”

Once configured properly, the SLD operates and protects even the seals used in the mining industry. Flushless Flowserve seals gave Falconbridge one more benefit. McGlynn added, “The change increased our plant capacity by removing this gland water volume.”
Joining forces

Collaborative alliances spell success for mechanical seal users

Imagine a world where your supplier’s product, price and lead times were known entities—and 100-percent reliable. Now imagine being able to trust that same supplier with your planning, forecasting and capacity requirements.

For many companies, these exclusive partnerships—also called collaborative alliances—may sound risky, but for a growing number of savvy companies, that “risk” is paying off.

“Users are looking for a framework to help industry understand collaborative processes,” says Larry Lapide, AMR Research, Boston, “and companies are beginning to develop closer partnerships with their suppliers.”

Indeed, more and more companies are realizing the immediate and long-term benefits of partnering with a supplier that they can trust, an option unheard of in many industry sectors.

“Trust is a key component,” notes Steve Knoner, Alliance Development Manager at Flowserve Corporation’s Flow Solutions Division, “plus, there is an efficiency factor. Customers don’t want to go through supplier/vendor qualification hassles on each and every part. To stay competitive, they need to save time.”

Knoner points to the mechanical seal procurement process as an example. “An engineer may spend two to three hours in the design and spec of a seal requirement, and purchasing may require another two to three hours to process it. But when several suppliers are invited to bid, the process is extended by up to six weeks.”

After bids are received, Knoner adds, a purchase order is processed and engineering must certify the technical merit of the vendor’s print. “That’s a little more than one working day for internal processing—and more than six weeks for external processing.”

Time is money

In the mid 1980s, Flowserve pioneered an alliance program that would remedy the costs not only associated with procurement, but those long-term costs associated with mechanical seals and rotating equipment. Designed to reduce total cost of ownership by decreasing maintenance and increasing reliability (uptime), the program provides mechanical seal users with an opportunity to forge a collaborative partnership with a vendor they can trust.

Flowserve’s alliance program includes a plant survey of all rotating equipment, followed by the establishment of a site standardization plan, which acts as a specialized blueprint for optimization of the plant’s seals based on their varied applications.

Next, the partners collaborate on a recommended list of priority actions to improve overall fluid flow performance. The list includes problem equipment, root cause analysis and recommended corrective action.

“The goal is to have Flowserve know the customer’s requirements as well as the customer does,” explains Knoner. “This way, we can help our customers optimize the way they do business.”

At BP Amoco, Whiting, Ind., optimization is primary to its refinery operations. As part of its alliance agreement, Flowserve’s onsite application engineer spent a year working alongside BP Amoco plant employees, making recommendations—based on BP Amoco’s unique requirements—on both product and process standardization.

“They took a lot of the bugs out of our seal problems,” notes Dave Vasil, BP Amoco’s reliability engineer. “We’ve seen reliability go up and costs go down.”
BP Amoco’s Whiting plant uses Flowserve’s mechanical seals in its hot bottoms, light ends and water applications areas, to name a few. For some applications, the company’s just-in-time requirements are considerable.

“We have critical pumps,” asserts Vasil, “but with a Flowserve quick response center nearby, we are never more than an hour away from a seal.”

Knoner admits that the company’s strategic alliance program runs contradictory to the typical customer/vendor relationships, which further sets Flowserve apart from its competition.

“Consider the existing user-supplier relationship,” Knoner says. “The user wants to buy less product and minimize expenditures, yet the supplier’s objective is to sell more. Our customers tell us that their main objective is to increase reliability and decrease overall cost of ownership. So, if uptime is a critical component to our customer’s success, it doesn’t make sense to have opposing goals. It’s in our best interest to maximize that opportunity for them.”

Working together
A crucial ingredient to the success of the strategic alliance program, notes Knoner, is that it’s based on goals that are agreed-upon as fair and objective by both parties. One such goal includes key performance indicators, which help both parties keep the program on track. “Having this alliance means we are both accountable,” adds Knoner. “We both take ownership of the success of the program.”

The benefits to users are many. Fluid seal customers can expect long-term reliability, or increased mean-time-between-failure (MTBF), and an overall reduction in costs associated with rotating equipment and mechanical seals. Other benefits include lower inventory costs and just-in-time availability of seal products.

“The Flowserve folks are dedicated to increasing our MTBF, and suggested that we build a database that listed all pumps, seals, applica-

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We have critical pumps, but with a Flowserve quick response center nearby, we are never more than an hour away from a seal.”

—Dave Vasil, BP Amoco