Client meetings fortify working relationships

Training program ensures world-class service

SMART THINKING SAVES THE DAY

Slurry-type mechanical seals slash maintenance & downtime for mining site
The Xstrata-Copper Inc. Kidd Metallurgical Plant site, called the Met Site, near Timmins, Ontario, Canada, refines about 1 to 2% of the world’s copper and zinc production. In addition, the Met Site produces indium, nickel-copper carbonate, liquid sulfur dioxide (SO₂), sulfuric acid and silver/gold bearing by-products. Maintaining production uptime and minimizing maintenance are keys to the plant’s success. Constant pump failures for almost two decades caused unnecessary and costly downtime and maintenance, so the company went in search of a solution that would keep production running.

Too Much Maintenance

In 1990, four ITT/AC, SRL, C-HD, Size 8x10 -21 rubber-lined slimes thickener tailings pumps were installed in the Concentrators tailings pump house. They consisted of 4 pumps: an A-Group with Stage #1 and Stage #2 pumps in series, and a B-Group with Stage #1 and Stage #2 pumps in series and originally supplied with packed stuffing box assemblies. Their function is to pump thickened (64% by weight) slimes tailings from the thickener through the tailings distribution lines.

The Stage #1 pump receives tailings slimes at a static-head pressure of 30 to 50 psig. The Stage #1 pump discharges at 60 to 80 psig into the Stage #2 pump, which discharges to the tailings pond at 100 to 190 psig. If one set of pumps requires maintenance, the operators must start the B-Group pumps before shutting down the A-Group pumps to maintain continuous slimes tailings flow.

For 18 years, the plant experienced recurring pump failures that caused significant maintenance, downtime and cleanup costs. Because of a low slimes dilution pump feature on the gland, it was difficult and almost impossible to control stuffing box gland water spray, which leads to pump barrel oil contamination and oil lip seal deterioration. In the end, premature barrel failures combined with gland water control deficiencies, gland follower stud failures and rapid sleeve wear made this a very poor pump design application.

The cleanup was always a difficult task with only one drain hole to wash away and remove the...
slimes tailings from the pump house floor. “During these upset conditions, other electrical motors and instrumentation were frequently contaminated if they happened to be in the way of the flood,” explains Hans Bekeschus, senior technical sales representative for Northern Ontario Canada for Flowserve’s Flow Solutions Division.

“The tailings pump house is about two miles away from the Concentrator Plant, and an operator would only travel to the tailings pump house once every eight-hour shift to inspect,” adds Bekeschus.

Well Thought-Out Solution

Identifying a solution was the result of a serendipitous meeting. Xstrata-Copper personnel were among the attendees at a Flowserve-sponsored slurry pump and slurry seal technical forum held a year earlier in Sudbury, Ontario. There, Bekeschus and Chris Cantwell, the Technical Sales Representative for Flowserve’s distributor, Kinecor LP, Timmins, Ontario, Branch, talked with Xstrata-Copper representatives. Flowserve was subsequently invited to come to the Kidd Metallurgical Plant site and evaluate the pump and sealing problems.

Marc Abrahams, a senior sales and applications engineer from Flowserve’s Perth, Australia, office, was part of the team that came to the Kidd Met Site to discuss possible sealing solutions. Bekeschus and Cantwell asked Larry Robichaud, the maintenance millwright team leader at Xstrata-Copper Inc., about his company’s sealing challenges. Robichaud knew Flowserve was already supplying other types of mechanical seals in other Xstrata-Copper Inc. plant sites on less severe applications.

“When Chris and I asked Larry about his worst application with regard to sealing slurry pumps in his Concentrator Plant, he said his slimes thickener tailings pumps were his worst nightmare and the most difficult to seal with braided packing,” Bekeschus says. Robichaud also said the packing would blow out every two to three weeks even though they tried a number of different manufacturers, brands and types of braided packing over the many years since the pump house was built.

A high-pressure slimes thickener tailings pump fitted with a custom-engineered Flowserve SLC seal helped Xstrata-Copper’s Met Site achieve leak-free operation.

“These pumps required a lot of routine maintenance at considerable time and expense,” Bekeschus adds.

In mid-2007 Cantwell, Bekeschus and Abrahams researched the Concentrator’s slurry seal needs and met with the management, maintenance and engineering staff. The Flowserve team determined that a custom-engineered Flowserve 3.750” SLC, GRP3 single-cartridge heavy-duty slurry-type mechanical seal would be the appropriate solution.

“We were originally planning to supply the SLC slurry seal without the need of an external source of clean, high-pressure flush water,” Bekeschus says. “But a sample taken of their slimes solids tailings revealed that 80% of their tailings were less than 40 microns in particle size. The sample was comprised primarily of water mixed with silica sand, quartz, mica and other abrasive matter.”

The Flowserve team realized that an external supply of high-pressure flush water was going to be required after all. This would prevent the small micron particles in the slimes from migrating across the seal faces, which would have caused etching and resulted in eventual premature seal failure.

To remedy this issue, Flowserve Engineering designed a custom solution: a bell housing constructed of high-chrome iron, with a close-clearance, glass-filled PTFE (GFT) throat-bushing and a specially designed Flowserve pump shaft sleeve. This design prevents the
slimes tailings from entering into the SLC seal’s cavity by injecting the very same external supply of flush water pressure previously used on their packed stuffing boxes through a flush port connection located on the slurry seals gland plate. The pump motor is on a time delay, so the pressurized flush water is turned on 30 seconds prior to the motor and pump starting up.

Robichaud championed the cause to convince Xstrata-Copper Inc. maintenance and management personnel to purchase and test the first Flowserv SLC seal for the high-pressure Stage #2 slimes tailings pump. This was no easy task; it took about a year for everyone at Xstrata-Copper Inc. to agree to take the next step.

“Some people were hesitant about investing money in a mechanical seal in a slurry pump application, especially since we were dealing with the tailings. No part of that product that brings in revenue for the company,” Robichaud adds.

However, after about year of analysis, engineering, and convincing management and maintenance personnel to test the solution, work began on designing and installing the first Flowserv SLC seal.

No More Breaks or Spills

Flowserv performed all the up-front analysis and engineering, including identifying the part numbers, developing specifications for machining the pumps’ rubber-lined, gland-side casing and taking slurry samples to ensure an effective design.

“Flowserv reps from Australia even came to the plant site to get a good feel for the application,” says Robichaud. “I was impressed with the effort put into doing the job right — and I’ve dealt with a lot of projects over my 33 years.”

“In the 10 months since the first Flowserv SLC seal has been in operation on our Stage #2 pump, we’ve had no leakage — not even water at the gland,” Robichaud says. “That in itself is worth a lot to us.” He says both pumps continue to operate leak-free.

“We’ve eliminated the maintenance cost, lost time and resulting production losses that would occur every time the braided packing would fail,” he adds.

“The seal on the original Stage #2 pump has probably already paid for itself; if it hasn’t yet, we’re confident that it will,” says Bill Morahan, Xstrata-Copper Inc. Concentrator crushing/grinding maintenance supervisor. “Both pumps are running fine with no problems. Before installing these new seals, we’d be doing ongoing maintenance. Now we haven’t had to touch the pumps.”

“Since installing both of the Flowserv slurry seals into our B-Group Stage #1 and Stage #2 slimes thickener tailings pumps this past year, all of the previous problematic issues surrounding the reliability of these pumps have been completely eliminated, including frequent maintenance costs associated with repacking these pumps and frequently replacing their shaft sleeves.

“In addition, morale has improved, and all of the costs associated with environmental cleanup and safety have disappeared from an Xstrata-Copper management’s control position,” explained Dennis B. Morrish, Xstrata-Copper Inc.’s Concentrator maintenance superintendent. “These Flowserv slurry seals have already proven to be a major cost saver to our company in their performance, reliability and leak-free operation, which – in 10 months – has already exceeded our company’s expectations”.

Robichaud says Xstrata-Copper Inc. plans to install more Flowserv SLC seals on other groups of problematic slurry pumps that still use braided packing. “With Flowserv doing the engineering and all the work, it’s a win-win situation for our company,” he says.

For more information on the company’s mechanical seals, visit www.flowserve.com.
Developing productive working relationships with clients is a high priority and a core business competence at Flowserve. A key to this is clear, honest communication to review best practices and determine new and dynamic ways to support business needs. One client that can attest to the value of partnering with Flowserve is LifeCycle Advantage Partner Shell Corp. and Motiva. For the last 13 years, Flowserve, Shell and Motiva have met annually to collaborate on improving productivity while increasing equipment reliability at Shell operating locations. These meetings have become a forum for developing mutually beneficial, long-term business plans for both companies.

The working relationship between Shell, Motiva and Flowserve has strengthened each year as meetings evolved into comprehensive planning, troubleshooting and technology-exchange sessions. The collaboration and commitment between both organizations has resulted in substantial savings in excess of $25 million between its refinery and chemical operations in the United States — all since the year 2000. These savings clearly demonstrate the benefits of sharing best practices and using innovation as a problem-solving and cost-reduction tool.

“Each meeting helps us promote accountability and make continuous adjustments to our strategy that will benefit Flowserve, Shell and Motiva,” explains Craig Brown, Manager of LifeCycle Advantage for North America at Flowserve. “It’s a very productive meeting. Participants from each site openly share ideas, identifying concepts that are working very well and discussing those that have not worked as intended.”

Specific meeting agendas and goals assure a positive outcome and include:

- Developing mutually beneficial, long-term business plans.
- Gaining a better understanding and communicating commercial and technical aspects of the relationship to optimize location profitability.
- Establishing accountability for making continuous improvements.
- Accessing appropriate personnel for commercial and technical information.
- Jointly developing and proactively communicating site goals to achieve reliability and cost targets and to optimize the benefits of Flowserve’s efforts.
- Discussing successful practices and unsuccessful applications across all locations.
- Sharing information from research and development, tests and field trials that provide insights for improvements across all locations.
- Understanding and influencing future

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Imagine that every seal system sales engineer around the world is a qualified rotating equipment professional, with the knowledge and skills to deliver consistent, high-quality support. No matter where a piece of equipment, process or facility is located, a company can be sure it will have the most reliable, cost-effective sealing solutions.

Such is the vision behind the Rotating Equipment Specialist (RES) Program at Flow Solutions Division of Flowserve Corporation. The RES program, a structured, comprehensive training initiative for Flow Solutions sales engineers and application engineers, emphasizes training in mechanical seal technology as used on pumps, mixers and compressors.

"Many Flowserve customers are multinational companies," says Andy Beall, president, Flow Solutions division. "They demand the same level of service everywhere. This requires us to have operational excellence in terms of technical service, application engineering and quick response on repairs. The RES program is a big part of accomplishing that goal."

**A Common Core**

Every calendar quarter, Flowserve invests thousands of hours in the RES program, which includes four levels of qualification — RES-1 through RES-4. Each has a defined number of courses, some of which are delivered by qualified instructors, and some are e-learning. Advancing to the next qualification level requires proof of competency, either by testing out of the course or completing it.

The curriculum was developed by consulting two sources. "First, it represents what a broad cross section of customers say they expect from our representatives," says Paul McMahan, RES program director. "Secondly, it was compared to the competencies and learning map for the job descriptions covered in the program."

The program starts with degreed engineers, usually Mechanical, who are placed as Application Engineers reporting to the company’s sales group. "They work inside, supporting field sales, for one to two years," says Mark Fallek, vice president, marketing, Flow Solutions Division. "Then they usually move up to a field sales position working directly with customers."

The individual’s training performance is an input for the annual performance appraisal process. Career direction depends on progress through the four levels, specifically, completion of RES-1 (eight courses totaling 14-15 days). Classroom sessions...
are backed up by laboratory sections with industrial equipment. “Our people learn to be hands-on,” says Fallek, “knowledgeable and confident enough to go and replace a seal in a pump in the field.”

**Technology Plus People Skills**

“The Rotating Equipment Specialist program is about more than just technical training,” says Beall. “A lot of time is spent making sure interpersonal communication and sales presentation skills are intertwined with technical training to develop the most comprehensive program possible. The RES program is a big investment in Flowserve sales engineers and their career development.”

RES-2 includes courses on selling, such as time and territory management, effective presentations and consultative selling, all customized to reflect applying seals for industrial applications.

“Our business model emphasizes working directly with the customer, bringing value by solving pump and seal problems right at the site with the maintenance crew,” Fallek adds. “Our representatives know how to troubleshoot and recommend the right product to provide the best sealing solution — the best value to the customer.”

Sales engineers also learn about finance to help clients with cost justification by developing and presenting a financial case. “Improving reliability not only can avoid a $10,000 repair,” McMahan says, “it can prevent production losses that might, for example, add up to $150,000 per hour for an alkylation unit in a refinery producing gasoline during the summer. Or a $10,000 single seal with a flush might be reducing pump capacity enough to pay back a $50,000 dual seal in a month.”

Completing RES-3 and RES-4 represents having high technical competence. The total number of training hours and amount of in-field experience required to achieve the RES-4 qualification is 101 days, comparable to a Ph.D. in rotating equipment operation. “Only the best and most dedicated people will reach RES-4 status,” says McMahan.

**Hands-On is a Core Competence**

Seal and pump fundamentals are taught in static and dynamic laboratory settings at Flowserve Learning Resource Centers located near the company’s corporate headquarters in Irving, Texas; the Changi Chemical Processing Technology Center in Singapore; and facilities in Essen, Germany; Macae, Brazil; Tlaxcala, Mexico and Suzhou, China.

In the static lab, the equipment is not connected. “Trainees practice taking measurements, doing inspections, installing seals, performing equipment checks, making adjustments — anything we expect them to do in the field,” says McMahan. The powered lab has running equipment where trainees can take readings, do calculations and evaluate performance.

Advanced courses include diagnosing problems with the equipment, recognizing when something isn’t correct and analyzing what’s wrong with it. “We show them failed parts and quiz them about causes based on the coursework,” McMahan says. “We can’t run equipment to failure in the lab, but we are acquiring different pieces of used equipment, and we don’t overhaul it. Bent shafts, cracked impellers — they see what failures really look like.”

**Changing With the Times**

While the RES program is expected to produce uniform results around the globe, it also must adapt to changing priorities. For example, increased emphasis on environmental concerns is raising the importance of seal technology and expertise. “The fluids and gases
On a Mission

The mission of the Rotating Equipment Specialist (RES) program is to design, implement and deliver comprehensive training for Flow Solutions sales associates, so that each is equipped with the necessary knowledge and skills to consistently deliver world-class service and support that satisfies our customers’ requirements regardless of location.

we seal aren’t benign,” says Fallek. “Leakage is hazardous to groundwater or to the atmosphere. You don’t want natural gas, light or heavy hydrocarbons affecting the planet.

“Flow Solutions was on the cutting edge in the 1990s when the first emission regulations were issued, and now there are even more,” Fallek continues. “New refinery regulations are classifying flaring as part of refinery emissions, when it used to be considered outside the range. Customers will need new solutions as regulations change.”

The RES classes are redeveloped to include new technologies and new materials, to be sure field sales engineers understand the latest sealing solutions to pump, compressor and mixer problems.

“We view this as one of the most important programs in our organization,” Fallek adds. “We’re only as good as our ability to fill customer needs, and mechanical seals aren’t taught in engineering courses. We want our sales engineers to be the best in the world, so our customers will have the highest level of confidence in our sales reps and in Flowserve.

“The knowledge of how to apply our technology in an effective fashion with the best people possible is what the marketplace really wants. Now, when a Flow Solutions engineer walks through the gate and says he or she is an RES-level professional, the customer knows that person possesses a significant amount of knowledge and skill and can be relied upon for quality and commitment to service.

“Most importantly, the RES Program is about investing in our people and their career paths,” continues Fallek. “Our customer surveys continue to highlight that the biggest single reason our customers buy from a mechanical seal manufacturer is because of their confidence in the sales person.”

The Flowserve educational services group also offers a series of classes (some of which are used in the RES program) to its customers. For more information, visit www.flowserve.com/eim/EducationalServices.

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Collaboration

plans for product development and consolidation.

• Understanding training resources available from Flowserve.

The active participation of key players from both companies is the heart of what makes the meetings so valuable. Additionally, senior management from both Shell and Motiva attend to collaborate with Flowserve. Shell and Motiva site personnel and Flowserve associates who work closely with the customers on a local level all the way up through Shell’s corporate steering team also attend.

Any Customer is Welcome

Annual meetings aren’t limited to Shell and Motiva. All Flowserve customers are encouraged to work with Flowserve via periodic review sessions. “It makes our relationship so much stronger when people who are accountable at various levels of both organizations are in the same room discussing and developing mutually beneficial goals and objectives,” Brown says.

Other Flowserve LifeCycle Advantage customers also are taking advantage of these annual business review meetings, adopting a format based on the incredible success of the Shell meetings. Any customer interested in annual meetings can contact his or her local Flowserve representative or any of the LifeCycle Advantage Managers:

• Steve Knoner – Director of Global Alliances
• Craig Brown – Manager, LifeCycle Advantage, North America
• Tom Carsten – Alliance Development Director, North America
• Barry Hart – Alliance Development Manager, North America

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