

Custom Seal Solutions

Listening to the customer and lending expertise yields long-lasting results

Pumping heavy slurry has its own unique challenges. Mike Sondys of Potash Corp. was seeing pump failures every two to three weeks on his Goulds 3196 M pumps and knew the mechanical seal was the source of the problem. He believed there had to be a way to improve the seal for a longer life, but he couldn't find a manufacturer to listen, until he met David Brewer, SEPCO Atlantic coast regional manager.

"I had been to all of SEPCO's competitors," explained Sondys. "They kept telling me their seals should work, and they weren't willing to listen to my ideas. David had a completely different approach. He said, 'Tell me what you want and we'll make it for you.'"

They put their heads together, redesigned the seal, and two variations later, they had a solution that has improved the life of the seals and pumps exponentially. One pump has now run for over two and half years without failure, a vast improvement over the typical life of only a month or two which he had struggled with before.

The Problem

Sondys believes it is his job to "dig down" and discover the root causes for equipment failures at his plant. And the regular failure when pumping heavy slurry was a serious problem. When the single internal cartridge seals failed, it was causing the pumps to fail. Sometimes he could wait for a planned outage to replace the pumps, but even then it was expensive and time-consuming.

"I've been working in research and development on mechanical seals for a heavy slurry environment without water intrusion into the process for a long time," he said. "The issue we were having was with 30 percent phosphoric acid. The temperature of the acid was very close to the temperature of what's happening around the seal bases. In that environment, phosphoric acid plates and causes a crystal formation. Crystal growth around the springs trashes the seal."



Evaporation system with subject pumps and seals.



Aerial image of phosphate processing facility.

"We allowed him to take the flush water off his process, so he doesn't have to introduce water into his system anymore—that's a big deal."

David Brewer,
SEPCO
Atlantic coast regional manager

He was convinced he had ideas that would solve the problem, but his vendor couldn't help, nor could other vendors he contacted.

Then he met Brewer, and together they set out to develop a better seal.

"He was pumping almost a solid material, basically clay and water," said Brewer. "Mike had ideas that he thought would help the success of our seal. He made some unusual requests, and our engineering department was able to accommodate him."

The Solution

Sondys had technical knowledge that – together with the skills and expertise of the SEPCO team – proved to be a winning combination for developing a better seal.

First they gave the seal a longer nose, lengthened the drive pin, and moved the springs to the rotating face instead of the stationary one. That helped, but they still found the stainless steel sleeve on the seal was showing significant wear. So the next attempt was to manufacture the sleeve out of Hastelloy[®], a chemically inert metal.

"We needed the seal to be bullet proof but universal," said Sondys. "We have multiple types of acid in this department, and each has a different chemical corrosion property. Some of those acids make stainless steel porous, so acid would leak by the O-rings, causing the seals to clog and crash. Hastelloy is resilient and unaffected by the different types of acid we have."

"Mike had ideas for improving the seal," said Brewer. "We had experts who could take that vision and make it work. Where his ideas were workable, we implemented them. When we could improve on his ideas, we did. Together we developed a successful seal."

"Previously, we had pumps failing in 19 to 28 days. I thought if I could get a pump to run for one year it would be a success. I have one that has been going now for two and a half years," says Sondys. "I was checking those pumps three times a day during the testing phase. Now I just let them run."

Beyond the Seal

Sondys cautions that the seal wasn't the only adjustment they had to make in this process. He also tweaked the rear cover the mechanical seal is bolted to. "The design of

that cover has a lot to do with the success of the seal," he said. "A standard bore box doesn't provide enough circulation for cooling to keep the crystal from forming. The success rate of the seal depends on its relationship with the stuffing box. You have to use the seal in the right application with the right stuffing box for it to work."

Reducing Water

Another improvement resulting from the improved seal is the significant drop in water required to cool the stuffing box.

Prior to the redesign, five to 10 gallons of water was used per minute per pump for flushing. This is a problem. As Sondys said, "We're in the evaporation business. So any water intrusion into the process is costly, because we have to turn around and evaporate the water back out."

"We allowed him to take the flush water off of his process, so he doesn't have to introduce water into his system any more," said Brewer. "That's a big deal. The power consumption alone of evaporating the water off that process is huge. It saves money on water and energy costs."

"The seal has a quench drain port," added Sondys. "I trickle in water just to rinse out any residual flash gas. There is now zero water intrusion into the process with this design."

Sondys brought expertise and ideas that were critical to this effort, but it took a vendor who was willing to listen, improve those ideas, and work with him to achieve success.

"I went through multiple variations of different seal designs with multiple vendors over several years. I finally decided what I wanted to do, and the other seal manufacturers said they couldn't help me. SEPCO did, and it works," said Sondys.

Brewer says it can be summed up in the approach he and SEPCO take with a customer. "We don't try to force a solution onto our customers," he said. "We listen, we give them what they want. We help solve problems." ▽



Modified SEPCO[®]
SRC Cartridge Seal
with elongated nose
and Hastelloy Sleeve.