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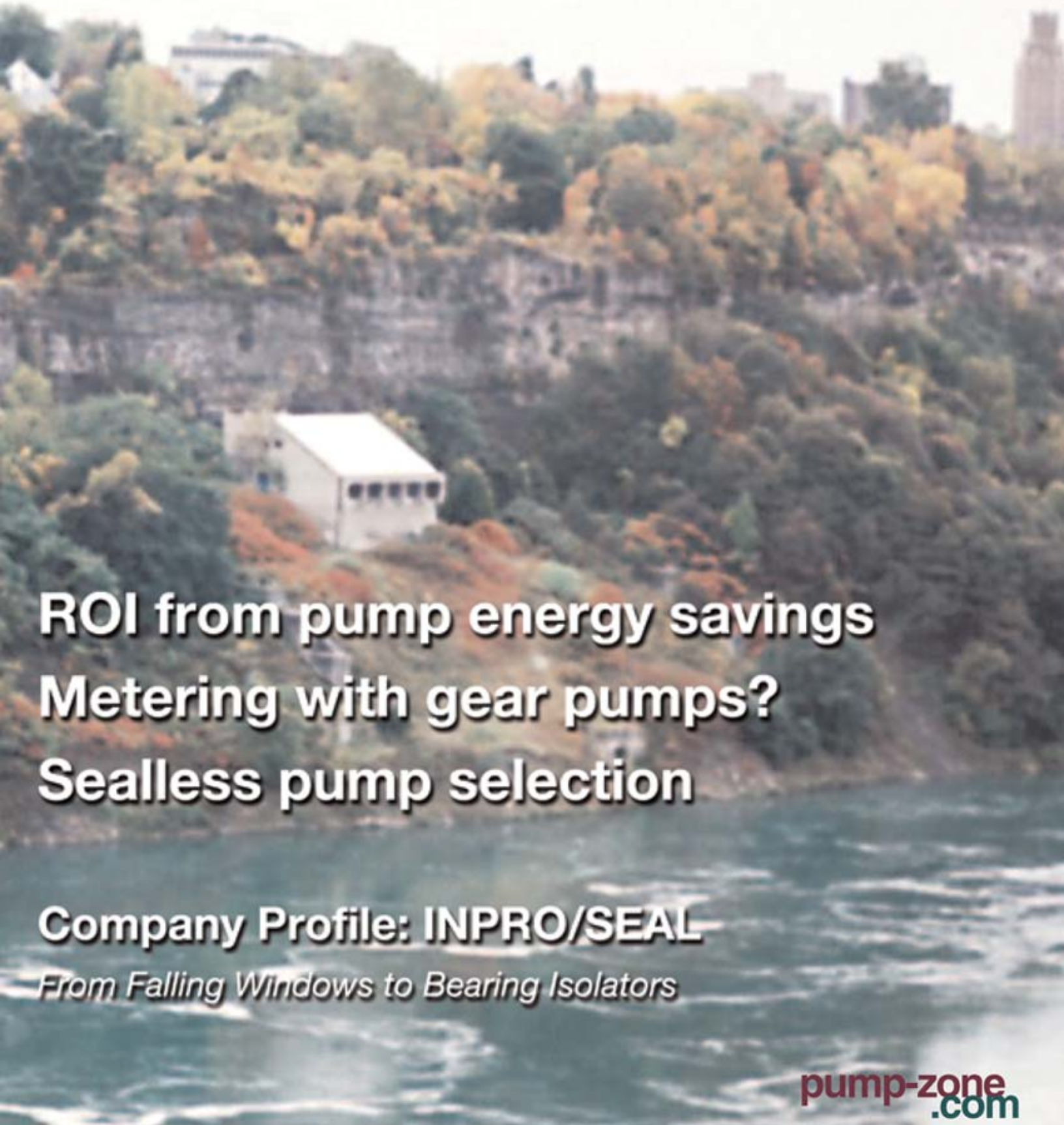
PUMPS & SYSTEMS

ROTATING EQUIPMENT



ROI from pump energy savings

Metering with gear pumps?

Sealless pump selection

Company Profile: INPRO/SEAL

From Falling Windows to Bearing Isolators

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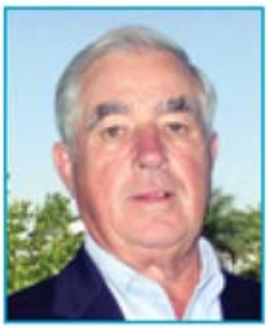
From Falling Windows to Bearing Isolators

40 patents and an industry standard. . .

By Jane Alexander



David C. Orlowski

Dave Orlowski, President and CEO of Inpro/Seal Company, didn't start out in the bearing isolator business. For all practical purposes, there wasn't such a thing.

Orlowski began his pump career working as a direct employee for what was then the Worthington Pump Company. After several years, he went on to start Inpro, Inc., a distributor (parts, sales, service) of Worthington and Viking Pumps in Illinois. That was back in 1965—when rubber lip seals were the most popular means of sealing process pumps. Early on, however, Orlowski recognized rubber lip seals were less than ideal for every application—he knew there just had to be a better solution.

Fast forward to February 1975. Inpro is called to Chicago's Sears Tower to service the Worthington API refinery pumps that were then part of the building's air conditioning system. Given the reputation of Chicago winters, this, at first, might not seem like a very big problem. However, even in winter, skyscrapers can quickly fall victim to "solar loading" wherein intense sunshine on vast expanses of glass causes buildings to over-heat. When that happens, not only will the inside environment become uncomfortable for human inhabitants, structural elements also may begin to suffer. In the case of the Sears Tower, although just one out of 16 pumps in the system had failed, a number of the building's large windows began popping out and falling down to land on Wacker Drive—100 floors below.

What Happened?

What wrecked the pump was a failed mechanical seal, which started to spray water. The water, in turn, leaked under the rubber lip seals and into the bearing housing, causing a catastrophic breakdown. Because this type of event could occur again at any time, Worthington asked Orlowski to take all 16 of the pumps back to his Rock Island shop (2 1/2-hours of round trip driving time) and retrofit each of them with a two-piece labyrinth seal. While this was a common practice with API pumps, the process involving the Sears Tower pumps amounted to somewhat more than a simple on-site seal change-out.

There was an upside, though. Dismantling 16 massive pumps one-by-one, transporting them 22 floors down on a freight elevator, moving them out of the building and loading them onto a truck to be hauled to a repair shop over an hour away, retrofitting them with the new labyrinth seal arrangement, loading each of them on a truck again and returning them to Chicago, where they were hauled back up those 22 floors and reassembled, gave Orlowski plenty of time to think about the inadequacy of rubber lip seals when it came to protecting pump bearings.

Eureka!

The two-piece labyrinth seal that Worthington specified for retrofitting the Sears Tower pumps was not new—basic labyrinth seal technology was in the public domain and had been used in API pumps for many years. Why, Orlowski wondered, had it not yet been applied to process pumps?

Mulling over the facts, he began experimenting with labyrinth seals in earnest, and in 1976 he was given the opportunity he had been seeking—a real world application. When Grain Processing in Muscatine, IA, needed help with extensive water contamination plaguing its pump bearings, Orlowski made sure those pumps were retrofitted with newly developed Inpro/Seal Bearing Isolators.

The problem was solved, and Grain Processing remains a loyal customer to this day, almost 27 years later.

Endless Innovation

Orlowski essentially reinvented the labyrinth seal, thus inventing the bearing isolator. It took him a little while to get the name right, though. From the beginning, he knew he couldn't call the product a "seal" as end users would have confused it with a mechanical seal. Bearing "isolator" was the name that ultimately stuck—but only after a little customer education. According to Orlowski, at first, it was too easy for people confuse the term "isolator" with "insulator."

Since that time, Orlowski and Inpro/Seal Company have continued to look for new and better solutions to bearing protection. Under his leadership, the company has dedicated itself to constant improvement and refinement of its products and practices. For example, its corporate headquarters (still in Rock Island, IL) is site of the largest bearing isolator manufacturing facility in the world. It also houses a round-the-clock Research and Experimentation Laboratory, where the company's isolators are perfected, competitors' products are tested and new Inpro/Seal products are constantly under development.

Today, backed by 40 U.S. patents, Inpro/Seal's Bearing Isolator is the industry standard for bearing isolation. In fact, it's standard equipment on IEEE-841 motors manufactured by Baldor, General Electric, Lincoln Electric, Marathon, Reliance Electric, Siemens, Toshiba and US Motors-Emerson—all of the major motor manufacturers in the United States, Taiwan, Korea, Canada and Mexico—and is standard on several ANSI pump lines. In addition, it is now being used as a standard repair item by at least one major nationwide pump repair service provider.

No, Dave Orlowski didn't actually "start out" in the bearing isolator business—he did something better. He played a key role in building it from scratch. And, even now, after all these years, he continues to nurture and grow it. **P&S**

How & Where the Inpro/Seal Bearing Isolator Works

A bearing isolator is a mechanical device that isolates a bearing from its environment, so that the bearing is kept properly lubricated and uncontaminated throughout its projected service life.

Inpro/Seal's Bearing Isolator is manufactured in two parts: a rotor and a stator. The rotor revolves with the shaft, driven by a tightly fitting drive ring that is fixed to the shaft. It also has a stationary component that is fixed to the bearing housing with a press fit and O-ring gasket.

The device protects two ways:

- bearing lubricant is captured in the inner portion of the labyrinth and flows back to the bearing housing; and
- outside contamination attempting to enter the bearing housing is captured in the outer labyrinth paths and expelled through a port in the stator by centrifugal force and gravity.

By maintaining bearings under ideal (laboratory) operating conditions, rotating equipment will last 5 to 10 times longer than without permanent bearing isolation. Because this equipment becomes substantially more reliable, costs for maintaining and operating it go down and productivity goes up. Interestingly, since its bearing isolators aren't subject to mechanical contact, friction, heat or wear, the company notes they will typically outlast the bearings and other mechanical components of the rotating equipment they're designed to protect. According to Dave Orlowski, 7 to 15 years of constant service is not long in the life of Inpro/Seal products.

The company also maintains that its products can be installed on virtually any shaft, and that there is no need to repair damaged shafts in order to retrofit them. To simplify installation on large shafts, the product line even offers a split-seal design.

Typical applications include service in the Severe Chemical, Pulp & Paper and Hydrocarbon Industries, among others.