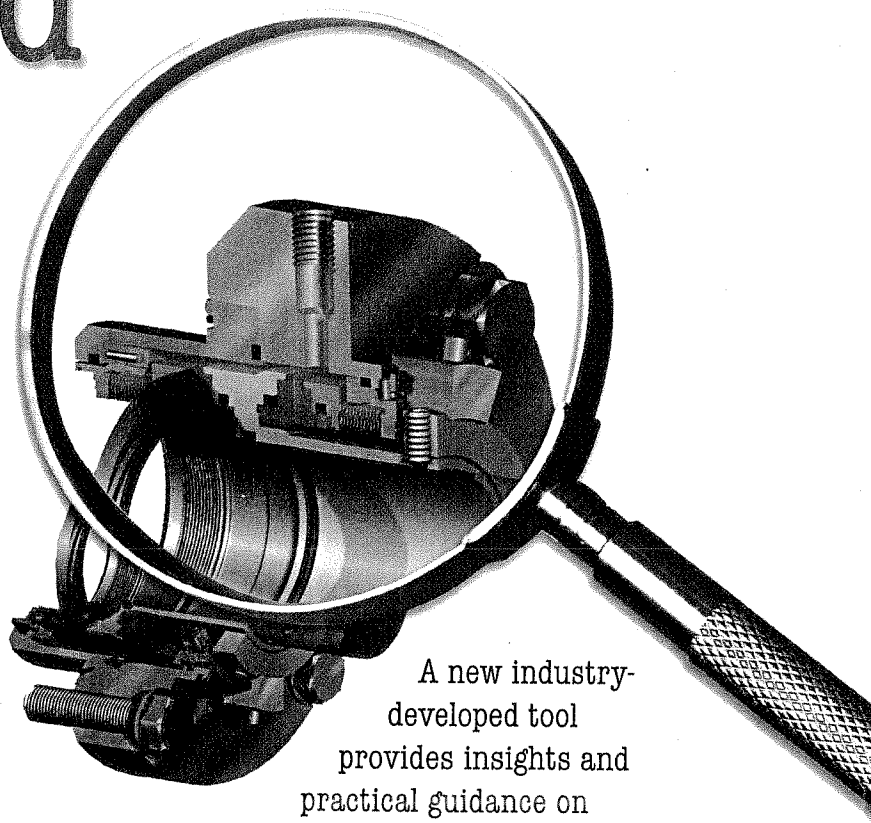
Find the best value seal



A new industry-developed tool provides insights and practical guidance on seal economics

By Pete Petrunich, Fluid Sealing Association

"COMPANIES THAT USE SEALS NEED TO GET AWAY from the 'how cheap can you make it?' approach," says Rick Page of seal manufacturer John Crane Inc. "Many plant construction projects these days are extremely 'down-and-dirty' and pumps and seals are some of the worst offenders for cost-cutting. But in the long run, this pressure to buy cheap will backfire on the operating companies and make them uncompetitive in today's world markets, he emphasizes."

Mechanical seals from reputable companies such as John Crane run anywhere from $2 to $50,000 or more, depending on the application. "Especially when bidding for new construction projects," Page explains, "there is intense pressure on costs and not enough emphasis on reliability and energy efficiency. To make matters worse, some seal suppliers encourage the 'buy cheap' philosophy by pursuing a lowest-price strategy at the expense of equipment reliability and the end user's total cost of ownership."

In the current climate of relentless pursuit of cost savings, such low prices are bad news for plant reliability and lifetime costs, Page warns. "Twenty years ago engineers and plant managers bought the best technical solutions, with a view to optimizing their plant's reliability, availability and safety," he says. "These days that is not necessarily the case."

Page set out to prove that there is a sound economic case for not always buying the cheapest. The key, he says, is to speak the same language as the plant's managers and accountants. He took his cue from consultant Paul Barringer, an industry expert who has long argued that to make a case for change an engineer must run the numbers and talk in terms of net present value (NPV). "The use of traditional engineering arguments, and even the concept of payback period, encourages short-termism, now that many of these decisions need approval from upstairs," notes Page. NPV is the preferred language of accountants, and calculated over the whole life of a pump, say, 20 years, it can reveal huge differences in the costs of different sealing options.

Broad-based support

With the backing of two industry associations, the Fluid Sealing Association (FSA, www.fluidsealing.com) and the European Sealing Association (ESA, www.europeansealing.com), Page set out to create a definitive guide to lifecycle seal costs.

At first his model was "Pump Life Cycle Costs: A Guide to LCC Analysis for Pumping Systems," published by Europump (www.europump.org) and the Hydraulic Institute (www.pumps.org). However, although that book gives excellent guidance on the principles of lifecycle costing, the FSA soon decided that working engineers needed something more practical and detailed. "Lifecycle cost calculations for seals are actually much more complex than those for pumps and we wanted a tool that could be used by both beginners and experts," says Page. "We also needed something that would be accepted as an industry-agreed standard to give it credibility."

Instead of a book, the FSA decided to produce an Excel-spreadsheet-based calculation tool that could be used either on the web or offline; John Crane engineer Jason Gondron was enlisted to produce it . The resulting Life Cycle Cost Estimator is now available at http://65.215.75.3/fsa/seallife.asp. The current version uses imperial units but the ESA plans to provide a metric version soon. Supporting pages provide the user with operating instructions, definitions of terms and explanations of the assumptions and formulas used in the calculations.

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Although by no means the first calculation tool for seal costing, Page believes it is the easiest-to-use, most comprehensive and most accurate. "Our own in-house costing tool was somewhat clunky and hard to use," he says, "and I'm sure the same must be true of many other seal suppliers. The FSA's Life Cycle Cost Estimator is a great improvement and our salespeople are already using it to support their proposals to customers."

The spreadsheet can be downloaded but also can be directly used via the Internet. It allows up to three seal options to be compared side-by-side and combines simplicity with flexibility. The spreadsheet takes into account dozens of parameters involved in seal costing, explains Page, and experts can view and modify them if they wish. "But engineers whose primary expertise is not seal costing can simply accept most of the default values, which makes the tool very easy to use," he adds.

Important insights

The Life Cycle Cost Estimator clearly underscores that it often is worth paying more upfront to achieve greater reliability, energy efficiency, environmental performance or all of these.

"There's an industry saying that you can almost always use a really cheap seal if you back it up with enough secondary equipment — coolers, filters, separators and so on," says Page. "One effect of accurate lifecycle costing will be to steer users towards sealing solutions that may have higher initial costs but are able to run with fewer external support systems."

A classic example of an inexpensive but hugely wasteful seal system is a conventional single seal with a once-through external flush (API Plan 32) that dilutes the fluid being pumped. Replacing this with a new double gas seal eliminates the seal fluid, so the higher upfront cost often is justified by greater process reliability and lower maintenance costs.

No costing tool can provide all the answers, Page points out. "If you compare three different sealing options, you could find that their lifetime costs come out at $30,000, $40,000 and $150,000, respectively. You might have good reasons for preferring the $40,000 seal over the cheapest option — but at least you know that it's probably a good idea to reject the $150,000 one."

If a piece of equipment needs frequent overhauls for reasons other than seal failure, then using a cheap short-lived seal may be a valid option to consider. "But if seal life is the limiting factor, it's probably time to choose a seal that's more reliable — and probably more expensive," says Page.

One higher-investment option that will not necessarily cost less in the long run, however, is the use of seal-less pumps, which also feature in the Life Cycle Cost Estimator. Seal-less pumps have transmission losses that make them noticeably less energy efficient than conventional pumps, Page notes. Such units also are more likely than conventional pumps to need returning to the manufacturer for repair, so maintenance and inventory costs are invariably higher.

Finally, any lifecycle cost calculations will only be accurate as long as the seal achieves its expected performance — which means it must be installed and operated correctly. Modern cartridge seals are easy to install correctly, says Page, but they can still be damaged by poor operating practices. "For instance, a large double-ended pump, especially a hot runner, needs several hours' warm-up before starting," he says. "Companies that cut corners here can shorten the life of their seals." **CP**

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