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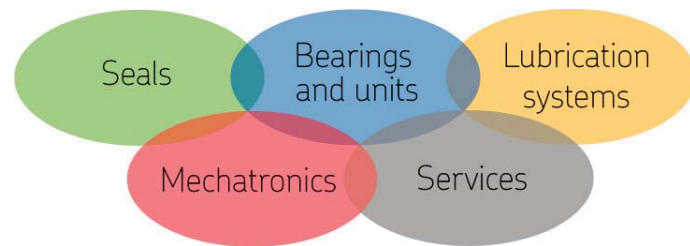
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Bearings: looking beyond unit price

Improve performance with a TCO approach

In the 1967 Indianapolis 500 race, the leader, Parnelli Jones, dropped out with only four laps to go because of a mechanical problem. The fault was subsequently traced to the failure of a \$6 bearing. Interviewed in the press about how a \$6 part could have been allowed to cost Jones the race, a bearing manufacturer commented that Jones' team should have used a \$12 bearing.

For the men and women in the ranks of our nation's purchasing departments, the million dollar question (the \$6 bearing must have cost Jones at least that) is how—when we're buying something like a bearing, can we know when and how to look beyond the sticker price?

Todd Snelgrove, global manager of customer value for major bearing manufacturer SKF Canada Ltd., helps buyers find answers to this question.

"The one reason why purchasing people focus on price," says Snelgrove, "is because it's measurable. It's a number: 'That's a dollar. That's two dollars, I can see the difference'. The problem is engineers talk in things such as longer life, lower friction, more this, better that. And it's not visible and tangible."

Making these other factors measurable in dollars and cents is what total cost of ownership (TCO) is all about. The practice was first used in the early 1980s by the Gartner Group, a research firm in the IT field. The basic idea is the purchase price is only one component of the total cost of owning that product.

Therefore, a higher-priced product may actually be less expensive because it reduces other costs, such as maintenance, user support, or loss of productivity due to down time. Needless to say, vendors of high-priced products are frequent users of the TCO model.

The concept is relatively new to the industrial sector, but is growing in



Diagnostic tools can help predict bearing failure, leading to better preventative maintenance and less downtime. Vendors also offer cost modeling programs, to make purchasing more effective.

popularity. In the bearing business, TCO requires measurement and sophisticated mathematical calculations. These tools provided by bearing manufacturers such as SKF and Timken, are frequently offered as packaged services, or in conjunction with value agreements.

According to Jamie Smith, a senior engineer with Toronto-based MCW Consulting Ltd., there are a number of factors affecting the performance of a bearing. One of them is the design, which determines the size relationships between the elements of the bearing.

"The difference in radius is the sort of thing that people like SKF have worked out," says Smith, "and that's part of the expertise in making bearings."

Another is the materials themselves. In a high quality bearing, they're selected for their specific properties.

"They can use very hard materials. Some are even getting into ceramics, which are much harder than metal, and can be used in high-speed, low load situations."

Tighter specs

These allow the bearings to function with less contact area, and as a result, less friction. High-end bearing manufacturers also have the capabilities to produce a product within very tight specifications.

"An important area is the degree of finish; how highly polished it is," says Smith. "This can have an enormous impact on the life of a bearing. Another thing is how close in diameter the rollers or balls are to each other. They've all got to be exactly the same size, with very close tolerances."

The result can be a much higher unit

price; sometimes many times that of the lowest priced equivalent. However, the purchase price of a bearing, as Smith points out, is typically a minor component of the total cost of owning and operating the bearing throughout its lifecycle when all other costs are considered.

As the Indy race example will attest, reliability is a key example of where quality pays off. Gallatin Steel in Lexington, Ky., for instance, has opted to purchase only high-end bearings from manufacturer Timken, and to engage Timken Industrial Reliability Services, a group which monitors the performance of bearings through sensors, and advises maintenance when a bearing in question is likely to fail.

"They've got a guy that's onsite, and he comes in and does vibration readings, infrared tomography, motor testing, ultrasound. He collects oil samples from some of the pieces of equipment," explains Jeff Stegemiller, Gallatin's maintenance and reliability team leader.

"What he's looking for is on-condition failures—stuff that's potentially going to fail in the future so we can catch it before it actually fails and causes us downtime. We've had great success with them. It decreases our downtime, makes us more productive."

There are many other factors besides reliability, however. Lubrication is a good example. "Usually customers spend twice as much money on grease as bearings," says Snelgrove, "but they don't put the two of them together."

Lubrication can give rise to additional costs. For instance, if the bearing is in a factory, there's labour and downtime that have to be factored in, not to mention the cost of environmentally safe disposal.

The best bearing to reduce lubrication costs depends on the application.

In the food industry, where loads are light and cleanliness is paramount, sealed bearings that don't require grease at all are a logical choice.

In industrial situations where loads are heavier, it might make sense to use a bearing that's easy to access. "Some bearings are really difficult to replace," explains Smith. "You've got to remove the whole shaft, for instance. Whereas with some, you can just slip them off and leave the shaft in place."



Timken has developed more efficient bearings which can save one to two per cent on fuel costs.

Like Timken, SKF also partners with their customers to help them reduce costs. In addition to providing a predictive maintenance program, SKF helps customers find savings in approximately 300 key areas, including energy savings, lubrication, and inventory reduction, where the quality of a bearing can have impact.

SKF supports this capability with a global database of 15,000 documented and customer-certified case study situations where savings were achieved.

SKF used these capabilities to partner with a large aluminum manufacturer which, facing tough economic challenges, asked all their suppliers to reduce their prices by 10 per cent.

"We came back with a guaranteed agreement to reduce their overall costs by 15 per cent," says Snelgrove. The agreement was a complex one.

Standards of measurement had to be agreed upon, often with the help of government standards, and ISO. The outcome was successful, and the agreement was extended to five years, and is now under consideration to be expanded globally.

Fuel efficiency

Better bearings can also result in savings at the gas pump. "We have fuel-efficient designs where we've worked on the geometry and the surface finishes and all of those factors," explains Skip Shattuck, Timken's vice-president for technical collaborations. "The reason is to get a low-friction bearing design and make that available to our customers."

According to Shattuck, truckers can save one to two per cent in fuel costs with this new design; a significant amount when you consider it now costs truckers \$1,200 to fill their gas tank.

Shattuck points out if automotive manufacturers were talked into migrating from the shell type bearings that cars use today to the more efficient rolling element bearings used by trucks, the fuel savings would be five per cent.

"If one year's production of cars used those type bearings," says Shattuck, "it would save 14 million barrels of oil, just for that one change for one year. That also means a quarter of a million tons of CO₂ would not be generated because the engines are more efficient."

As cost pressures continue to intensify, purchasers and engineers will likely still engage in some tug-of-war activity over price and quality. But an established TCO program should make it easier to understand how various bearings deliver different returns on investment, maintenance requirements and consumable costs. **b2b**

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