Healthcare at Hannover

SKF Insight Ups the Ante on Condition Monitoring Technology

Matthew Jaster, Senior Editor

Donald Howieson demonstrates SKF Insight during Hannover Messe in Germany (all photos courtesy of SKF).

The reliability of components can make or break a manufacturing operation. It's not just dollars and cents (though that plays a significant role); it's also an issue of time management, worker safety and productivity improvement. It's no wonder that condition monitoring is so popular today. Reducing repair time and maintenance costs and optimizing machine performance makes executives and their accountants very happy. And the technology is making it easier for maintenance, repair and upgrade professionals to integrate it all under a single, cohesive platform.

At the SKF booth during Hannover Messe, the SKF Knowledge Engineering team had attendees covered whether they were looking for bearings, seals, mechatronics, services or lubrication systems. Everything was in its place, from energy management to tribology to condition monitoring techniques. It was like walking into an Apple store that decided to highlight bearings over iPhones and iPads. The floor space SKF utilized could have been a shop floor, a laboratory or even a well-maintained emergency room. The medical motif actually made some sense when the discussion turned to SKF's latest condition monitoring technology, SKF Insight. This technology was, in a practical sense, healthcare for bearings.

"Traditional condition monitoring uses vibration or temperature to monitor damage in the bearing after it has occurred," said Donald Howieson, business manager, service platform at SKF. "This is similar to someone who has become seriously ill and is perhaps being cared for in a nursing home where doctors and nurses are ensuring the best quality of life can be achieved. Alternatively, consider someone who monitors their heart whilst jogging, monitors their weight and if required modifies their diet — they can perhaps avoid many health problems before they occur. In a similar way, SKF Insight enables you to monitor the bearings' operating conditions, understand the complex history of load in service and quality of lubrication throughout life. It can also identify overloads, duty excursions, lubricant contamination and lubrication problems so that modifications can be made to the operating conditions to avoid damage before it occurs."

A New Condition Monitoring Concept

By selecting the appropriate sensors for the application, using appropriate electronic processing technology to capture the data required and with the application knowledge of where and how the bearing is being utilized, SKF can implement the specific tools to the application. SKF Insight was conceived in 2009 when SKF had a vision to create an integrated, self-powered sensor package that could communicate the condition of a bearing at any time. Following extensive R&D work, including miniaturization, solving power generation challenges and developing unique packaging of sensors and electronics, SKF Insight made its official debut during Hannover Messe 2013 in April. Alan Begg, senior vice president of group technology development at SKF, spoke fondly of the concept behind SKF's latest condition monitoring technology. "This technology makes condition monitoring autonomous. It powers itself and it talks to the Internet. That allows it to be in places that were never possible before," Begg said. "In the planetary bearings in a gearbox, for example, where wires would quickly get wrapped around the moving parts; or in a steel mill, where hot metal and water sprays make it a very aggressive environment for condition monitoring."

Begg remarked that traditional condition monitoring looks for early signs of failure by measuring vibration. "A bearing starts to have vibration signals when the first small fragments of steel spall off the surface of the rings or the rolling elements (balls or rollers). By the time these fragments have come off, you are getting close to the end of life of the bearing—it is already damaged. SKF Insight can detect early changes in the microstructure of the steel, before macroscopic damage has

occurred, so giving earlier warnings of problems, and in some cases, allowing preventive action."

According to Begg and Howieson, SKF Insight will benefit applications involved in complex rotating systems, aggressive environments, remote and inaccessible places and high measurement points (large areas). An investment in SKF Insight offers a lower cost of ownership, greater reliability, optimized maintenance and the ability to safely push a plant closer to its operating limits. It also enables OEMs to reduce size and weight of their products through an improved understanding of the operating environment.

How SKF Insight Works

Howieson explained that bearings with SKF Insight create a mesh network, communicating through each other and with a gateway. "The gateway can be local to the machine, or local to the plant. System information is either made available to the customer for analysis using SKF @ptitude, or sent via the SKF cloud to our SKF Remote Diagnostic Centers. From here, dashboards and reports can be made available to the plant operator, the machine manufacturer, to SKF, or any other authorized person with Internet access."

Real-time condition monitoring data are accessible to everyone involved. Machine failure can in many instances not only pull the plug on a production run, but also cause huge financial burdens to a manufacturing outfit. Bearing failure can be more easily addressed with a system like this.

SKF is able to monitor the conditions that can cause damage, from the first microscopic effect as it is happening, and with this information, customers can take remedial action to reduce the reason for damage in the bearing — adding lubricant, mitigating transient overloads, etc. In addition, by monitoring the load directly on the bearing, SKF Insight makes it possible to measure the load the bearing actually experiences rather than what is was designed for. This valuable information can be routed back into the design phase to improve both the system and bearing design. "It is essential when designing any engineering application to have accurate knowledge of the structural loads," Begg said. "These are well understood in mature systems with simple loading. For newer systems, especially when there is little control over the applied loads, SKF Insight will give big benefits. For example, wind turbines are getting larger all the time, as larger turbines reduce the

average cost per kilowatt for the power generated. These are new systems, and the since loads come principally from the wind loading on the blades, they are by nature random and unpredictable."

The Future of Condition Monitoring

At Hannover Messe, SKF demonstrated the potential of SKF Insight with many comparisons to healthcare for humans. It's the first step in a condition monitoring system that will continue to evolve. "Today SKF Insight is our ability to power and package the appropriate sensors and electronics, to wirelessly communicate data, the algorithms and interpretation of the data into information for specific applications, and combine that with related diagnostic software and services from SKF," Howieson said. "We demonstrated that with a demo rig at Hannover Fair on small/medium-sized bearings. Today we have to start with a customer's general arrangement drawing of their application. Tomorrow — whether it is 5 or 10 years — who knows? — SKF Insight could be standard in specific bearing sizes or types."

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