Hands-On Manufacturing

FOUR WAYS SKF USA INC. IS TRYING TO MAKE YOUR JOB EASIER

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There's plenty of work to do. Whether you're on a manufacturing site or sitting at your desk rifling through two-weeks-worth of e-mails, projects keep coming. The 2016 engineer, however, has it much easier than the 1988 version. He or she can browse CAD downloads online, shuffle through product catalogs on their smartphones or learn how to properly mount bearings with a click or two of the mouse. SKF USA Inc. recently shared some of its tried and true engineering methods during the 2016 Technical Press Event in Philadelphia, PA. Here's a short recap:

#1 The Evolution of Connectivity

Mark Hinckley, director, strategic projects, SKF, used to carry a very large workbag to manufacturing sites. This included his laptop, a bulky battery pack and a couple of physical SKF product catalogs. In the late 1990s and early 2000s, we all had work bags that looked like this. We stuffed our bagged lunches between file folders, notepads and various books. Our shoulders hurt, our backs were sore and our designer workbags took a beating right down to their deep hidden pockets.

Hinckley only takes his iPad to manufacturing sites today as well as a small, easy-to-manage workbag he can quickly sling over his shoulder. Instead of two large product catalogs, Hinckley has access to SKF's entire product library right on his tablet. He was simply making a point to show a room full of editors at SKF's Technical Press Day 2016 that technology is making it easier for everyone to do business in 2016.

Today, SKF has developed over 45+ apps for smartphone and tablet users simply because there is an industry-wide need for such resources. Whether its engineering/selection tools, educational apps, trade show support, industry specific apps or condition monitoring/alignment tools, SKF has been vigilant in equipping both its customers and employees with mobility tools that are useful and improve the way we collect and distribute information.

Some of these resources have been available for some time such as *SKF's Bearing Calculator* (the most downloaded app from the SKF collection) which simply makes it easy to perform complex bearing calculations. Others like *DataCollect by SKF*, provides intuitive data collection for machine inspections to help engineers be more efficient on the job. *PM Motors from SKF* is the company's first augmented reality app that allows engineers to virtually look inside a 3D magnetic system and provides data for all the key components.

Why are these technologies so important today? Manufacturing is going through some significant changes, not in the manufacturing itself, but the way in which the data is collected, processed and managed. Mechanical component manufacturers must adapt in order to stay ahead of the competition. In short, it's time to ditch that old, bulky workbag and buy into something much more practical.

2 Blank Sheet Engineering

Laurie Olson, specialty sales and marketing manager, SKF, could be considered a bearing detective of sorts. She's responsible for meeting with clients and coming up with custom solutions when off-the-shelf bearings won't get the job done. These custom solutions typically offer higher performance capabilities and are engineered for the technical demands of a specific application.

Where would such bearings fit in the manufacturing world? (Pumps, turbines, conveyors, electric motors, paper mill rolls and steelmaking equipment to name a few). These solutions are tailored to meet the unusual operating conditions engineers must deal with in the field such as extreme temperatures, corrosive environments, high-speed applications or simply a critical component that can't afford to fail.

Olson believes this is possible with a blank sheet engineering approach. SKF engineers identify and review all existing application data for the application in question (speed requirements, load information, environmental concerns, etc.). They select the appropriate modeling software and input design options that will fit the customer's needs.

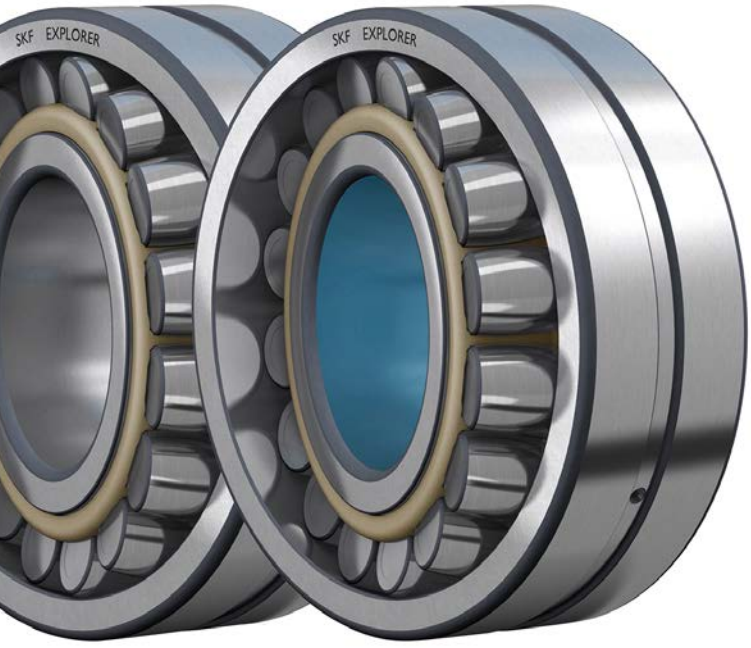
It's detective work, as mentioned earlier, but new bearing designs can create non-standard geometries and sizes, integrated outer or inner rings, custom assemblies, seals and shields, custom clearances and a range of additional innovations. With new materials, increased service capabilities and hybrid bearing options, SKF technology is helping take the guesswork out of custom bearing designs.

#3 Proper Seal Selection

Seals for bearing arrangements should provide a minimum amount of friction and wear while providing maximum protection under the harshest conditions. Bearing performance and service life are ultimately tied to the effectiveness of the seal as well as the influence of contaminants. These should be key design considerations at the early stage of the bearing manufacturing process.

According to Bryan Uncapher, director business development, seals, SKF, the primary functions of seals include retaining lubricant, separating media, excluding contaminants and resisting pressure. Several factors to consider when determining what seal material should be used include temperature range, pressure range, fluid media to be sealed, duty cycle, surface speed, the working environment and friction and installation concerns.

Uncapher described how important it is to identify the different factors that can influence seal material selection. For example, some materials such as polyurethane and rubber provide better sealing properties but polytetrafluoroethylene (PTFE) and polyetheretheketone (PEEK) provide better chemical and temperature resistance. He recommends re-



searching each sealing application on a case by case basis to determine the best course of action.

SKF has 100+ years of experience in various industries and applications including seals for the wind industry, tunnel boring machines, agricultural equipment (combines), gearboxes and steel mills.

#4 Asset Management

Mike Trainor, manager asset reliability consulting, believes a good maintenance program starts with the right roadmap. The company must universally agree on the criteria and the path forward. You must understand how an asset fails and its consequence. Basically learn what you've done in the past, know what it means and take action. This starts by prescribing maintenance activities to detect, prevent or eliminate asset failures. "We cannot prevent equipment from degrading toward failure but we can prevent business consequences by intervening at the appropriate time," Trainor said.

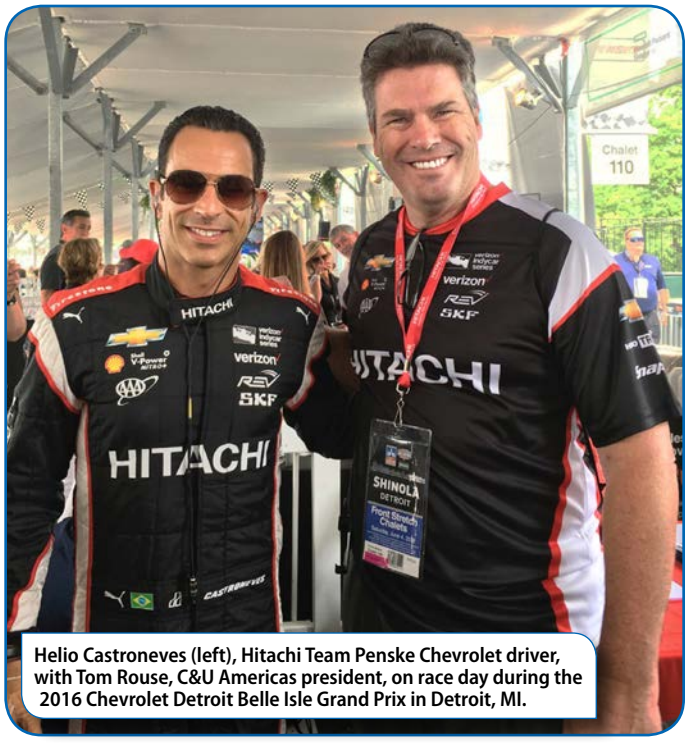
Putting these ideas into action, SKF worked with a power producer to improve uptime. The customer was experiencing reliability and performance problems. This customer wanted to improve performance by decreasing equipment failure. SKF worked with 27 units to determine an applicable and effective maintenance strategy for both the critical and non-critical assets. After 30 months of implementation, the customer reported a 30 percent reduction in equivalent forced outage rate (EFOR) a 7 percent increase in peak period reliability and a 30 to 40 percent reduction in high priority corrective work.

In another example, a heat treat facility had large amounts of downtime after the initial install. This was a result of many breakdowns and also a lack of critical spare parts. SKF came up with a preventative maintenance, inspection and spare parts program to eliminate downtime. After three months of implementation, the facility went from 46 percent unplanned maintenance hours down to 12 percent.

Hitachi Automotive Systems

RECOGNIZES C&U AMERICAS AS A TOP SUPPLIER

Top executives from C&U Americas, LLC enjoyed the best of both worlds on Saturday, June 4, 2016 at the 2016 Chevrolet Detroit Belle Isle Grand Prix in Detroit, MI. In addition to the honor of being recognized as a top supplier, C&U Americas President, Tom Rouse and Matthew Unsworth, director of sales, were honored guests in the Hitachi Automotive Systems Americas, Inc. suite during the 20th running of Detroit's premier open wheel racing spectacular and had the opportunity to partake in some exciting 'varoom' trackside.



Helio Castroneves (left), Hitachi Team Penske Chevrolet driver, with Tom Rouse, C&U Americas president, on race day during the 2016 Chevrolet Detroit Belle Isle Grand Prix in Detroit, MI.

According to Rouse, "We are delighted to receive this prestigious recognition and could not ask for a more enjoyable way to celebrate the day with our valued partner, Hitachi Automotive Systems, and help them cheer on their driver, Helio Castroneves, and the Hitatchi Team Penske Chevrolet."

Hitachi Automotive Systems Americas, Inc. President and CEO, Paul Carroll, noted, "C&U earned the opportunity because of their overall achievement on quality, cost savings, delivery, and innovation. They are one of our very best suppliers and in a class of elite suppliers in our industry. This is the first time we have had this type of award and we were very pleased to be able to host C&U Americas for this event."

Schaeffler

SUPPLIES KEY COMPONENTS FOR NEW PANAMA CANAL

After a nine-year construction period, the new, third channel of the Panama Canal opened recently. Starting immediately, ships with a maximum length of 366 meters (984 feet) and a width of around 50 meters (164 feet) can travel this shortcut between the Atlantic and Pacific oceans. Until now, the passage was restricted to ships that were no more than 290 meters (951 feet) long and 32 meters (105 feet) wide. Bearing solutions from Schaeffler keep lock gates and valves moving.

Bearings for reliable lock operation

Components made by Schaeffler play a key role in the operation of the lock gates. The locks are necessary both on the Atlantic and Pacific side so that ships can overcome a difference in height of 26 meters and pass through the interior of the country. This is achieved by three consecutive locks that are flooded with water from adjoining reservoirs. The lock gates are made of reinforced concrete and have enormous dimensions of 50 meters (164 feet) wide, 30 meters (98 feet) high and 10 meters (33 feet) thick. For safety reasons, two gates have been installed for each barrage that open to the side. The mechanism for opening and closing the gates was developed by Italian engineering company Cimolai Technology. To open and close the gate, each has two main drive units that drive a cable winch. The drums of the steel cable winches are supported by spherical roller bearings made by Schaeffler. Since very high torques of up to 330,000 Nm are required to move the gates, there is also a gearbox on each that increases the torque of the electric motors by almost 280 times. The gearboxes developed by PIV Drives, a company owned by the Brevini Group, are equipped exclusively with tapered, spherical and cylindrical roller bearings made by Schaeffler. Most of the bearings have been coated with Schaeffler's Triondur C to prevent wear and ensure their operation for 35 years.

Both at the top and at the bottom of the reservoirs, two "carriages" guide the gates that weigh 3,100 tons. The guide pulleys that are used must be able to withstand not only the weight of the, but also the pressure of 430 million liters of water per reservoir. The guide pulleys are equipped with spherical roller bearings supplied by Schaeffler.

Bearings for Resource-Conserving Water Cycle

One important feature of the new Panama Canal is its three reservoirs that are located next to each barrage. They ensure a resource-conserving water cycle. Several valves open in a channel below ground to drain the water from a barrage. The channel connects the water saving basins and the barrage. Due to the large size of up to seven meters (23 feet), the valves supplied by Hyundai Samho have also been designed as gates. The steel guide pulleys for these gates are equipped with bearings made by Schaeffler. The bearings used here are chromium-plated, making them particularly resistant to corrosion. Different variants of the Durotect coating developed by Schaeffler are used for this application.

Challenging Conditions

Schaeffler Engineer Francesco Capittini describes the special challenges for bearing solutions for the Panama Canal as follows: "The slow motion causes a quasi-static load in the bearings with very high forces."

In addition, the operation of the Panama Canal must work reliably 24/7 due to its significance for world trade. Maintenance intervals are scheduled only every five years.

Schaeffler was able to develop solutions based on standard products despite the tough requirements for technology in the expansion of the Panama Canal. The international network of engineers and application specialists also implemented project-specific solutions. Dr. Stefan Spindler, who is a member of Schaeffler's executive board and responsible for the company's industrial business, explains: "Our sales team is made up of engineers all over the world. They work with Schaeffler experts from a wide range of disciplines, such as coating engineers and calculation experts, which helps them provide our customers with bearing solutions for even the most challenging applications."

Matteo Maretto, member of the development team at Cimolai Technology, the Italian engineering company that developed the mechanism for moving the lock gates, agrees: "The bearings are a very critical component for the overall functioning of the lock. They have to work under any circumstances; otherwise the entire facility would stand still. Schaeffler provided valuable support to us during development."

The Timken Company

ACQUIRES INDUSTRIAL COUPLING MANUFACTURER LOVEJOY INC.

The Timken Company has announced that it has acquired Lovejoy, Inc., a manufacturer of premium industrial couplings and universal joints, for approximately $66 million. For the 12 months ending March 31, 2016, Lovejoy sales were approximately $56 million.

"The acquisition of Lovejoy is a great strategic fit, and we're pleased to add their strong brand to our growing portfolio of industrial brands," said Richard G. Kyle, Timken president and chief executive officer. "Lovejoy features premium products used in challenging applications across diverse markets. While our two companies operate in many of the same markets and channels in North America, the acquisition provides exciting growth opportunities."

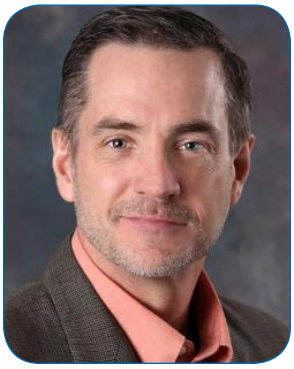
Based in Downers Grove, IL, with additional locations in the U.S., Canada and Germany, Lovejoy is widely recognized for its flexible coupling design and as the creator of the jaw-style coupling. Lovejoy also manufactures a line of universal joints, hydraulics and vibration dampening products. The company's Lovejoy, Curtis and RunRight products are considered a mainstay in diverse industries including energy, fluid power, food and beverage, aggregate, paper and steel. Lovejoy employs approximately 300 people.

"We're pleased to become a part of such a well-respected industrial leader as Timken," said Mike Hennessy, chairman of the board of Lovejoy. "Under Timken ownership, Lovejoy's technical leadership and commitment to customers will carry forward seamlessly. It's clearly a win-win for our customers and our employees."

The Hennessy family has owned and operated Lovejoy for four generations and as part of the transaction, Hennessy will be retiring. "We have a great deal of respect for the business, brand and talented team they have built through the years," said Kyle.

This acquisition adds to The Timken Company's growing portfolio of mechanical power transmission products. In recent years, Timken has been diversifying its offering, completing a number of acquisitions featuring products adjacent to its core bearing lines. This includes belts, chain, gear drive systems, lubrication systems and a variety of related services, all marketed under strong industrial brands including Timken, Philadelphia Gear, Carlisle, Drives and Interlube. Timken expects the acquisition to be accretive to earnings in the first year of ownership, excluding one-time transaction costs.

Happach Named President of Lovejoy



The Timken Company has announced that Mathew W. Happach has been named president of Lovejoy, Inc. At the same time, Lovejoy's CEO Woodrow "Woody" Haddix assumes the role of advisor to the president, supporting Happach through the transition period. Timken announced that it has acquired Lovejoy, adding the premium manufacturer of industrial couplings and universal joints to the Timken lineup of mechanical power transmission products.

"Mat brings great experience in the power transmission space as well as broad leadership skills to his new role," said Hans Landin, vice president of mechanical power transmission products for Timken, in announcing the appointment.

"He and Woody share the same goal: to build the Lovejoy business and brand while ensuring that customers continue to experience the high levels of service and support that have long been a Lovejoy hallmark."

Lovejoy, Inc., is based in Downers Grove, IL, with additional locations in the U.S., Canada and Germany. Widely recognized for its flexible coupling design and as the creator of the jaw-style coupling, Lovejoy also manufactures a line of universal joints, hydraulics and vibration dampening products. The company's Lovejoy, Curtis and RunRight products have long been mainstays to diverse industries including energy, fluid power, food and beverage, aggregate, paper and steel.

A Timken associate since 1987, Happach has extensive experience in OE and distribution sales, marketing and planning functions. He has served as director of aerospace bearings, managing director for Europe, managing director for Korea and Japan, and also was vice president of the global rail businesses. Previously Happach also held leadership positions in global marketing and business planning and was the director of sales and marketing for the Timken business in India.

Happach received a bachelor's degree in mechanical engineering from Bradley University and holds a master's degree in business administration from The University of Texas at Arlington. Happach and his wife will relocate to the Chicago area in the near future.

Haddix most recently was chief executive officer of Lovejoy, Inc., and has extensive industry experience. Prior to Lovejoy, he held positions in Premier Industrial, Hawk Powder Metal Group and International Harvester. He earned both a bachelor's degree and a master's of business administration degree from DePaul University.