

The Path to Smarter Bearings

Interview with Stefan Hantke

Dave Friedman, Associate Publisher

At Hannover Messe, Power Transmission Engineering had the opportunity to sit down with Stefan Hantke, president of the Industrial North America division of Schaeffler USA, to discuss the current state-of-the-art in bearings manufacturing, the trends in industrial bearings and the current state of U.S. manufacturing. (In the meantime Stefan Hantke has taken over responsibility for the global sales activities of Schaeffler Industrial)



Stefan Hantke

What are the main areas of technical advance with regard to bearings for large, high-power applications such as wind turbines?

What we are seeing in the industry are different trends. One clear trend is

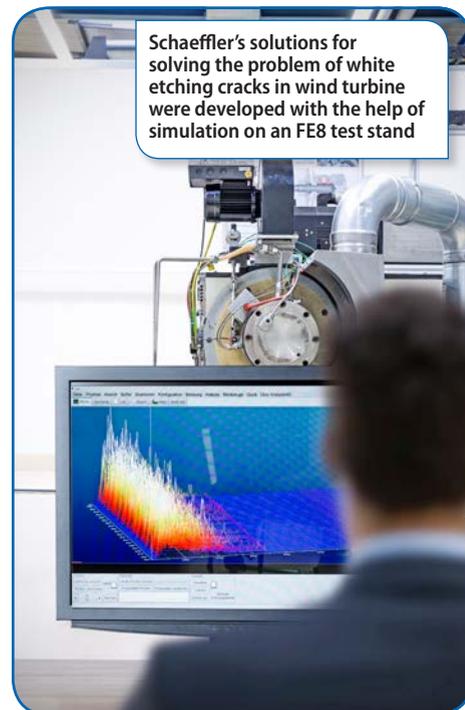
downsizing leading to higher power density. At Schaeffler, we have responded to this demand for example with the X-Life bearing program. X-Life means extended life rating. So X-Life is our best-in-class bearing—you have the highest lifetime, you have the highest load carrying capacity, you have the best bearing in its class. This is what X-Life means.

Friction reduction is another demand out of the market, because friction reduction means a reduction in energy consumption. We see this trend in every device you can see in the field—especially in Europe, but in the U.S. as well—customers are focused on the reduction of energy consumption. They are looking for the complete system and solution for energy consumption.

Further, our customers are asking more and more for predictive analysis of bearings. For example, they really want to have a clear calculation of the lifetime of the grease lubricant. And they want to know the life of the bearing. How rigid is the bearing? And not just the bearing. At the end of the day they want to know the complete system. So with our response to these

demands, we are going to approach a complete system understanding. For example, with our BEARINX calculation program, you can simulate bearings as well as complete transmissions regarding, for example, lifetime or stiffness including the shaft and the bending of the shaft. Everything is considered in BEARINX.

This tool is being used for all kinds of applications: in machine tools, in the steel industry and among our distributors. And we offer online access for our



customers. From my perspective it is the best calculation program for bearings and benchmark.

And you asked especially about applications such as wind turbines. We are working very closely with our customers from the wind energy sector. One example: Operators of wind turbines all over the world suffer from so called white etching cracks in bearings. A phenomenon that has a negative influence on the reliability of bearings. WEC are structural changes in the material that form below the surface of the bearing. These changes result in the formation of cracks, which extend to the surface during stress conditions under different external loads. We now developed a solution combining the through hardening of the bearings in combination with black oxide coating on the inner and outer rings and the rolling elements. A solution we developed in close cooperation with our customers in the OEM and the MRO market.

The FAG X-life cylindrical roller bearings for planetary gears pictured here feature rolling elements and inner rings coated with Durotect B. The raceway of this bearing is integrated into the planetary gear.

What are the main areas of technical advance for automotive and other vehicle applications?

I'm first of all responsible for industrial. But from everything I'm hearing out of the company, the CO₂ reduction is one of the main concerns of our customers including weight and size reduction. And customers are increasingly asking for complete systems. So the trends we see in automotive are similar to those we see in industrial. We see the same trends in agriculture and mining trucks. In all these cases, they are going away from just the bearing to a more complete system, for example with traction control, integrated torque sensors or sensors for lubrication and condition monitoring. There's really a trend into what I would call smart bearings. For all trends and all sectors we're thinking in the region, for the region. Because the requirements in every region are different, and you have to be close to the region, close to the customer there, to meet their requirements and to know what they really want. You have to adjust your concepts to the local markets. And this is one of the strengths of the Schaeffler group, because we are in the region, for the region—producing parts in the region and developing parts in the region, for the region.

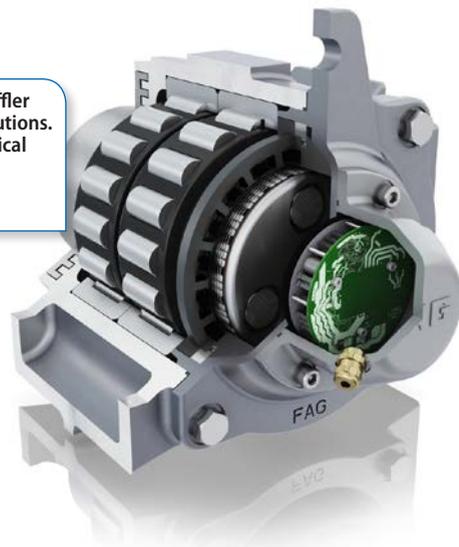
How is Schaeffler making use of engineered coatings in bearings applications?

Coatings is from my perspective the most important add-on for bearings you can have. We recognized this 10-15 years ago. So we started developing a dedicated coating department at our headquarters. Today, from my perspective we are the leading company in the world concerning coatings for bearings.

Coatings offer advantages in almost every application. We offer a comprehensive kit of coatings including Corrotect for corrosion protection, Durotect for wear protection and Triondur

In response to the demands of rail freight traffic, Schaeffler is developing a range of self-powered, mechatronic solutions. A wheelset generator from FAG, which generates electrical energy, forms the core component of these systems. It provides an independent power supply for monitoring, position determination, and telemetry.

for friction reduction. Additionally we have developed coatings for current insulation and also sensor coatings. Depending on the requirements of the application we can coat outer rings, inner rings, or rollers or balls. We can coat the cages. I already mentioned how important coating is for example for wind energy. With our black oxide



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bearings

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coating, we offer a reliable solution to prevent white etching cracks.

We are also using this corrosion coating in agriculture. The agricultural market needs to have good corrosion coated bearings. Also, a lot of distributors are coming to us. They see bearing failures in the field. We analyze the failures and with additional coatings, we can bring the bearing in the steel plant, in the paper plant and whatever plant, to the next level. Our distributors and their customers often consider the TCO, total cost of ownership, approach, and coatings are an effective step towards this requirement. In the field, if you consider that with a coating you can have 30% more lifetime, the customer is willing to spend a little bit more. We see a lot of good ideas and good applications coming from our distributors here.

What are the most intense areas of R&D at Schaeffler?

Aside from the areas we've already talked about, I see that we are especially supporting mechatronics. Let me say, from my perspective, the future is not just selling and providing bearings. We have to provide systems. Customers are asking for complete solutions, not just one bearing.

In North America we started a center of excellence for mechatronics, located in Fort Mill, South Carolina. With this dedicated team we develop bearing based modules and systems for rotary and linear motion, as well as multi-axis systems and complete solutions. We started five years ago,

and our customers and our salespeople are recognizing that there is a deep knowledge, that there are young people who are able to combine electrical devices, controllers and bearings together to make complete systems. And this is really a value-add for the customer and for the company.

What new technologies are you able to offer customers who are concerned with maintenance, reliability or advance prediction of bearing failure?

We already offer a wide range of condition monitoring components combining them with autonomous condition monitoring systems including services like online monitoring. With our FAG Smart Check, we can monitor vibrations in the bearing. Combined with FAG Grease Check for lubrication control and with our lubrication systems we can already offer a 360 degree condition monitoring including predictive maintenance. This helps operators to reduce downtimes for maintenance and to save money.

Another example: We designed a split spherical bearing – produced in the U.S. in Joplin, Missouri. This is very easy to assemble and disassemble. This is really a new development coming from the United States making mounting much easier and also helping to keep downtimes short.

What will the bearings of tomorrow be able to achieve that today's bearings cannot? What is the timeframe for the next level of advancements?

This is my personal vision, to be honest. I think – and this is a perfect example of coming to Industry 4.0 – I think the vision and the future is not just bearings. I think the future will be a bearing with integrated sensors offering information of the actual and the future condition of the bearing but also the complete machine.

This means the bearing is telling you, "I need now to be replaced." The bearing is telling



"I think in the future out of every bearing there will come a wire, and we will have communicating bearings"
— Stefan Hantke.

you, "I need now more grease or more lubrication." And the bearing is telling you in the plant, "I am very close to failing. Please order a new one, and please order it at Schaeffler."

This is my vision. I think we are on the right track. There is still a lot of R&D to be done but in the next three to five years, this will gradually turn into reality. First steps like the 360 degree condition monitoring or the torque measurement are already in the field.

What is the state of manufacturing in the United States?

From my perspective, we in the U.S. are successful everywhere where we are innovative. Examples include John Deere, one of the most innovative companies we are working with in the world; Haas, the machine tool manufacturer on the west coast; and Caterpillar. Very innovative. And these are only a few examples.

Wherever there are innovative companies, suppliers will locate their production and their headquarters. I see the trend in the last five years, especially in the U.S., that a lot of production is coming back here. Our approach is "in the region for the region," but with the highest quality standard. We have the same equipment everywhere in the world – and not cheap machines in India and expensive machines in Germany. We have everywhere the same quality standards, and this makes a difference from my perspective. To be successful in the world market, you have to have high quality, and a lot of production is coming back to the U.S. So I see a very positive future for U.S. production. **PTE**



This FAG torque measurement module for agricultural applications transfers its data to the control system via the ISOBUS. All relevant parameters such as the speed and torque of the take-off shaft, the push-off speed, and the system's hydraulic pressure are recorded using sensors and then processed in the control unit.