SCHAEFFLER

Schaeffler Global Technology Solutions

Production Machinery

Oerlikon Barmag, China

Friction Disk Spindle Bearing Failure Analysis

Oerlikon Manmade Fibers with its product brand Oerlikon Barmag is the world market leader in the development and manufacture of filament spinning systems and equipment for producing manmade fibers such as polyester, nylon and polypropylene, as well as for texturing machines.

Challenge for Schaeffler

A Chinese textile manufacturer had installed around 30 Oerlikon Barmag texturing machines featuring INA-brand friction spindles in 2012. Even during the first and second years after commissioning, the company experienced several failures of friction disk spindle bearings. Approximately 200 spindles were affected. Schaeffler received a customer complaint for all mounted friction disk spindles (in total 7 200 pieces), as such damage affects the spindle accuracy and thus the customer's product quality.

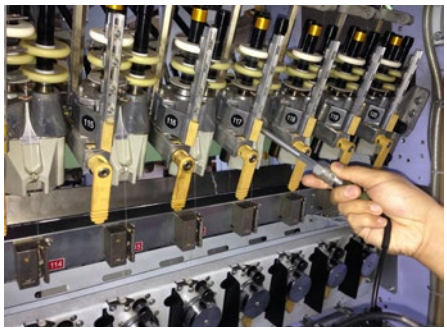
Schaeffler Solution

An initial failure analysis by a Schaeffler China quality engineer revealed that the bearing bottom raceways showed spalling, possibly caused by contaminant particles close to the bottom raceways. The customer was not convinced by this conclusion as he had carried out machine maintenance himself for many years. Thus, another expert from the Schaeffler Global Technology Network, a Schaeffler application engineer for textile machinery from Germany, was called in. He took further failure samples and sent them to the Schaeffler failure analysis department in Germany. Following in-depth investigation, the experts found white etching cracks (WEC) underneath the surface of the raceway. These were caused by the passage of current and the use of a grease containing lithium, which did not correspond with the original grease. A mixing of grease and oil occurred due to relubrication with the incorrect grease, which also contributed to the damage. During their next visit, the Schaeffler experts checked the machine in operation and detected static electricity.

oerlikon barmag

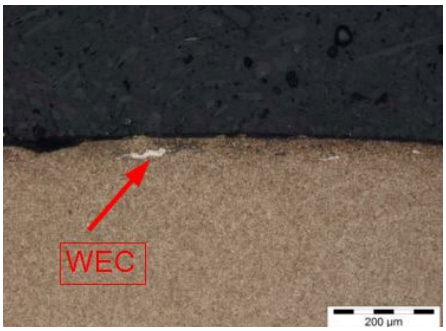
Technical Information about the Texturing Machine
Machine Manufacturer (OEM):
Oerlikon Barmag
Texturing machines:
1. FK-6 2. EFK
Number of Oerlikon Barmag texturing machines:
30 pieces (each equiped with 240 spindles, 7 200 spindles in total)
Speed:
7 000 – 9 000 rpm

LuK INA FAG



Manual vibration check on texturing units with friction unit spindles

INA-brand friction unit spindle F-221502.06 & F-220501.06



"White etching cracks" (WEC) underneath the raceway material

Customer Benefit

Thanks to the inter-site international cooperation within the Global Technology Network, Schaeffler was able to identify the root cause of the friction disk spindle bearing failures. The affected 200 spindles were replaced immediately. Subsequently, the customer received specific recommendations on how to prevent such failures in the future, for example by relubrication at the recommended intervals, as well as by checking for static electricity and avoiding its build-up in the first place. Thus, he is now able to prevent such lengthy downtimes in the future. The textile manufacturer was so satisfied with the service provided by Schaeffler that he plans to equip his new machines too with INA-brand spindles. OEM Oerlikon Manmade Fibers was also very satisfied with Schaeffler's support as it helps the company to keep the textile manufacturer as a satisfied customer.

What's special

WECs are changes in the material's microstructure that develop beneath the surface of the component. As a result of the influence of various external stress factors, cracks form that can cause premature bearing failure. These cracks occur both in through-hardened and case-hardened rolling bearings. Schaeffler has an exceptionally high level of expertise in materials science and tribology, and a team of specialists particularly qualified to analyze bearing damage. Innovative solutions from Schaeffler help to improve the bearings' resistance to white etching cracks and to prevent premature bearing failure.
With the Global Technology Network, Schaeffler combines its local and global competencies. Thus the customer always receives the best solution, anywhere in the world.

Technical Information about the Solution
Number of friction disk spindles affected:
200 of in total 7 200 pieces
Bearing affected:
INA-brand friction unit bearing F-221502.06
Schaeffler recommendations:
• The grease used fo relubrication should be the same as the recommended one used for initial greasing • If a different type of grease is to be used, its miscibility and compatibility must be checked in advance • Relubricaton after 1 year
Operation conditons:
• 50 – 60 °C • 20 – 30 N belt load

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