RESISTING ROLLING CONTACT FATIGUE IN BEARINGS WITH HYBRID STEEL®

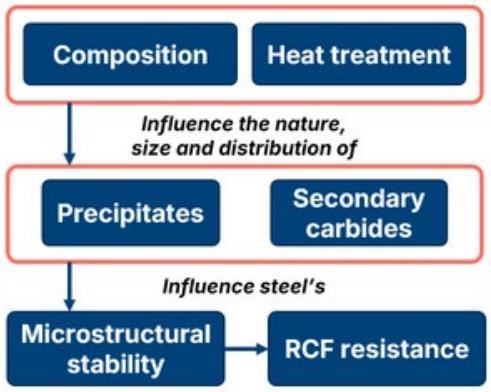
IN BRIEF

Increasing demand on highly stressed bearings

The electrification of heavy vehicles is accelerating demands on highly stressed bearing steels. Additional loads on the powertrain are driving the search for new steel grades with robust fatigue properties. In addition, the energy transition requires steel with enhanced hydrogen and corrosion resistance properties in applications such as offshore wind power.

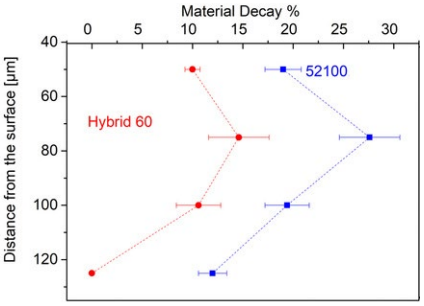
Understanding rolling contact fatigue (RCF)

The ability of a material to withstand rolling contact fatigue (RCF) depends on its composition and heat treatment. These two factors influence the formation of precipitates and secondary carbides that give the steel its stability. Microstructural changes in the contact areas ultimately manifest as fatigue damage. Microstructural stability is then crucial for providing longer service life of bearings under RCF conditions.



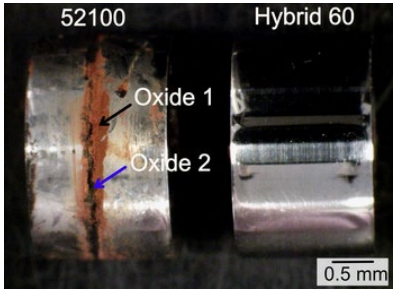
The microstructural stability of Hybrid steel®

Ovako compared the RCF resistance of a traditional bearing steel (52100) with Hybrid steel 60. The results indicate that alloy carbides and NiAl precipitates present in Hybrid steel exhibit high thermodynamic stability, making them less susceptible to dissolution. This resistance to dissolution gives the steel a high decay resistance when exposed to RCF, making it particularly suitable for bearing applications.



Additional properties of Hybrid steel®

Ovako's latest research aims to assess the effects of corrosion on 52100 bearing steel and Hybrid steel 60. One of the main strengths of Hybrid steel are enhanced corrosion and hydrogen resistance properties. In addition to RCF resistance, Hybrid steel 60 is then particularly suitable for bearing applications facing hydrogen and corrosive environment.



Contact surfaces of 52100 bearing steel (left) and Hybrid 60 steel (right) after immersion in a water-based lubricant solution for 12 hours

Key messages

- **Increasing demand for highly stressed resistant bearing steel**
  Partly driven by electrification of heavy vehicles
- **Microstructural stability is crucial for providing longer service life under rolling contact fatigue conditions**
- **Higher microstructural stability of Hybrid Steel 60**
- **Hybrid Steel 60 better suited for special bearing applications where corrosion and hydrogen resistance are required**

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