M.Sc. project: Designed surface integrity of hard turned parts made of Hybrid Steel

- in collaboration with RISE, SKF, Ovako, and Sumitomo Electric

Background
The product performance of advanced bearings of e.g. SKF is very much given by the final machining step of the bearing raceway. The raceway-roller interface is designed to contain an oil film, yet with maximum precision and low friction operation. The surface engineering steps involved are grinding, polishing, honing, and hard turning. In addition, the sub-surface residual stress state is equally important.

Ovako has introduced a relatively high alloyed steel grade aimed at bearings, the Hybrid steels. The possibilities of surface engineering of this Hybrid steel are to date unknown, as compared to the industry standard of 100Cr6 bearing steels.

Aim
This project aims at assessing the surface integrity of steel samples made of Hybrid steel. The samples are prepared through hard turning with cutting conditions aimed at designed beneficial stress state and a surface suitable for the oil film. The project is hosted by Chalmers and assisted by SKF, Ovako and Sumitomo Electric.

Work description:
A literature review is suggested as an introduction to the machining and hard machining of bearings. In addition, insights into engineering steels and hardening processes should be gained.

Experimental work: Ovako and Sumitomo will provide the project with samples of the designed surface integrity through various hard turning conditions of hybrid steel. The surfaces may be assessed with metallography, imaging by optical microscopy and SEM, residual stress profiling and measurement of retained austenite. The work makes use of advanced material characterization equipment at Chalmers and RISE. The goal is to link and explain the relation of the hard turning cutting data and the obtained integrity of the prepared samples. The Hybrid steel is described here: https://steelnavigator.ovako.com/steel-grades/20nicrmov24-20-7/

Time plan and report: The work is planned and carried out over a period of 20 weeks starting in mid-January 2024 (30 credits). Industrial supervisors will be available at Ovako, Sumitomo and SKF. A MSc thesis will be written and presented both in the academic environment at Chalmers, as well as at the industrial partners.

Contact
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