Influence of Run-in Procedures on the Efficiency and Anti-Wear Performance of Hydraulic Pumps

KEYWORDS
Run-in, Friction, Efficiency, Tribology, Hydraulic pumps

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INTRODUCTION
Hydraulic pumps are the most important component in hydraulic drive technology. Before new pumps are delivered, the manufacturer usually performs a function test of the units, which may involve a short run-in procedure. This run-in process has a big influence on the formation of the tribological contacts, in particular the cylinder block/valve plate, piston/cylinder block and swash plate/slipper. The run-in procedure initially leads to an increased particle load in the system and to changes in the system behavior (e.g. efficiency, control behavior). This has been shown on the wear of automotive engine cylinders using different run-in loads [1].

It was also shown, that the short running-in process is far from complete after the functional test and that the hydraulic units continue the run-in at the user site during operation.

SYSTEMATIC INVESTIGATION
Systematic investigations of the tribological effects based on different abstraction levels are planned. Using a disc-disc tribometer, as the highest level of abstraction, an optimal run-in procedure is identified. As part of a previous project, a disc-disc tribometer has already been constructed at the ifas [2]. This tribometer will be adapted to the new requirements in order to be able to map different run-in procedures.

To have a better understanding of the tribological effects, various regular metallurgical analyses, like structural investigations and micro indentation tests will be carried out. Run-in procedures have a substantial influence on the operating life of all kind of tribological contacts. A better understanding of the effects of the first hours of use, especially parameters like normal load, relative velocity, temperature and additives can have a significant impact on the overall operating life of the pump. If an average service life of 10.000 hours is expected, this leads to significant energy savings due to the higher degree of efficiency. The reduced wear also increases the expected service life.

REFERENCES
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