

Large test bench for main bearings at Liebherr

- Validation of main bearings for wind turbines
- A great variety of test options for the development of bearings

Nussbaumen (Switzerland), June 2017 – The Components division of the Liebherr Group brings a new test bench into service for the validation of continuously rotating bearings. The focus is on large diameter bearings which are used as main bearings in wind turbines.

The Components division of the Liebherr Group has brought a new test bench into service to validate continuously rotating bearings. The focus is on large diameter bearings, which are used as main bearings in wind turbines. As a long-term partner of the wind industry, Liebherr is again setting course for the expansion of its product portfolio in this market segment. After a development, design and construction phase of eighteen months, the new test bench was brought into service in the second quarter of this year.

All design, development and calculation work was performed at Liebherr's facility in Biberach (Germany), in order to adapt the test bench in the best possible way to the existing conditions. The test bench mainly consists of components made by Liebherr such as hydraulic cylinders, electric motors and planetary gearboxes. To allow the main bearings to be tested in real machines' environment, a genuine wind turbine's main frame was used as an assembly geometry. It reproduces realistically the stiffness conditions of a wind turbine and enables the engineers to simulate the deformation that actually occurs when the bearing is under load. The turbine's loads can be simulated to its limits with great accuracy. The load simulating system in the test bench encompasses an electric motor and a hydraulic system, thus generating a maximum radial load of 2 meganewtons (MN) and an overturning moment of 8 meganewtonmeters (MNm). The test bench's rated speed of 15 rpm allows the bearing to rotate at very high rotation speeds and in this way to reproduce the number of load cycles occurring during its anticipated life time in a shorter period of time.

In addition to double-row tapered roller bearings and triple-row roller bearings, the new test bench will also be used to validate additional innovative bearing designs in future. The upcoming test campaigns will provide valuable knowledge regarding the service life of the bearings' raceways, seals and rolling elements, and will also be helpful in further creating a continuously optimised design for the main bearings. "In addition, we will determine the specific friction torques of different bearing types and continuously optimise our calculation base", says Andreas Palmer, head of development and design at Liebherr. It will also be possible to gain insights into and monitor various bearing operation parameters such as grease quality, temperature and wear. "The tests will provide valuable information on the effects of the entire bearing arrangement on assembly, warping, stiffness and pre-load. And there is further potential for optimisation with regard to weight reduction and compactness in its dimensions", Andreas Palmer continues.

Field tests will be performed in parallel to the test bench runs on a customer's turbine. With this investment, Liebherr has introduced a structured product validation method for continuously rotating torque bearings and established an important pre-condition for the further expansion of the product portfolio.

Captions

liebherr-test-bench-main-bearing.jpg

New test bench for validating main bearings for wind turbines at Liebherr in Biberach (Germany).

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