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”FDP1#5 - On the detection of rolling contact fatigue in large bearings using roller embedded sensors.”

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Sensor Roller (SR) system is a prototype technology, developed by SKF, that uses sensors embedded in bearing rollers to collect data on load, roller accelerations & rotation speed, and temperature. This data is then transmitted wirelessly to operations and maintenance staff, allowing them to monitor the state and performance of machinery in real time. The system is currently being used in customer pilots for design validation and is being tested in various types and sizes of bearings. There is a desire to further analyse the data collected to improve the performance and reliability of new bearings. Towards this approach, a study was conducted to determine if SR can be used to detect surface damage. Early detection of damage is important to prevent problems such as increased friction, decreased efficiency, and, therefore, reduced lifespan of the machinery. Gathering the data for this study involved artificially damaging an SKF Nautilus bearing raceway and testing it at the SKF Sven Wingquist Test Centre (SWTC), where the testing rigs are designed to reproduce all the loads that this bearing may experience in operation. The Nautilus bearing, mainly used as a main shaft bearing for offshore wind turbines, has an outside diameter of up to four meters and a weight of up to 14 tonnes, and an expected bearing life of more than 20 years. A testing protocol of various machine speeds and loads was initiated with the SR. The damage detection algorithm is comprised of mapping multiple records of data around the bearing race by performing signal processing techniques on the SR data. The results of the study show that it is possible to detect damage on a bearing raceway using a SR.

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