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Lubricants for Wind Turbines Part 2

Gear Oils-Demands and Characteristics

Fuchs Europe Schmierstoffe GmbH, Wolfgang Bock, Henrik Heinemann

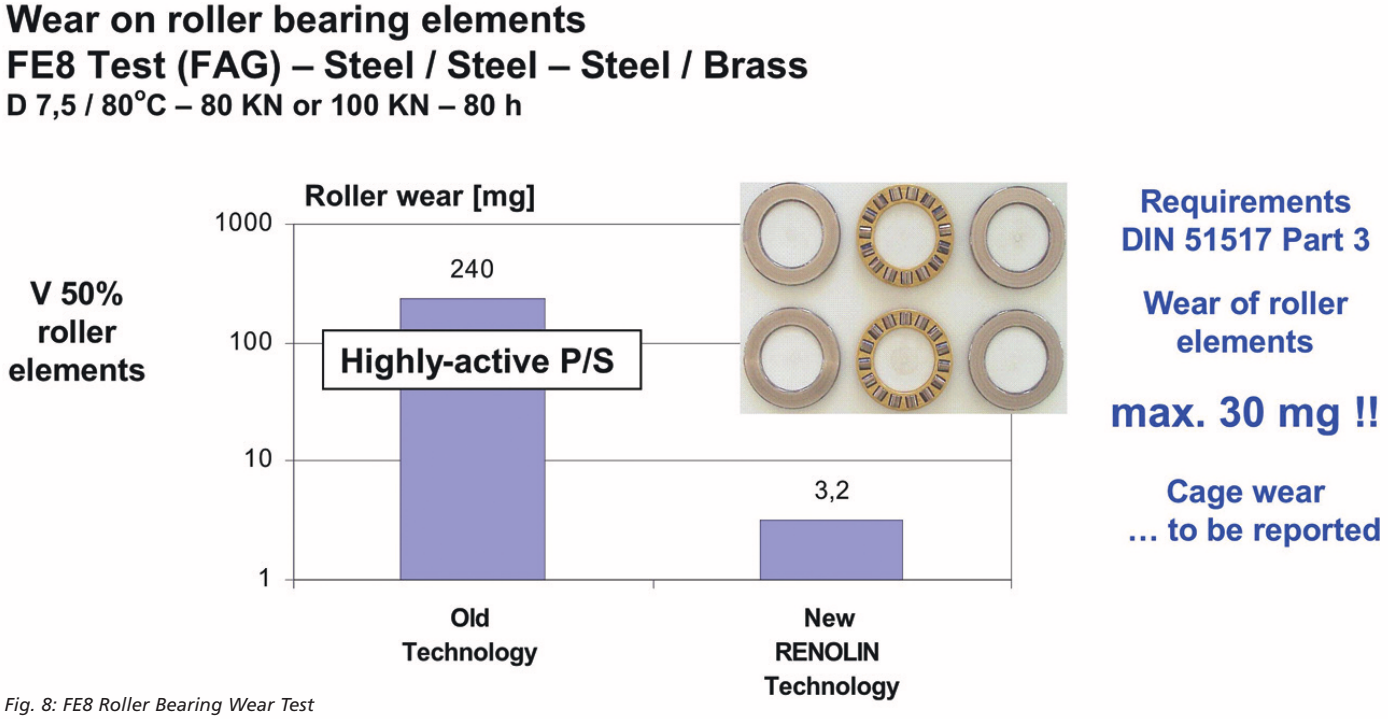

Fig. 8: FE8 Roller Bearing Wear Test

7. Special Tests for Wind Turbine Gear Oils

FAG Wind Turbine Four-Stage Test (Schaeffler-FAG)

The FAG FE8 four-stage test was specially developed for wind turbine gear oils. In the past (about 10 – 15 years ago), gear oils contained highly-active phosphorous-sulphur compounds. In the FE8 test rig, these generated roller wear rates of 200-300 mg. These days, industrial gear oils are formulated with mild phosphorous-sulphur compounds to meet the roller wear specifications of less than 30 mg (Figure 8).

The FAG FE8 four-stage test attempts to replicate different load and mixed friction conditions at different speeds, temperatures and test parameters.

Stage 1 can be described as a short-term test and is performed on the FE8 test rig according to DIN 51 819, Parts 1 to 3 at 80 KN axial load, 80°C for a duration of 80 hours.

Stage 2 describes a fatigue test with moderate mixed friction and is performed on the FE8 test rig at 75 rpm, 100 KN axial load, 70°C for a duration of 800 hours.

Stage 3 is a so-called fatigue test under EHL conditions (10 bearings). The test is performed in the FAG Test Rig L11 at 9000 rpm, an axial load of 8.5 KN, about 80°C and for a duration of 700 hours.

Stage 4 involves a deposit test at higher temperatures in the presence of water. This modified PM paper-making machine oil test from FAG is performed on a special FAG test rig at 750 rpm, an axial load of 60 KN, at up to 140°C for a duration of 600 hours.