

MICROPITTING OF AUSTEMPERED DUCTILE IRON GEARS: BIODEGRADABLE ESTER VS. MINERAL OIL

R. Martins¹, J. Seabra², L. Magalhães³

¹CETRIB, DEMEGI, Rua Dr. Roberto Frias s/n, 4200-465 PORTO, Portugal

²FEUP, Rua Dr. Roberto Frias s/n, 4200-465 PORTO, Portugal

³DEM-ISEP, Inst. Politécnico do Porto, Rua Dr. António Bernardino de Almeida n°431, 4200-072 PORTO, Portugal

ABSTRACT

High strength austempered ductile iron (ADI) gears are widely used in mechanical transmissions having as main advantages the low production cost, the eventual noise and vibration reduction and the self lubricant properties of graphite nodules. Environmental awareness is leading to a growing interest in biodegradable non-toxic lubricants. However, the key aspect for any industrial application is technical performance and technical advantages proved in dedicated tests. The aim of this work is to evaluate and compare the protection against micropitting provided by a biodegradable non-toxic ester and a reference mineral industrial gear oil in gears manufactured in ADI. Gear micropitting tests were performed in the FZG test rig using type C gears according to the DGMK gear micropitting short test procedure. Lubricant samples were collected during the tests. Extensive post testing analysis was performed in order to compare the performance of the two industrial gear oils: pinion and wheel weight loss, evolution of the micropitted area on the teeth flanks, ferrometric analysis of lubricant samples and teeth flank surface roughness.