Comparison of oxidation of EALs using different methods and catalysts

S. Davison[1], J. Carrell[1]

[1]Department of Mechanical Engineering, University of Sheffield, Mappin Street, Sheffield, S1 3JD, UK

Each year around 80 million litres of oil leaks into the sea from marine vessel stern tubes during routine operations around the globe. The use of environmentally acceptable lubricants (EALs) in marine vessel stern tubes is a legal requirement in many countries including the United States and Europe. There has been a rise in bearing failures since the adoption of EALs, resulting in costly bearing repairs and downtime for ship operators.

Early degradation of EALs has been blamed in many cases, of which one of the key mechanisms is oxidation. A variety of different types of EALs are available, with differing levels of oxidation resistance. Fully saturated synthetic esters appear to have the best oxidation resistance, because of their purity and lack of vulnerable carbon to carbon double bonds, but testing methods are not standard and often only endorsed for comparison between manufactured batches of lubricant. Hence, comparison between the claims of different manufacturers are difficult to verify.

The aim of this study was to compare two different the rapid small scale oxidation test (RSSOT) and rotating pressure vessel oxidation test (RPVOT) methods used by industry to define the oxidation resistance of their products. It also investigated the effect of tin as a catalyst as appose to copper because EALs in are exposed to predominantly tin based bearing liners when in operation.

Keywords: Lubricant, EAL, Oxidation, Marine, Journal Bearing

*Corresponding author: sdavison1@sheffield.ac.uk