

## **Effect of Dynamic Loading Frequency on Lubricant Decomposition and White Etching Area Evolution During Severe Slippage in Bearing Steel**

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### **Abstract**

Wind turbine gearbox bearing premature failure is a key challenge in front of lubrication engineers and tribologists over the past two decades. White etching areas (WEAs) formation associated white etching cracking (WECs) is the prevalent mode of premature failure in WTG bearings. Preceding investigations reported that the frequency of WTG transient event and its magnitude is directly related to promote premature failure in bearings. Therefore, it is important to investigate the effect of frequency of dynamic loading on PAO base oil chemical breakdown using 'dynamic load Pin-on-Disc (PoD) tribometer'. The experiments are conducted by varying the dynamic load frequency from 1.5, 3 and 4.5Hz at 1.5GPa contact pressure with sliding velocity of 0.2m/s under severe boundary lubricating condition. Further, the inception of WEAs evolution behaviour of PAO lubricants is studied in detail using various metallographic inspection techniques. Besides that, correlation between loading frequency and decomposition of lubricants will be analysed using FTIR, NMR and EPR techniques.