



UNIVERSITY OF  
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Poster 21

## *Effects of cryogenic treatment on the precipitation behaviour in En31 bearing steel*

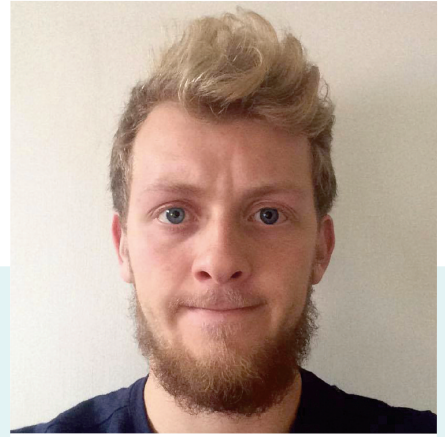
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### *ABSTRACT:*

Deep cryogenic treatment (DCT) is a supplementary treatment step in between hardening and tempering of steel, providing permanent microstructural changes not solely attainable by conventional heat treatment (CHT) processes alone. However, the mechanisms by which DCT is reported to alter the microstructure are contradictory in nature, and often lack correlation to prior thermal history and chemical composition. Roller bearings fabricated from En31 bearing steel typically retain up to 10wt% austenite on quenching, with the presence of austenite causing uncertainty in wear performance and dimensional stability at operating temperatures of 373-523 K. Therefore, tempering using diffraction, calorimetry and dilatometry on En31 bearing steel has been studied after a DCT cycle (93 K, 24 hrs), with varied austenitising temperatures employed prior, to investigate the effects of austenitising temperature and DCT on precipitation behaviour versus CHT samples. DCT is found to reduce the activation energy for the decomposition of retained austenite during tempering.



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