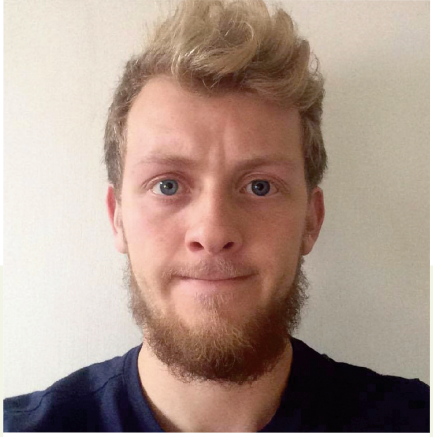
UNIVERSITY OF LEICESTER

Speaker 6

# *Understanding the effects of deep cryogenic treatment on precipitation behaviour in En31 bearing steel*



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*ABSTRACT:*
Deep cryogenic treatment (DCT) is a commonly applied supplementary treatment step in between hardening and tempering of steel, providing permanent microstructural changes not solely attainable by conventional treatment alone. As often cited, DCT provides ferrous alloys with improved hardness and wear properties.

However, the mechanisms by which DCT alters the microstructure are reported in literature as contradictory in fundamental nature, and often lack correlation to prior thermal history and chemical composition. The inconsistency in the field hinders industrial uptake of the process and fails to optimise DCT cycles for specific ferrous alloy applications.

Therefore, tempering using Calorimetry 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. Activation energies have been determined using a Kissinger analysis where possible, with views to optimise DCT cycles.