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Assessment of Remaining Life and Microstructure Degradation of Creep Exposed High – Pressure Rotor Steels

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A remaining life assessment and microstructural ageing study was performed on a high-pressure turbine rotor belonging to a 200 MW coal-fired power plant unit. The rotor consists of 1CrMoV steel that operated for more than 100 kh, under a pressure of 10.55 MPa and a temperature of 520 °C. Core samples were removed from the high stressed geometry areas of the rotor by a plug sampling and hydro – pillar repair welding process. Light microscopy was used to map out creep voids and cracks which form as a consequence of the reduction in creep-strength due to microstructural degradation. Hardness testing was performed to estimate the extent of damage undergone by the rotor. Two methods were used for estimating creep remaining life; creep – cavitation model and a hardness based model. Furthermore, scanning electron microscopy and transmission electron microscopy techniques were used to quantitatively evaluate the microstructural ageing to corroborate the results for accumulated creep damage obtained based on the creep void and hardness measurements.

Apply to be considered for a student award (Yes / No)?

YES

Level for award (Hons, MSc, PhD, N/A)?

PhD

Primary author: Mr NYEMBE, Hlanganani (Centre for HRTEM, Nelson Mandela University)

Co-authors: Dr WESTRAADT, Johan (Centre for HRTEM, Nelson Mandela University); Prof. NEETHLING, Johannes (Centre for HRTEM, Nelson Mandela Metropolitan University)

Presenter: Mr NYEMBE, Hlanganani (Centre for HRTEM, Nelson Mandela University)

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