

# Abstracts of Papers

(Oral and Poster)

# 60 Annual Technical Meeting

Jamshedpur, 15<sup>th</sup> - 16<sup>th</sup> November 2006

Jointly Organised by  
The Indian Institute of Metals  
and  
Tata Steel Limited

compressor stage of aircraft engines in the temperature range from 250 - 600°C. In this temperature range, some titanium alloys have reported to exhibit dynamic strain ageing. In the present investigation, a systematic effort has been made to study dynamic strain ageing in a near a titanium alloy IMI 834. In the temperature range of 375 - 475°C, the alloy IMI 834 has exhibited serrated flow behavior indicating occurrence of dynamic strain ageing (DSA). In the present investigation, the plot of  $\epsilon_c$  vs  $1/T$  exhibited reverse slope behavior indicating interaction of mobile dislocations not only with the solutes atoms but also with precipitates (Ti<sub>3</sub>Al) within the DSA regime of the alloy IMI 834. Fractographic studies have also been carried out to understand the fracture behavior within the DSA regime.

197/POSTER

### STRUCTURAL INTEGRITY ASSESSMENT OF HIGH MAST LAMP POST BASED ON RELIABILITY ANALYSIS

A K Datta, G Das and A K Mallik

Scientist, National Metallurgical Laboratory, Jamshedpur

The present work presents a reliability based approach and the investigations conducted to assess the structural integrity of high mast lamp post. High slender masts are susceptible to fatigue cracking due to high stress concentration influenced by wind loads. Failure investigation of a High Mast Lamp Post had been carried out to ascertain whether it was due to problem related to materials or due to deficiencies in design / fabrication/installation etc. The objective of this work is to impart assurance of some level of reliability as the probability that the slender mast would perform according to specified performance criterion for at least a specified period under specified conditions. The significance of randomness in the variables modeled and the sensitivity of the reliability index on those variables are studied using example problem.

199/POSTER

### INFLUENCE OF AUSTEMPERING TEMPERATURE ON MICROSTRUCTURE AND MECHANICAL PROPERTIES OF CAST Fe-Si-Mn-V STEEL

D. Mandal, M. Ghosh, J.Pal, P. K. De, S. Ghosh Choudhuri, S.K.Das, G.Das and Sukomal Ghosh

National Metallurgical Laboratory, Jamshedpur

The present investigation was carried out to examine the influence of austempering temperature on the microstructure and mechanical properties of a low carbon, high silicon (C-0.13%, Si-1.2%, Mn-1%, V-0.08%) cast steels. The Induction melted casting block was homogenized at 1000°C for 6 hrs. The samples for microstructure and the tensile specimens were prepared

from the cast steel block according to ASTM standards and were imparted three different austempering heat treatments to produce different microstructure. The samples are austenitisation at 900°C for 30 minute and then rapidly quenched to a salt bath maintained at temperature 350/400/450°C for 10 minute and then finally air cooled. The microstructure were observed under optical and TEM microscopy. show that UTS decreases but % EI increases with increasing austempering temperature. The 400°C austempering temperature exhibited the best combination of UTS and %EI at room temperature (UTS-663 MPa, EL-26%) with revealing microstructure of bainite and retained austenite.

203/POSTER

### MAGNETIC EVALUATION OF CREEP ON SERVICE EXPOSED 5Cr-0.5Mo STEEL

J.N.Mohapatra, A.K.Panda, A.K.Ray and A.Mitra

National Metallurgical Laboratory, Jamshedpur

Under high temperature and pressure service-exposed conditions, the materials undergo microstructural changes, which ultimately leads to failure. In pursuit of finding the effect of creep on magnetic properties of thermal components, service exposed 5Cr-0.5Mo material was chosen in the present study. The as-received material that was already in service for 15 years at an operating temperature 400°C and a hoop stress of 40 MPa had dual phase microstructure that was ferritic - martensitic in nature. Magnetic properties of the creep-exposed samples were evaluated using magnetic Barkhausen emission (MBE) and magnetic hysteresis loop (MHL) techniques. The rms MBE voltage and MHL measurements showed variation in magnetic properties that could be associated with carbide precipitation, distribution and growth. Such change lead to change in hardness of the material. The magnetic properties find interesting correlation with microstructure as observed from optical and scanning electron microscopy (SEM).

204/POSTER

### MICROSTRUCTURE AND PHASE EVOLUTION IN SPUTTER DEPOSITED Ni-RICH NiTi THIN FILMS

S. Bysakh<sup>1</sup>, S. V. Kamat<sup>1</sup>, M. A. Sumesh<sup>2</sup> and S. Mohan<sup>2</sup>

<sup>1</sup>Defence Metallurgical Research Laboratory, Kanchanbagh, Hyderabad

<sup>2</sup>Department of Instrumentation, Indian Institute of Science, Bangalore

Thin films with composition of about Ni-47at.%Ti were sputter deposited from alloy targets on Si substrate at 300°C. Two of the as-deposited thin films were given a short annealing at 700°C for 30 minutes followed by 5-hour aging treatments at 400°C and 500°C, respectively. The as-