

Influence of microstructure on fatigue life of cryogenically treated AISI H13 steel

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Cryogenic treatment is widely utilized for tool as well as die steels in order to enhance their performance. AISI H13 die steel is widely used in forging industries wherein fatigue loading conditions are frequently encountered leading to failure of the forging dies. This work involves heating AISI H13 specimens to 1020°C for 20 minutes thereafter quenching in oil followed by double tempering at 525°C. The specimens were subjected to cryogenic treatment at -185°C for 16 hours cryosoaking period followed by soft tempering at 100°C. Rotating bending fatigue test was performed at room temperature at constant amplitude loading conditions. Precipitation of fine carbides in the matrix of tempered martensite assisted in refining the grain structure by inhibiting the grain growth. The fatigue life was reported to be enhanced by 17% on account of obstruction to the fatigue crack propagation due to fine grained structure in case of 16 hours cryogenically treated specimens in comparison with conventional heat treatment for AISI H13.

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Primary authors: SHINDE, Dr. Tarang (Yashoda Technical Campus, Satara, India); Dr DHOKEY, N.B. (Professor, COEP Technological University, Pune)

Presenters: SHINDE, Dr. Tarang (Yashoda Technical Campus, Satara, India); Dr DHOKEY, N.B. (Professor, COEP Technological University, Pune)

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