Abstract

Cryogenic treatment (CT) is the supplementary process to conventional heat treatment process in steels, by deep-freezing materials at cryogenic temperatures to enhance the mechanical and physical properties of materials being treated. Cryogenic treatment (CT) of materials has shown significant improvement in their properties. Various advantages like increase in hardness, increase in wear resistance, reduced residual stresses, fatigue Resistance, increased dimensional stability, increased thermal conductivity, toughness, by transformation of retained austenite to martensite, the metallurgical aspects of eta-carbide formation, precipitation of ultra fine carbides, and homogeneous crystal structure. Different approaches have been applied for CT to study the effect on different types of steels and other materials.
This paper aims at the comprehensive analysis of strategies followed in CTs and their effects on properties of different types of steels by application of appropriate types of CTs from cryogenic conditioning of the process. The conclusion of the paper discusses the development and outlines the trends for the research in this field.

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Index Terms

Computer Science

Computational Intelligence

Keywords

Austenite  Cryogenic Treatment  Carbide formation  Cooling rate  Dimensional stability
Deep-freezing
Martensite
Soaking
temperature
Wear resistance