FACIES AND MECHANISMS INVOLVED IN THE DAMAGING FRACTURED SURFACE OF A STAINLESS STEEL TURBINE BLADES

BOUTAREK Naima, BOULEGHEB K., BELAROUSSI H., BOUTAREK N.

University of Science and Technology Houari Boumediene, Algiers, Algeria

Abstract

This study focuses on the characterization and examination of the fracture mechanisms acting simultaneously on the fractured surface of a of stainless steel turbine blade. This objective is reached using a variety of experimental approaches to determine the material's properties (chemical composition, morphology and crystalline structure) and the microscopic observation of the fractured surface. Major morphological variations are observed (microfacets, microcupules and streaks). Correlations have been established leading to the conclusion that competing fracture mechanisms are involved. The main fracture mechanism is intergranular thermo-mechanical fatigue starting at the border of the blade. However, intragranular fracture by stress corrosion under load, and intergranular fracture by creep are also operative simultaneously in the center of the observed surface. Various explanations for the premature fracture behaviour of the turbine blade are discussed

Keywords: Fractured surface, Turbine blade, Rupture modes, Crack propagation, stainless steel

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