

## EFFECT OF DIFFERENT INVESTMENT CASTING CONDITIONS ON HIGH CYCLE FATIGUE OF MAR-M 247 SUPERALLOY AT ELEVATED TEMPERATURES

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## Abstract

Cast polycrystalline superalloy MAR-M 247 has been thoroughly studied under high cycle fatigue loading. Investigated alloy was available in several batches cast under different conditions and also into different types of molds. Fully reversed (R = -1) fatigue testing was conducted by resonant pulsator in stress control regime at temperatures 650 and 800 °C. Significant differences in fatigue life time were observed among various batches. Obtained fatigue test results are showing the effect of the distribution and size of defects, average grain size and also experimental temperature. Fractured surface of tested specimens underwent fractographic analysis by light and electron microscopy. Typical features of fracture surfaces for the experimental temperatures were closely studied and main deformation mechanisms were described. In most cases, the shrinkage pores were places of the fatigue crack initiation at both temperatures. Advanced electron microscopy techniques like electron back-scattered diffraction (EBSD) and focused ion beam (FIB) revealed significant localization of cyclic plastic deformation partly diminished with increased experimental temperature.

Keywords: Nickel based superalloy, high cycle fatigue, elevated temperatures, fractography

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