

8th International Conference on Physical and Numerical Simulation of Materials Processing (ICPNS)

14–17 October 2016

Seattle, Washington | Hosted by Purdue University

SESSION 5: IRON AND STEEL, HARBOR HALL

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SATURDAY, OCTOBER 15, 2016

Properties that characterize the material X46Cr13 steel

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ABSTRACT

Optimization of structure implies among other details, also choice of appropriate material. The material under consideration in this study is X46Cr13 (1.4304) steel. Pump parts, valves, cutting tools, etc., are usually mentioned as its applications in mechanical engineering. In this sense, it is important to know material's mechanical properties at different temperatures, its resistance to creep and fatigue limit for prescribed stress ratio. Mechanical properties, such as ultimate tensile strength, yield strength, and modulus of elasticity, for considered material were determined at different temperatures on the basis of engineering stress–strain diagrams using material testing machine. Uniaxial short-time creep tests were carried out at different temperatures and different stress levels and are presented by creep curves. Results of high cycle fatigue tests, carried out at stress ratio $R = 0.25$, were entered in diagram maximum stress versus number of cycles to failure. Finite fatigue regime was modeled by inclined log line, whereas infinite fatigue regime was modeled by horizontal line and it represents fatigue limit.

KEYWORDS: mechanical properties, short-time creep, fatigue, X46Cr13 steel