

INFLUENCE OF COATING AND ENVIRONMENT ON THE CREEP OF THE Ti-6Al-4V ALLOY AT 700°C ⁽¹⁾

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ABSTRACT

Ti-6Al-4V is currently used in aeronautic and aerospace industry mainly for applications that require resistance at high temperature such as, blades for aircraft turbines and steam turbine blades. The titanium affinity by oxygen is one of main factors that limit the application of their alloys as structural materials at high temperatures. Notables advances have been observed in the development of titanium alloys with the objective of improving the specific high temperature strength and creep-resistance properties. However, the surface oxidation limits the use of these alloys in temperatures up to 600°C.

The objective of this work was study the influence of the plasma-sprayed coatings for oxidation protection and the atmosphere on creep of the Ti-6Al-4V alloy, focusing on the determination of the experimental parameters related to the primary and secondary creep states. Ytria (8 wt.%) stabilized zirconia (YSZ) (Metco 204B-NS) with a CoNiCrAlY bond coat (AMDRY 995C) was atmospherically plasma sprayed on Ti-6Al-4V substrates by Sulzer Metco Constant load creep tests were conducted with Ti-6Al-4V alloy in air and in nitrogen atmospheres in uncoated samples and in air in coated samples at stress level of 56 MPa at 700°C. The highest values of t_p and the reduction of the steady-state creep rate demonstrated that the higher creep resistance of Ti-6Al-4V was observed in uncoated samples in nitrogen atmosphere and coated samples in air. Results indicated the creep resistance of the coated alloy was greater than uncoated in air, but nitrogen atmosphere was more efficient in oxidation protection.

Keywords: Ti-6Al-4V; Creep; Metallurgy, Non-ferrous metals.

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61º Congresso Anual da ABM – Rio de Janeiro – Julho 2006

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