Isothermal Oxidation Behavior of Tribaloy^{TM} T400 and T800

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Abstract: The long-term isothermal oxidation behavior of Tribaloy^{TM} T400 and T800 in synthetic air at 900 °C for up to 1000 hours was investigated. The mass gains of the samples were recorded continuously during the experiments with a thermobalance. Post mortem inspection of the samples was performed and the oxidation mechanism was analyzed. The results show that T800 has a better oxidation resistance than T400. The parabolic rate constant k_p of T800 is $2.4 \cdot 10^{-13}$ $g^2 \cdot cm^{-4} \cdot s^{-1}$, which is about one order of magnitude lower than $1.7 \cdot 10^{-12}$ $g^2 \cdot cm^{-4} \cdot s^{-1}$ for T400. The penetration depth of the oxides in T800 is less than half of that in T400 and steady state oxidation is attained after about 400 h, compared to 600 h for T400. The better oxidation resistance of T800 is related to its higher Cr content whereby protective Cr_2O_3 scales form more readily.

Keywords: Tribaloy; T400; T800; Oxidation resistance; Oxidation mechanism

1. Introduction

Tribaloy^{TM} (a registered trademark of Kennametal Inc.) alloys are a group of Co or Ni-based superalloys that are extensively used as wear-resistant and corrosion-resistant coating materials for applications in which extreme wear is combined with high temperatures and corrosive media, such as industrial turbine applications [1-5]. Tribaloy^{TM} alloys are composed of a large volume fraction of hard intermetallic Laves phase dispersed in a eutectic matrix of Laves phase and a Co- or Ni-based solid solution. These alloys can be used up to 800-1000 °C [6]. The hard Laves phase is a ternary C14 $MgZn_2$-type Laves phase with a melting point of about 1560 °C and compositions between