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ВЛИЯНИЕ ПРОМЕЖУТОЧНОЙ ТЕРМОМЕХАНИЧЕСКОЙ ОБРАБОТКИ В УСЛОВИЯХ ПОЛЗУЧЕСТИ НА ХАРАКТЕРИСТИКИ ПРОЧНОСТИ И МИКРОСТРУКТУРУ СПЛАВА АМг6М

EFFECTS OF INTERMEDIATE THERMO-MECHANICAL TREATMENT IN CREEP ON STRENGTH CHARACTERISTICS AND MICROSTRUCTURE OF AMg6M ALLOY

The effects of the intermediate thermomechanical treatment in creep on the strength characteristics and the microstructure of the AMg6M aluminium-magnesium alloy were studied. Mechanical tests were carried out at 160ºC and pressure of 23.3 mPa. Samples were preliminary tested in creep to about one-half the time of their failure, and then they were subjected to the intermediate thermomechanical treatment considering compressive and tension loads in a thermal field as well as an ultra-sonic frequency impact. A generator was used as an impact by scanning the sample surface with a frequency of 20 kHz using the block head of the striker. The treatment was carried out using two schemes. In accordance with the first scheme, samples were initially endured at a tension load to about one-half the failure time. After unloading and cooling samples were subjected to high-temperature compressive loading and then samples were subjected to the impact treatment at an ultrasonic frequency. Thereafter samples were reloaded by an initial tension load and placed in creep to failure. In accordance with the second schemes, after treatment with high-temperature compressive pressure samples were annealed at T= 320º during 2 hours following by the ultrasonic frequency impact. The analysis of the test results of samples in an initial state and after the energy treatment presented that an intermediate plastic deformation in creep improves characteristics of a short-term strength and the time to failure of the AMg6M alloy. The first-scheme treatment raises significantly the time to failure in creep but reduces drastically the material plasticity. Annealing allows a rise of the time to failure of the alloy on a relative retention of yield limit.

Keywords: aluminium-magnesium alloy, self-organizational processes, life, creep, intermediate plastic deformation, high-temperature compressive load, impact ultrasonic oscillation, annealing, removal of faults.

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