

EFFECT OF HEAT TREATMENT PARAMETERS ON MECHANICAL PROPERTIES OF Cu-Al-Fe ALLOY

ABDUL HAMEED KHAN¹ & PRAVIN KUMAR SINGH²

¹Asst. Professor, Mechanical Department, Trinity Institute of Technology and Research, Raisen Road, Bhopal, India

²Asst. Professor, Mechanical Department, Barkatullah University Institute of Technology, Barkatullah University, Hoshangabad Road, Bhopal, India

ABSTRACT

The present investigation deals with the study relating the response of aluminum bronze (Cu-Al-Fe alloy) under the condition of changing heat treatment parameters and type. The types of heat treatment employed in this investigation types were solutionizing and ageing. The solution treatment was carried out at two temperatures (850°C and 900°C) and duration in the range of 0.5, 1, 1.5 and 2 hrs respectively. Similarly, ageing was carried out at 300°C, 400°C and 500°C wherein the duration of the ageing was maintained at 2 and 3 hrs respectively. The heat treated samples were subjected to water quenching in order to bring them to ambient temperature. The behavior of the alloy has been assessed in terms of the influence of the type, temperature and duration of the heat treatment on the microstructural and mechanical properties of the samples. Results showed that as cast alloy showed granular structure consisting of primary α , eutectoid $\alpha+\gamma_2$ and Fe rich phase. Solutionizing led to the microstructural homogenization by way of the elimination of the dendrite structure and dissolution of the eutectoid phase and other microconstituents to the form the single phase structure consisting of β . This was followed by the formation of the β' martensite, retained β and α . Ageing brought about the transformation of the martensite and other microconstituents into the eutectoid phase. Also, solutionizing at 850°C for 2 hrs led the alloy to attain the highest hardness in the category of solutionized samples while ageing at 300°C for 2 hrs offered maximum hardness amongst the aged samples. The as cast alloy attained highest compressive strength and strain followed by that of the heat treated samples while the trend reversed as far as their tensile properties are concerned.

KEYWORDS: Aluminum Bronze, Heat Treatment, Microstructure, Mechanical Properties, Microstructure Property-Correlations

Received: Dec 17, 2015; **Accepted:** Dec 20, 2015; **Published:** Dec 25, 2015; **Paper Id.:** IJMMSEDEC20153