

MSE SEMINAR

February 24, 2017

113 McBryde Hall

3:30 – 4:30 PM

Refreshments at 3:00 PM

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“Thermo-processing of Nickel Aluminum Bronze”

ABSTRACT

Nickel-Aluminum Bronze (NAB) is a series of copper-based alloy with the additions of 9% - 12% Al, 6% Ni and 3 to 4.5 % Fe weight percent specified by ASTM B148 [25] for cast marine propellers, ASTM B150 [26] for plates and ASTM B171[27] for bars. The high corrosion resistance makes it one of the most used alloys in a marine application. The Nickel Aluminum Bronze primarily alloying elements are Copper (Cu) with the additions of secondary elements such as Nickel (Ni), Aluminum (Al), Iron (Fe), and Manganese (Mn). The secondary elements addition percentages can vary according to the specification. The chemical composition requirement for as-cast material falls under the ASTM B148 standard and the chemical composition requirement for wrought plate material falls under the ASTM B150 standard plate specification C63200. This alloy has a microstructure of Copper (Cu) rich solid solution know as an alpha phase with an (FCC) structure surrounded by lamellar eutectoid phase with a series of intermetallic kappa phases (k) and dark etched martensitic regions beta phase (B) or retained beta prime with a B2 high-temperature phase structure. The research has a dual goal, the first goal is to develop a thermo-processing such as rolling schedule to manufacture 1” to 2” plates. The second goal is to study the alloy phases to learn about the microstructure provide an optimum rolling schedule at elevated temperature.