STUDYING THE EFFECT OF QUENCHING MEDIUM AND THE AGING TEMPERATURE ON HARDNESS OF Al6063 ALLOY

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This study investigates the influence of different combinations of quenching mediums and aging temperatures on the hardness of Al 6063 billets. To of finding maximum hardness, samples underwent quenching in air, water, and a salt bath and aging at temperatures of 170°C, 190°C, and 210°C. Microstructure images were obtained after quenching and after aging to compare the grain structures. Scanning Electron Microscope/Energy Dispersive Spectroscopy (SEM/ EDS) analysis is utilized to examine the composition of both the inside and outside of the particles present in the samples of after aging, use to identify and characterize the precipitates formed during the aging process. Scanning electron microscopy (SEM) images are obtained for samples representing the highest, lowest, and medium hardness values after aging, to investigate the relationship between hardness and particle sizes distribution. The major results of this research revealed that the combination of quenched medium as salt and an aging temperature of 190°C resulted in the highest hardness value of 85.46HV. This optimized process can serve as a practical guideline for industries seeking to enhance the mechanical properties of Al6063 alloy, ensuring they can achieve the desired hardness levels efficiently and reliably. The exploration of this novel quenching medium presents an opportunity for local industries to adopt this approach and potentially improve their manufacturing processes by capitalizing on the benefits of salt quenching.

Keywords: Quenching Medium, Aging Temperature, Hardness, Al 6063 Billets, Microstructure, Precipitates, Particle Size Distribution.