

## Analyses and Optimization of Physical and Mechanical Properties of Direct Recycled Aluminium Alloy (AA6061) Wastes by ANOVA Approach

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**Abstract :** The present study is aimed at investigating microhardness and density of aluminium alloy chips when subjected to various settings of preheating temperature and preheating time. Three values of preheating temperature were taken as 450 °C, 500 °C, and 550 °C. On the other hand, three values of preheating time were chosen (1, 2, 3) hours. The influences of the process parameters (preheating temperature and time) were analyzed using Design of Experiments (DOE) approach whereby full factorial design with center point analysis was adopted. The total runs were 11 and they comprise of two factors of full factorial design with 3 center points. The responses were microhardness and density. The results showed that the density and microhardness increased with decreasing the preheating temperature. The results also found that the preheating temperature is more important to be controlled rather than the preheating time in microhardness analysis while both the preheating temperature and preheating time are important in density analysis. It can be concluded that setting temperature at 450 °C for 1 hour resulted in the optimum responses.

**Keywords :** AA6061, density, DOE, hot extrusion, microhardness

**Conference Title :** ICAMMMMET 2018 : International Conference on Applied Mechanics, Materials, Manufacturing, Mechanical Engineering and Technology

**Conference Location :** Tokyo, Japan

**Conference Dates :** March 27-28, 2018