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# Improvement of ultimate tensile strength by artificial ageing and retrogression treatment of aluminium alloy 6061

ACCEPTED MANUSCRIPT

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## Abstract

In the present work, the relation between ageing and retrogression temperatures on Al 6061 alloy hardness and ultimate tensile strength (UTS) was studied. It was found that higher UTS and hardness were obtained at higher ageing, retrogression temperatures, and lowest retrogression time. Controlling these parameters, alloy UTS has been improved 12% over T6 temper, showing a 40% reduction in time consumption during the thermal treatment. By means of a multiple linear regression method, a correlation has been established between UTS, hardness, and time/temperature for ageing and retrogression regimes. This correlation can be used to select adequate ageing temperature and retrogression time-temperature in order to obtain both specific UTS and hardness on aluminium 6061 alloy.

Keywords: Aluminium alloy, artificial ageing, retrogression, hardness, UTS, microstructure

## 1. Introduction

In modern times it is imperative to improve customer value through products based on design of advanced structural materials; this requires the extension of system life and lowering environmental impact. It is of most importance the reduction of product weight in industries of global importance such as transportation and aeronautical [1]. The need for these requirements has led to many improvements in materials design during the few past decades through research on material science.

Improved structural materials such as polymer matrix and ceramics have found little success when incorporated into aircraft design due to manufacturing high costs, lack of proper research for

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