

## MICROSTRUCTURE AND MECHANICAL CHARACTERISTICS OF TITANIUM ALLOY TC21 AFTER HEAT TREATMENT

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### ABSTRACT

Effect of heat treatment on microstructure and mechanical properties of TC21 titanium alloy was investigated. TC21 in annealed condition with an equiaxed  $\alpha+\beta$  structure was solution treated at temperature below  $\beta$ -transus ( $920^{\circ}\text{C}$ , 15 min) and temperature above  $\beta$ -transus ( $1020^{\circ}\text{C}$ , 15min, WQ). Aging was applied for both groups of samples ( $600^{\circ}\text{C}$ , 4h, AC). Treated samples below  $\beta$ -transus showed an equiaxed  $\alpha+\beta$  structure. Samples treated above  $\beta$ -transus have been changed to a solely  $\beta$ -phase with little amount of secondary  $\alpha$ -phase precipitated in the formed  $\beta$ -phase due to high cooling rate and aging process. Maximum hardness of  $492\text{HV}_{30}$  was reported for samples treated at  $1020^{\circ}\text{C}$  due to precipitation of secondary lamellar alpha phase and small lathes of martensitic phase ( $\alpha'$ ) in  $\beta$ -matrix. Maximum tensile strength of  $1447\text{MPa}$  and ductility of 8% were reported for the samples treated at  $920^{\circ}\text{C}$  due to its structure that contained  $\alpha$ ,  $\beta$  and  $\alpha_s$ . Hence, treated samples at  $920^{\circ}\text{C}$  showed the best mechanical properties and the most reliable and repeatable characteristics.

**KEYWORDS:** TC21 Titanium Alloy; Heat Treatment; Microstructure; Mechanical Properties

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