

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 β -transus (920°C , 15 min) and temperature above β -transus (1020°C , 15min, WQ). Aging was applied for both groups of samples (600°C , 4h, AC). Treated samples below β -transus showed an equiaxed $\alpha+\beta$ structure. Samples treated above β -transus have been changed to a solely β -phase with little amount of secondary α -phase precipitated in the formed β -phase due to high cooling rate and aging process. Maximum hardness of 492HV_{30} was reported for samples treated at 1020°C due to precipitation of secondary lamellar alpha phase and small lathes of martensitic phase (α') in β -matrix. Maximum tensile strength of 1447MPa and ductility of 8% were reported for the samples treated at 920°C due to its structure that contained α , β and α_s . Hence, treated samples at 920°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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