



## STUDYING THE EFFECT OF VARIOUS PARAMETERS ON DRY SLIDING WEAR BEHAVIOR OF TC21 TITANIUM ALLOY USING TAGUCHI EXPERIMENTAL DESIGN

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### ABSTRACT

*This study investigates the effect of independent control factors of heat treatment, normal pressure and sliding speed on the dry sliding wear behavior of TC21 titanium alloy using Taguchi's experimental design. Dry sliding wear tests were carried out using a pin on disk testing device based on Taguchi's orthogonal arrays. Two heat treatment cycles were carried out to produce different microstructures with different hardness and hence, different wear resistance. Using signal-to-noise ratio and analysis of variance (ANOVA), the main controlling factors that influence the dry sliding wear were determined for this alloy. The normal pressure was the most significant control factor (~85 %) affecting the wear resistance followed by sliding speed (~8 %) and at last heat treatment (~5 %). A regression model has been developed and showed a good prediction ability with average absolute deviation less than 10 %. SEM analysis of worn surface revealed that the abrasive wear is the predominant mechanism under low levels of pressure and speed while adhesion and delamination mechanisms was predominant under high pressure and speed.*

**KEYWORDS:** Wear, Titanium Alloy TC21, Heat Treatment, Normal Pressure, Sliding Speed, Design of Experiment (DOE), Taguchi

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