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## Tribological properties of surface modified Ti-6Al-4V alloy under lubricated condition using Taguchi approach

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### Abstract

Surface modification technique is important to enhance the tribological properties of titanium alloy grade 5 (Ti-6Al-4V). One of the surface melting techniques is tungsten inert gas (TIG) torch welding to produce similar results to the costly high power laser technique. The substrate alloy was preplaced with silicon carbide (SiC) powder and then melted using tungsten inert gas (TIG) torch surface melting technique. The process parameters of the surface melting technique are current, voltage, travel speed and SiC powder size. The process optimization was carried out to obtain the desired quality characteristics of the SiC coated surface using Taguchi method in the Minitab version 17 software. The results showed that the significant improvement of hardness and better wear rate performance. The maximum hardness increased until 482.3 Hv compared to substrate material of 152.8 Hv. The lowest result of the SiC modified titanium alloy for wear rate is 0.1711 mm<sup>3</sup>/Nm and coefficient of friction is 0.39. It is found that the voltage and SiC powder sizes play important role on the hardness, wear resistance and coefficient of friction of the modified titanium alloy surface layer.

### Keywords

**Author Keywords:** TIG torch technique; Tribology characteristics; Optimization; Taguchi Approach; Ti-6Al-4V

**KeyWords Plus:** WELDING PARAMETERS; WEAR PERFORMANCE; STEEL; OPTIMIZATION; LAYER

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