VISVESVARAYA TECHNOLOGICAL UNIVERSITY

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Project Report On

"STUDY OF DRY SAND ABRASIVE WEAR BEHAVIOR AND CORROSIVE PROPERTY OF HOT FORGED Al-6061 AND Ni-P-TiO_2 COMPOSITE FOR THE APPLICATION IN THE MANUFACTURE OF WINDMILL BLADES"

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ABSTRACT

In the modern world the diminishing non renewable resources has created more demand for the energy produced using renewable resources like wind, solar, tides etc... out of which wind energy plays a significant role in meeting the energy demand. In wind mill kinetic energy of the wind is used to produce energy. In wind mills the blades are continuously flexed due to unsteady gravitational and inertial loads, hence the blades are made of composite materials. But the composite used for blades are not economical which limits the use of wind for producing energy. Hence attempt has been made to develop the material which is more economical and satisfies all the requirements for it to be used in the manufacture of wind mill blades. Here Al-6061 is chosen as matrix material because of its low density and excellent formability. In the present study an attempt is being made to reinforce titanium dioxide (white particulates) into aluminium 6061 alloy. Before reinforcement, titanium dioxide is coated with nickel to improve its wettability. The 4wt% Ni-P-TiO2 is reinforced to Al-6061 by liquid metallurgical method and the cast obtained is hot forged at 550°C. The specimen of required shape and dimension suiting to different tests are prepared from forged plates. These specimens are then heat treated for different intervals of time (2, 4, 6, 8hrs). The obtained specimens are subjected to following tests.

- Dry sand wear abrasion test
- Corrosion test
- Tensile and Compression test
- Micro hardness and micro structure

By comparing the results obtained for different heat treated specimens of Al-6061 and 4% Ni-P-TiO2 composite, it can be stated that corrosive property and wear resistance of the Al-6061 has improved by reinforcing Ni-P-TiO2 and further improvement is found by heat treating the composite.