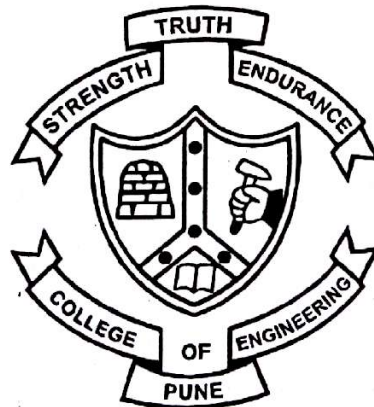


A
DISSERTATION REPORT
ON
**Wear Resistant Coating of Aluminium Alloy by Laser Assisted
Thermit Reaction**

Submitted in partial fulfillment of the requirements
of the degree of
**Master of Technology
(Process Metallurgy)**

By
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Abstract

Thermit reaction is used in industry mainly in fusion welding. However, in this work, it is used to make wear resistant coating on aluminium alloy substrate using laser heat to control the reaction. The aim of this study is to increase wear resistance and hardness of aluminium 6068 alloy substrate. The substrate was initially coated with slurry of powder mixture of $\text{Al}:\text{Fe}_2\text{O}_3$ in alcohol to a constant average thickness of $120\text{ }\mu\text{m}$. A continuous wave fibre laser beam with the maximum power of 400 W was used to heat the coated layers. A constant scan spacing of 2.8 mm was used and the shielding provided with argon gas. Laser clad layers were produced by varying the parameters like amount and ratio of aluminium and iron oxide powders in the mixture, laser power and scanning speed. The coated specimens were analysed for microstructure, coating thickness, coating composition along with hardness and wear behaviour of the coatings. With the scanning speed of 1 mm/s and laser power of 220 W , a maximum coating thickness of $349.5\text{ }\mu\text{m}$ for the powder with $75\text{Al}:25\text{Fe}_2\text{O}_3$; it resulted in hardness of $356\text{ HV}_{0.1}$. XRD analysis indicated that the coated layer is a composite mixture of phases like Al , Fe , Al_2O_3 and Fe_2O_3 , confirming the thermit reaction during laser heating.