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CAD MODELLING AND THERMAL ANALYSIS OF DISC BRAKE BY USING OXIDE AND NON-OXIDE MATERIAL

T. Ganesh[1], M. Pugazhenthi[2], E. Thamizhventhan[3] & V. Manikandan[4]

[3]B.E, Mechanical Engineering, ARJ College of Engg & Tech, Edayarnatham, Mannargudi

[4]Professor of Mechanical Department, ARJ College of Engg & Tech, Edayarnatham, Mannargudi

ABSTRACT

The vehicle braking system is considered one of the most fundamental safety-critical systems in modern vehicles, with its primary purpose being to stop or decelerate the vehicle. The frictional heat generated during braking application can lead to numerous negative effects on the brake assembly, including brake fade, premature wear, thermal cracks, and Disc Thickness Variation (DTV). Historically, studies of thermal analysis of a disc brake assembly using the finite element method have seldom considered factors such as surface roughness and wear at the pad interface.The motivation behind this project is to reduce the weight of the disc rotor by replacing conventional materials with composites. The objective of this research is to design and manufacture an Aluminum metal matrix composite disc brake using the Stir casting method. AL6061 serves as the base alloy, supplemented by Al2O3 as the matrix material. Following manufacturing, the thermal performance of the disc brake models is defined. Thermal performance emerges as a key factor, studied extensively using a 3D model in Finite Element Analysis simulations. Experimental validation of the FEA results will provide insight into how efficiently the implemented disc brake operates, potentially aiding in the reduction of accidents that may occur daily.

KEYWORDS: *CAD Modeling, Disc Brake*

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