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## MODELLING AND ANALYSIS OF A DISC BRAKE PLATE

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### ABSTRACT

The standard disc brake plate of two-wheeler is mostly used by many two-wheeler manufacturing companies. These companies are also customizing the disc plate with new designs and different materials. The disc plate braking system is predominantly used in many automobile industries. Generally, the disc plate braking system has good efficiency. In this project, the standard disc plate is designed using the NX CAD software and using the Ansys workbench the thermal analysis and static structural analysis also calculated. The deformation, stress, Heat flux and temperature of disc brake model. The latest CAD software introduced includes the new NX 10 software, which has important features like 2D,3D and surface modelling the component can be either designed on this software or can be retrieved from any other CAD software. This is important to understand action force and friction force on the disc brake new material, how disc brake works more efficiently, which can help to reduce the accident that may happen in each day. The suitable material for the braking operation is selected and all the values obtained from the analysis are less than their allowable values. Hence the brake Disc design is safe based on the strength and rigidity criteria. By identifying the true design features, the extended service life and long-term stability is assured. In this we done analysis between gray cast iron, aluminum alloy and carbon fibers. We found that carbon fiber is the best suitable material but the cost is more thus mostly industries prefer cast iron.

**Keywords:** Disc Plate, Computer Aided Engineering, Optimizing.

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### I. INTRODUCTION

In today's rapidly expanding automotive market, the rivalry for higher-performance vehicles is increasing. The disc brake is a mechanism that slows or stops the wheel from rotating. A brake is commonly made of cast iron or ceramic composites such as carbon, aluminium, Kevlar, and silica and is attached to the wheel and axle. Mechanically, hydraulically, pneumatically, and electromagnetically, a friction substance in the form of brake pads is pressed on both sides of the disc. The friction between the disc and the attached wheel causes the vehicle to slow or stop. The vehicle generally uses a regenerative braking system or else a friction braking system. A friction brake reduces movement by generating frictional force when two or more surfaces rub against each other. Vehicle friction brakes are classified as disc brakes or drum brakes based on their design configurations. Our project is about disc brake rotor modelling analysis and Machining.

When a car brakes applied repeatedly, it generates a lot of heat. For optimal brake performance, this heat must be dispersed. The temperature rise in the brake components has a significant impact on braking performance. Thermal cracks, brake fade, wear, and a drop in the coefficient of friction can all be caused due to high temperatures.

The kinetic and potential energies of a moving vehicle are transformed into thermal energy by friction in the brakes during braking. By blowing air over the brake pad and disc, the heat generated between them can be dispersed. Conduction, convection, and a small amount of radiation are used to transfer heat. The study of the heat transfer phenomenon between the disc, pad, and the air medium is required to achieve proper cooling of the disc and pad through convection. Then, in order to estimate the increase in temperature while braking, it's crucial to examine the disc brake system's thermal performance. Convective heat transfer model has been used to analyze the cooling performance. Brake discs are provided with cuts to increase the area coming in contact with air and improve heat transfer from disc.

Properties to be considered

1. Coefficient of friction.