**A PROJECT REPORT ON**

# Design, Analysis and Optimization of Aluminium Based Composite Bearings

Submitted to

**VISVESWARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM**

In partial fulfillment of requirement for the award of the degree in Bachelor of Engineering in Mechanical Engineering

Submitted by


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|---|---|
| **PRADEEP RAJAN D** | **1HK09ME065** |
| **M. FREXIN SIMON** | **1HK09ME033** |
| **SYED WASEEM AKRAM** | **1HK09ME091** |
| **ANISH KUMAR PATHAK** | **1HK09ME003** |



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*Under the Guidance of*


**Prof. BHARAT VINJAMURI** **BE, MTech, (PhD)**
Dept. of Mechanical Engineering,
H.K.B.K College of Engineering,
Bangalore - 45


**Department of Mechanical Engineering**
**H.K.B.K College of Engineering**
**Bangalore**

# ABSTRACT

A possible way of improving the operating performance of a machine component is to mount their rolling members not in antifriction, as is done at present, but in sliding bearings. In this connection, a great deal of research is being conducted at present with an aim of developing and selecting a suitable bearing material for this application. The present investigation is aimed at formulation of design procedure, selection and testing of wear resistant materials meeting the requirements of sliding bearing operation in actual service.

Present investigation is aimed to develop a systematic procedure to design, model and perform analysis of sliding bearings made of Al – SiC metal matrix composites (MMCs). In this model various physical and mechanical properties of MMCs have been taken from the existing literature and a method is developed to understand the influence of change in volume fraction of reinforcement on the performance of bearings.

In this study, a computerized three dimensional model of the bearing was modeled using CATIA software. The concept of Finite element method (FEM) is implemented to determine the performance of bearings made of metal matrix composites (MMCs). A commercially available finite element package, ANSYS is used for the numerical analysis.

This study shows that the incorporation of Al-SiC MMCs results in reduction of contact stresses in sliding bearing and thereby improving the performance. Also the other major parameters that influence the performance of bearings like total deformation, pressure and frictional stress proves that Al SiC can be used as an equally competent material for design of bearings. The analysis showed that the wear rate of Al SiC is more than the sintered bronze but can be minimized by changing the percentage of reinforcement.

The experimentally measured values are compared with the numerically calculated ones and also with the existing theoretical and empirical models. The values obtained using finite-element analysis (FEA) is found to be in reasonable agreement with the experimental values.