Code	AMI- NPST009 (13-ADV971-02)
Project Name:	**Modelling and Optimization while Machining Particle Reinforced Alumina Based Metal Matrix Composites**
Objectives:	1. Development of 3D Finite Element Model for Machining of particulate reinforced Aluminium based MMC. 2. Verification and tuning of the model using experimental runs. 3. Development of Response surface model using Design of Experiments. 4. Multi-Objective optimization of the model using Genetic Algorithms. 5. Verification of the solution by experimental runs.
Project Period	02 years
Start Date	Not started yet
Budget	SR 1,760,000/-
Status	Accepted
Project Outcome	1. Robust Finite Element Model for Machining of MMC. 2. An integrated frame work for modelling and optimization of MMC
Abstract	Metal matrix composites contain at least two separate phases, arranged in a way to obtain properties which cannot be attainable by constituent phases. Most of the MMC have two phases which can be in the form of short or long fibers or in the form of small particles surrounded by a metallic matrix. MMC are gradually replacing conventional metals in many engineering applications due to their superior properties like fracture resistance, higher stiffness and extremely good strength to weight ratio. The machinability of MMC in terms of tool wear and workpiece quality can be improved by selecting suitable cutting parameters namely; speed, feed, depth of cut, cutting tool geometry and its relative inclination with respect to the workpiece. However individual and combined effect of these cutting parameters is difficult to model analytically and therefore numerical models such as Finite Element Models (FEM) and Response Surface Models (RSM) are needed to analyze the effect of these process parameters. The analyses than help in finding the optimum solution i.e. selection of suitable cutting parameters that will result in reasonable tool life and workpiece quality. Although there has been no. of attempts to model and optimize MMC. A comprehensive and integrated methodology does not exist that utilize FE models, Response Surface Models and Genetic Algorithms. The main goal of this project is to develop 3D Finite Element Model for optimization of machining of particulate reinforced MMC. The optimization will help in selecting suitable cutting parameters that leads to reasonable tool life and workpiece quality with some constraint like power consumption and material removal rate. The workpiece material selected is Aluminium based MMC with SiC reinforced

	particles which is being used extensively in the automotive and aerospace industries. The machining will be carried out by PCD inserts.
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