CHAPTER 3

AIM OF THE PRESENT STUDY

Based on the literature review of the research work, the major objectives of the present research work are:

3.1 FABRICATION OF COMPOSITES

To study the influence of process parameters such as size and shape of the impeller model, weight percentage of fly ash and wetting agent magnesium on the distribution of fly ash particles in Al matrix and mechanical properties of composites. Taguchi and ANOVA techniques were employed to predict the optimum process parameters that give the highest hardness and tensile strength to the composites.

3.2 WEAR BEHAVIOUR OF METAL MATRIX COMPOSITES

To investigate the dry sliding wear behaviour of Al and Al - fly ash composites as a function of fly ash particle content at two different loads and sliding speed conditions using a pin-on-disc machine.

To evaluate the influence of fly ash reinforcement in Aluminium metal matrix composites on wear behaviour and to provide a qualitative description of the mechanisms that govern their resistance to sliding wear.

To quantify the extent of subsurface damage for different sliding load and sliding speed to identify the mechanism that influences the subsurface damage of composites.
To employ an Artificial Neural Network (ANN) to predict the wear rate of composites. Different ANN structures were used to develop the best model for prediction of the wear rate of the composites.

### 3.3 DRILLING OF METAL MATRIX COMPOSITES

To analyze the influence of the feed and step drill’s geometries such as step angle and step size on the exit burr height during machining of pure Al, Al-15wt. % fly ash and Al-15wt. % fly ash-1.5wt. % graphite hybrid composites.

To identify the percentage influence of factors affecting drilling of pure Al and composites using Taguchi design of experiments.

To develop a statistical model to evaluate the exit burr height using multiple linear regression analysis.

### 3.4 TURNING OF METAL MATRIX COMPOSITES

To analyze the effect of fly ash and graphite reinforcements, machining parameters such as cutting speed, feed rate, and depth of cut on surface roughness during turning operation. To develop a statistical model to evaluate the surface finish using multiple linear regression analysis to optimize the machining parameters.

### 3.5 CORROSION BEHAVIOUR OF METAL MATRIX COMPOSITES

Investigations were carried out to study the corrosion behaviour of unreinforced Al, Al-fly ash and Al-fly ash - Gr reinforced composites in
NaCl solution. The effect of fly ash and graphite concentration on corrosion resistance was observed using the potentiodynamic polarization method. The tested specimens were observed by Scanning Electron Microscopy to find the morphology of the specimen surface.