PREFACE

To investigate the effect of process parameters such as surface roughness, material removal rate (MRR) and power consumption (PC) in turning operation on AISI 4340 material, a powerful tool design optimization, is used to find the optimal cutting parameters. An orthogonal array, the signal – to noise (S/N) ratio, and analysis of variance (ANOVA) are employed in investigating the cutting characteristics of AISI 4340 using PVD and CVD coated cemented carbide tipped cutting tool.

Artificial neural network (ANN) model is designed through back propagation network using MATLAB software for the data obtained from experiments.

The present work also attempts the application of the Genetic Algorithm (GA) to find optimal solution for the cutting conditions for the minimum value of surface roughness and power consumption. By referring the real machining case study, the regression model is developed and formulated the fitness function of the GA. The analysis of this study has proven that the GA technique is capable of estimating the optimal cutting condition that yield the minimum surface roughness and power consumption value.

As the customer satisfaction for better quality and manufacturer requirements at low machining cost, for high metal removal rate technique may be adopted for better optimization objectives set of input variable according to the production
requirements. The objectives the thesis is divided into six chapters as given below.

Chapter I

This chapter deals with introduction to the metal cutting. This chapter among various metal cutting processes, turning operation is selected for the present work. A detailed report on turning operations is provided.

Chapter II

This chapter deals with Literature survey and objectives of the present work were reviewed on vapour deposited tools such as PVD and CVD are presented. In the literature review the objectives of the present thesis are defined.

Chapter III

This chapter is based on the objectives defined, design of Experiments (DOE) by orthogonal array of Taguchi methods and procedures for analysis of variance, Designing the ANN modules for simulated conditions and for obtaining feasible solutions by detecting or the multi objectives and solved by Genetic Algorithm is elaborately discussed.
Chapter IV

The analysis of variance of turning parameters such as speed, feed, depth of cut and hardness fraction. Based on the experiments ANN model is developed and simulated for obtaining the feasible solutions of turning parameters using Genetic Algorithm which are discussed in detail in this chapter.

Chapter V

Based on the experimental producers the results are tabulated, plotted and discussed in detail in Chapter 5 followed by conclusions which were drawn based on Results and Discussions. The organization of work is shown in below figure.

Figure: Organization of Present work