PREFACE

Manufacturing industries form the backbone for the development of any country. The manufacturing sector impacts the economy in a major way next only to the agriculture sector. The process of globalization has brought challenges and competition to the door steps of Indian manufacturing sector. In order to face the challenges and competence with the competitors, the manufacturing industries should embrace the technology to enhance the effectiveness. Having served in different manufacturing industries at different positions for more than 12 years, I can comprehend and appreciate the challenges faced by the Indian manufacturing sector. This comprehension has resulted in a motivation that has driven me to take up this research work. The journey into this research was embarked with a single goal to improve the efficiency and in turn the productivity of a manufacturing setup. This goal guided the selection of Flexible Manufacturing System (FMS) as an able tool that has to be scheduled effectively in order to improve the efficiency, throughput and economic variability of the manufacturing setup.

In the course of problem formulation, different literatures were reviewed to define and formulate the specific objectives of research and modeling it. It was identified that the scheduling of FMS system can go a long way in improving the efficiency of manufacturing setup and take us towards our goal. The literature reviews clearly pointed in the direction of Metaheuristics as the preferred tools for optimizing the scheduling problems.

To present the results of the research to the users, a tool in the form of GUI is also designed. This is expected to improve the ease of use and provide a platform for easy decision making. Any amount of research will fulfill its said objective if and only when the research addresses the specific problems faced by the end user. This thought has provoked me to include an industrial partner to understand the research problem and to test the validity of the proposed solution. In order to present the research in a more acceptable form to the end user, the industrial setup is modeled and simulated using Promodel software.

The contents in this thesis are divided into seven parts. The preparation of the first chapter is originally based on the authors like Kalyanmoy Deb, Mikell Groover, P and for specifying the objectives, authors like Jerald.J, Asokan.P, Prabaharan.G
and Saravanan R played a key role. The second chapter provides various survey reviews on optimization of scheduling in Flexible Manufacturing System environment. The third chapter describes various concepts of FMS and significance of scheduling in FMS which was drawn originally from the text books of Panneer Selvan, S N Chary, Frederick S Hiller and Gerald J Lieberman. The fourth chapter deliberates in brief about the priority rules and Metaheuristic approaches used such as GA, DE and BFOA for optimization of scheduling in the proposed work. The part of GA was strongly influenced by Gnanavelbabu, Jerald, Noorul Haq, Asokan and the part of BFOA was influenced by Kevin M Passino, and next DE part was influenced by Storn R, Tea Robic and Bogdan Filipi. This chapter also elaborates on description of the software tools like Promodel and Matlab used in the research work influenced by Suresh Kumar N and Sridharan R. The fifth chapter depicts the various FMS Model buildings and devoted for analyzing the optimization of scheduling using the proposed approaches like GA, DE and BFOA. This was strongly influenced by Choudhury B B, Biswal B B and Mahapatra R N works and Dr. V Veeranna’s Ph D Dissertation. The sixth chapter provides the summary and comparison of results of FMS scheduling using the different Metaheuristic approaches and Priority rules. This chapter also shows various observations of the performance of the system by modeling and simulation with ProModel software. The seventh chapter presents the conclusion of the research work, carried out on FMS scheduling and also proposes possible suggestions for future research.