Preface

Manufacturing complexity occurs in many ways and the handling of the same has become one of the most prominent foci in production/operation management domain in recent times and several theories, applications and models have been developed to identify, analyse and simplify the difficulty. Cellular manufacturing system design is one such application developed to amplify the efficiency and flexibility of a manufacturing system. The cell formation is one of the most important stages in designing cellular manufacturing systems whose primary objective is to generate machine cells to identify part families and allocate the part families to the machine cells so as to minimize intercellular movements of parts. It is a complex optimization problem.

This thesis proposes an artificial intelligence (AI) based, state-of-the-art visual clustering approach, to solve the cell formation problem both in binary and non-binary form in a cellular manufacturing system.

The present work tries to contribute to the reduction in inter and intra cell movement leading to reduced material handling cost and to guide the facility layout design since the relocation decision can be suitably taken based on rearrangement of facilities in multiple manufacturing cells. This proposed solution of manufacturing system may help an overall improvement in operational system characterized as efficient, cost effective, and competitive.

The present thesis work has been a breathless journey to finally accomplish one of my ambitions. A lot of people have rendered their heartiest cooperation in this journey. Without their anchorage and direction, it would have much more difficult to complete. In the last lap of my journey when I look back, I am overwhelmed with a sense of unflinching gratitude towards every one of them for their motivation and support.

First of all my deep sense of gratitude and indebtedness is to Prof. Sitanath Mazumdar, supervisor and Dr. Pranab K Dan, joint supervisor due to their invaluable guidance, encouragement and support during the entire course of this research. Without their continuous support and encouragement, it would not have been possible for me to submit this thesis.
I am thankful to Dr. Surajit Chattopadhyay for some valuable advice in this work. I am also grateful to Mr. Sourav Sengupta who helped me in resolving certain issues and provided a valuable feedback on this thesis work.

This work would not have been possible without the direct support of many people and institutions for several reasons. My sincere thanks go to the Pailan College of Management & Technology, especially Mr. Apurba Saha (Chairman-Pailan Group), Vice Chair-Person, Directors, Registrar, colleagues and the systems department. I am also indebted to the students, scholars and staff of Industrial Engineering & Management Department, West Bengal University of Technology for exchanging ideas and for providing the necessary support. I would also like to express my sincere thanks to the faculty and staff members of the Business Management Department, Calcutta University for their continuous encouragement and suggestions.

I express my most profound gratitude and am deeply indebted to my brothers, my sister and other family members for inspiring me in this course of journey. The author expresses his appreciation to his beloved wife Swati and son Master Maneet for their understanding and patience during the period. I would also like to thank my in-laws for inspiring me althrough.

Last but not the least; I would like to acknowledge the steadfast faith and the unwavering friendship of Dr. Nityananda Das, Mr. Tamal Ghsoh, Mr. Nilanjan Sen, Mr. Sudipta Kundu, Mr. Ayanangshu Sarkar and others with whom I could share the joy of my experiences, the ecstasy of my progress and findings and the pains of those moments when things appeared tough and my confidence seemed to ebb.

I dedicate this work to my parents who have not only inculcated moral values in me but also considered my education as their first priority. A frown never wrinkled their faces when they had to sacrifice their pleasures at the altar of my education. I feel pleased and privileged to fulfill my parents’ dream.

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