CHAPTER 10

10.0 CONCLUSIONS & SCOPE

10.1 SCOPE FOR FURTHER WORK
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In this doctoral thesis, the analyses of batch manufacturing systems have brought out the different parameters and procedures leading to optimal performance of the systems under dynamic market conditions. The Manufacturing rates Wanted at Factory (MWF) are arrived at, feeding the data of demand forecasts, order backlogs, rates of filling orders and delays in filling orders to the computer simulation program.

The manufacturing rates wanted at factory estimated at various conditions have been realised through optimal usage of resources in these analyses. The Work-In-Process inventory level at the shop-floor is kept minimal through newly developed stabilised sequence planning system. This system also enables to maintain manufacturing lead times to a lower level to meet the delivery schedules.

A generalised model has been designed for dynamic scheduling of batch manufacturing systems to evolve strategies for capacity planning of manufacturing systems.

Dynamic schedules of manufacturing systems of types Job shop, FMS and FMC are generated with effective capacity utilisation through various algorithms, facilitating addition of new components. Due to random nature of processing of components in shop-floor, digital simulation study has been made on these manufacturing systems to investigate the effects of various scheduling rules (dispatching) with/without urgent orders on shop performance. These investigations have resulted in the reduction of tardiness of components and improvement in the operation of manufacturing systems.

The scheduling of a new type of FMC with automatic set-up features has been generated through simulation runs to maximise its throughput at minimal usage of resources.
All these dynamic simulation models are based on queuing theory that provided expected steady state conditions for a certain kind of situations and time distributions. These scheduling algorithms have helped to use resources more effectively through schedule changes due to machine breakdown, tool breakage, etc., Simulation runs enable to fulfill the objectives of maximum machine utilisation, minimum average waiting time, minimum WIP ratio and maximum throughput.

The above conclusions drawn clearly show that batch manufacturing systems are made to yield optimal performance under rough market conditions through dynamic simulation.

10.1 SCOPE FOR FURTHER WORK

The manufacturing systems considered in the above analyses can be expanded by adding more number of machines, output buffers, spacing between machines, and speed of material handling systems to make them more real to Computer Integrated Manufacturing systems. Further scheduling rules and more number of distributions can also be considered. The present model can further be modified to backward loading with setup and processing time taken separately. It is also possible to enhance the discrete event simulation with expert system which will enable a novice to use it successfully for analysing manufacturing systems.