

FLEXIBLE MANUFACTURING SYSTEMS MODELLING AND PERFORMANCE EVALUATION USING AUTOMOD

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Abstract

In recent times flexible manufacturing systems emerged as a powerful technology to meet the continuous changing customer demands. Increase in the performance of flexible manufacturing systems is expected as a result of integration of the shop floor activities such as machine and vehicle scheduling. The authors made an attempt to integrate machine and vehicle scheduling with an objective to minimize the makespan using Automod. Automod is a discrete event simulation package used to model and simulate a wide variety of issues in automated manufacturing systems. The key issues related to the design and operation of automated guided vehicles such as flow path layout, number of vehicles and traffic control problems are considered in the study. The performance measures like throughput, machine and vehicle utilization are studied for different job dispatching and vehicle assignment rules in different flexible manufacturing system configurations.

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Key Words: Flexible Manufacturing System, Simultaneous Scheduling, Automated Guided Vehicle, Simulation, Automod

1. INTRODUCTION

The present day manufacturing environments are highly agile and are confronted with the continuous changing customers' requirements. Flexible Manufacturing Systems (FMS) emerged as a powerful one due to its wide flexibility, which is essential to stay competitive in this highly dynamic environment. FMS is a complex concurrent system consisting elements like machines, automated guided vehicles, storage and retrieval system. FMS scheduling problems are more complex, since the components are highly interrelated and in addition has multiple part types and alternative routings.

Typically, parts in an FMS visit different machines for different operations and thus generate a great demand for vehicles. Automated guided vehicles (AGV) are widely used in FMS due to their flexibility and adaptability. Vehicle scheduling is crucial in FMS for timely transfer of parts between the work centres and the decisions include the design of flow path layout, traffic control and vehicle dispatching rules.

Simulation is a powerful tool used to imitate the system behaviour over time and to draw inferences about its real time performance. Simulation is used to study the various control strategies before one can suggest an optimum solution for the given problem, hence simulation is used as a decision support system for real time scheduling of manufacturing systems and is found to be an effective tool in design and operation of an FMS.

The authors made an attempt to address simultaneously both the machine and vehicle scheduling in a given FMS environment with an objective to minimize the job completion time using Automod a powerful discrete event simulation package. Extensive simulation

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