

Testing a Flexible Manufacturing System Facility Production Capacity through Discrete Event Simulation: Automotive Case Study

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Abstract : In the age of automation and computation aiding manufacturing, it is clear that manufacturing systems have become more complex than ever before. Although technological advances provide the capability to gain more value with fewer resources, sometimes utilisation of the manufacturing capabilities available to organisations is difficult to achieve. Flexible manufacturing systems (FMS) provide a unique capability to manufacturing organisations where there is a need for product range diversification by providing line efficiency through production flexibility. This is very valuable in trend driven production set-ups or niche volume production requirements. Although FMS provides flexible and efficient facilities, its optimal set-up is key in achieving production performance. As many variables are interlinked due to the flexibility provided by the FMS, analytical calculations are not always sufficient to predict the FMS's performance. Simulation modelling is capable of capturing the complexity and constraints associated with FMS. This paper demonstrates how discrete event simulation (DES) can address complexity in an FMS to optimise the production line performance. A case study of an automotive FMS is presented. The DES model demonstrates different configuration options depending on prioritising objectives: utilisation and throughput. Additionally, this paper provides insight into understanding the impact of system set-up constraints on the FMS performance and demonstrates the exploration into the optimal production set-up.

Keywords : discrete event simulation, flexible manufacturing system, capacity performance, automotive

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