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Hierarchical production planning and scheduling in make-to-order environments: reaching short and reliable delivery dates

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Abstract

This study proposes a novel hierarchical production planning (HPP) structure for make-to-order (MTO) companies. The proposed HPP structure contains three decision making levels: (1) the order entry level, (2) the order release level and (3) the order sequencing/dispatching level. The objective is to manage the delivery dates of arriving orders in order to reach short and reliable delivery dates using appropriate decision making techniques at each level. At the first level, the main decision concerns the acceptance or rejection of new arriving orders subject to some relevant limitations (e.g. capacity constraint). At this level, an extended version of our previously proposed model (Ebadian, M., et al., 2007. A new decision making structure for the order entry stage in make-to-order environments. International Journal of Production Economics, 111, 351-367.) is applied. Besides rejecting some of the low priority orders,

determination of delivery dates and prices for the non-rejected orders constitute the other outputs of this level. The second level is related to releasing the accepted orders to the shop floor. The decision making problems at this level include which orders and when they can be released. We develop a new order release method which improves the delivery date performance through generating a smoothed production schedule. Finally, at the third level, a modified dispatching rule is proposed to sequence the existing orders at each workstation so that the previously agreed delivery dates can be met. The proposed models at the second and third levels are validated through a number of numerical experiments conducted by simulation studies and the corresponding results are discussed in details.

Keywords:

make-to-order

hierarchical production planning and scheduling

delivery date management

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simulation studies

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