

Production lot-sizing decision making considering bottleneck drift in multi-stage manufacturing system

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ABSTRACT

Under a capacity constrained multi-product manufacturing system, the products are usually prepared and produced in lots. As a lot-sizing strategy is critical for effective production and high productivity, this encourages practical and research interest in the strategic batch sizing decision for a minimum procedure time in an order-to-delivery (OTD) operating environment. While the lot-sizing plan can be formed by studying the manufacturing parameters of the established bottleneck procedure, for a multi-stage manufacturing system, the bottleneck is not fixed and fluctuates with the production rate or batch size. This paper proposes a lot-sizing strategy to determine the optimal lot-size for each class of products taking bottleneck drifting into consideration. A queuing network analyser (QNA) method is employed to deal with the non-linear mixed integer programming model targeting at the total flow time minimization of the system. A practical case is presented and solved using the proposed method, and the results are validated with Flexsim, a simulation model.

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Odločanje o velikosti serije proizvodnje z upoštevanjem zamika ozkega grla v večstopenjskih proizvodnih sistemih

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POVZETEK

V okviru proizvodnega sistema z omejeno proizvodno zmogljivostjo se izdelki običajno pripravljajo in izdelujejo v serijah. Odločitev o velikosti serije je ključnega pomena za učinkovito proizvodnjo in visoko produktivnost. To spodbuja praktični in raziskovalni interes za načrtovanje velikosti serije z namenom skrajšanja časovnega obdobja od naročila do dostave. Z analizo proizvodnega sistema lahko velikost serije prilagodimo ozkemu grlu. V večstopenjskih proizvodnih sistemih je ozko grlo spremenljivo in odvisno od stopnje proizvodnje in velikosti serije. Prispevek predlaga strategijo za določitev velikosti serije za vse razrede izdelkov z upoštevanje zamika ozkega grla. Z analizo mreže čakalnih vrst (QNA) smo minimizirali skupni pretočni čas. S predlagano metodo smo rešili praktični primer, rezultati pa so bili potrjeni s Flexsim simulacijskim modelom.

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PODATKI O ČLANKU

Ključne besede:

Proizvodni sistem
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