World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:9, No:03, 2015

Scheduling in a Single-Stage, Multi-Item Compatible Process Using Multiple Arc Network Model

Authors : Bokkasam Sasidhar, Ibrahim Aljasser

Abstract : The problem of finding optimal schedules for each equipment in a production process is considered, which consists of a single stage of manufacturing and which can handle different types of products, where changeover for handling one type of product to the other type incurs certain costs. The machine capacity is determined by the upper limit for the quantity that can be processed for each of the products in a set up. The changeover costs increase with the number of set ups and hence to minimize the costs associated with the product changeover, the planning should be such that similar types of products should be processed successively so that the total number of changeovers and in turn the associated set up costs are minimized. The problem of cost minimization is equivalent to the problem of minimizing the number of set ups or equivalently maximizing the capacity utilization in between every set up or maximizing the total capacity utilization. Further, the production is usually planned against customers' orders, and generally different customers' orders are assigned one of the two priorities – "normal" or "priority" order. The problem of production planning in such a situation can be formulated into a Multiple Arc Network (MAN) model and can be solved sequentially using the algorithm for maximizing flow along a MAN and the algorithm for maximizing flow along a MAN with priority arcs. The model aims to provide optimal production schedule with an objective of maximizing capacity utilization, so that the customer-wise delivery schedules are fulfilled, keeping in view the customer priorities. Algorithms have been presented for solving the MAN formulation of the production planning with customer priorities. The application of the model is demonstrated through numerical examples.

Keywords : scheduling, maximal flow problem, multiple arc network model, optimization
Conference Title : ICEORS 2015 : International Conference on Econometrics, Operations Research and Statistics
Conference Location : London, United Kingdom
Conference Dates : March 14-15, 2015