

Operator Assignment Problem in Multiple Cells Production Systems with Operator Sharing

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Abstract

This research deals with an operator assignment and cell loading problem in multi-cell production systems. One operator can be shared to perform the operations in two adjacent cells, which provides an opportunity to reduce total manpower requirements. This kind of strategy is called inter-cell operator sharing. This research proposes a two-phase methodology to optimize the operator assignment and cell loading with inter-cell operator sharing. In the first phase, manpower configurations for all products with all levels of manpower available will be generated under the consideration of inter-cell operator sharing. Then, based on the manpower configuration generated from the first phase, the second phase aims to optimize the cell loading and select manpower configuration for all cells when given a product mix. In order to further reduce manpower requirements, lot-splitting is considered. For both phases, the corresponding mathematical models, which can be optimized by commercial software, LINGO 17, are developed. A case study of a jewelry manufacturing company proposed from the literature is adopted to test the proposed methodology. The results show that the strategy of inter-cell operator sharing can save 11.56% manpower at most. Moreover, if splitting is further considered, at most, 14.66% of manpower can be saved. Therefore, it shows the promise of the proposed methodology for solving practical applications.

Keywords

Cellular Production; Operator assignment; Mathematical Programming; Cell Loading; Operator sharing

Biographies

Yiyo Kuo received the Ph.D. degree in Manufacturing Engineering from National Cheng Kung University, Taiwan, in 2005. He is a Professor in the Industrial Engineering and Management, Ming Chi University of Technology, New Taipei City, Taiwan. He teaches courses of Operations Management, Lean Production and so on. His areas of research/expertise are production management and application of artificial intelligence.

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