A Mathematical Model for the Assembly Job Shop Scheduling Problem with Overtime: A Case Study in Construction Machinery Industry

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Abstract

Production scheduling affects the cost of production. Hence, it is one of the important problems for operational problems. Especially for productions that require assembly precedencies, an inappropriate production schedule may be the reason for overtime decisions for a finite planning period. An inappropriate production schedule may lead to tardiness in assembly jobs as subassembly parts may not be ready on time. To meet the deadline of products, tardiness must be compensated using overtime. In this study, we considered an assembly job shop scheduling problem for multi-group jobs with sub-assembly precedence's from a real-world application. Our aim is to determine the production schedule that minimizes overtime for a finite planning time interval. We developed a mixed integer programming model that minimizes the overtime complying with the delivery dates for the problem. We conducted a case-study on a construction machinery industry in Thailand. Construction machines have several welded body parts with sub-assembly processes. Welded body parts with sub-assembly processes have cutting, bending, machining and pre-welding processes. The readiness of the welded body parts before the machine assembly is critically important for the continuity of the machine assembly line.

Keywords
Production scheduling, Assembly job shop, Overtime, Mixed integer programming, Finite scheduling.

Biography
Mustafa Ustuncelik is an Industrial Engineer and serves as a Planning and Control Assistant Manager at Hidromek Construction Equipment Company which is a construction machinery company located in Thailand. He graduated from Eskisehir Osmangazi University with a bachelor's degree in 2013 and is now a master's student at Social Sciences University of Ankara in Business Administration.

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