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Abstract

The integrated lot sizing and cutting stock problem is studied in the context of furniture production. The goal is to capture the interdependencies between the determination of the lot size and of the cutting process in order to reduce raw material waste and production and inventory costs. An integrated mathematical model is proposed that includes lot sizing decisions with safety stock level constraints and saw capacity constraints taking into account saw cycles. The model solution is compared to a simulation of the common practice of taking the lot size and the cutting stock decisions separately and sequentially. Given the large number of variables in the model, a column-generation solution method is proposed to solve the problem. An extensive computational study is conducted using instances generated based on data collected at a typical small scale Brazilian factory. It includes an analysis of the performance of the integrated approach against sequential approaches, when varying the costs in the objective function. The integrated approach performs well, both in terms of reducing the total cost of raw materials as well as the inventory costs of pieces. They also indicate that the model can support the main decisions taken and can bring improvements to the factory's production planning.

Keywords: Two-dimensional Cutting Stock, Lot Sizing, Integrated

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