Line feeding with variable space constraints for mixed-model assembly lines

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Abstract. Nowadays, assembly systems are used for the assembly of an increasing amount of models, which are often mass-customized to meet customers' demands. This results in a rising number of parts used for assembly and, consequently, space scarcity at the line. Therefore, parts must not only be fed to the line cost-efficiently, but also meet space constraints (Limère et al., 2015). The assembly line feeding problem (ALFP) deals with the assignment of parts to line feeding policies in order to reduce costs and obtain a feasible solution.

Within this paper, we examine all distinct line feeding policies at the same time, namely line stocking, kanban, sequencing and kitting (stationary and traveling kits). There is, to the best of our knowledge, no research conducted, including more than three line feeding policies in a single model (cf. Sali and Sahin, 2016). Furthermore, we assume space at the border of line (BoL) being variable. For this reason, space is not constrained per individual station, but we assume one overall space constraint for the entire line (Hua and Johnson, 2010).

The main focus of this work is on accurately modeling the problem. This includes a representation of all line feeding processes, being storage, preparation, transportation, line side presentation and usage. By incorporating the variable space constraints at the BoL, we provide a decision model reducing the overall costs for line feeding in assembly systems, since rigid space constraints at the BoL usually lead to more expensive line feeding policies. In contrast, variable space constraints enable balancing unequal space usage of different stations, allowing cheaper line feeding policies to be selected. Some preliminary results on the cost impact of variable versus fixed space constraints will be discussed.

Keywords: Logistics, Decision support system, Material supply

References

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