Abstract

Due to the rising number of variants produced on a mixed-model assembly line, high variations in workload occur and have to be compensated by surplus capacity of production resources and expensive floater operations. Traditionally capacities in an assembly line are fixed for the entire production life cycle and variations in workload are absorbed by the sequencing of orders only. This approach does not suffice any longer.

In this work a method is presented for a cost-optimal capacity balancing of an assembly line, adjusting the assembly line setup periodically to the production program that has to be produced in the future, considering reconfiguration costs and minimizing floater operations.

Methods and algorithms for the steps reconfiguration and sequencing are presented and integrated in a hierarchical planning approach. Additionally, a model for the simulation of a mixed-model assembly line has been developed.

The variant precedence graph is a necessary input for the balancing of mixed-model assembly lines but in most industries it is usually not available due to the high effort which is necessary to create it. In this work a method for a semi-automated precedence graph building, using existing product documentation, has been developed.

The methods were tested in workshops with practice-oriented problem-sizes from the automobile industry and generate distinct improvements.