Combinatorial design of manufacturing systems: new approaches and real life applications

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Abstract

A complex machine or machining line consists of a sequence of work positions through which products move one way in order to be processed. Designing such a production system represents a long-term decision problem involving different crucial decision stages. Combinatorial design is one of them; it mostly deals with assigning the set of indivisible units of work (named tasks or operations) to work positions (or stations). In literature, the most attention was paid for combinatorial design of assembly lines (assembly line balancing problems). In our work, we develop approaches and formulations of combinatorial design for machining lines and complex machines. All types of machining lines are considered: mass production transfer lines, flexible lines based on machining centers and reconfigurable manufacturing systems.