

RECONFIGURABLE TRANSFER LINE BALANCING PROBLEM : DETERMINISTIC AND STOCHASTIC CONTEXT.

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CEDEX - FRANCE

MARS 2018, EURO 2018, VALENCIA, SPAIN

Abstract

We are dealing in this paper with balancing reconfigurable transfer lines. The production lines involved can machine a single part category and could be seen as serial lines of workstations. In this context, reconfigurability is the ability of the transfer line to be rapidly and cost-effectively reconfigured *to machine a new part category* (1) (addressing shortening product lifecycle times) and to *handle changing demand size* (2).

While (1) is guaranteed by the use of mono-spindle head machines equipped with tool magazines, (2) is guaranteed by the possibility to introduce several machines into workstations. Consequently, setup times between operations should be considered to perform tool change.

The problem consists into allocating the operations necessary to machine a part to the workstations and sequencing the operations into every workstation while respecting the cycle time constraint and minimizing the overall number of machines used.

The problem has been rarely dealt with in the deterministic context and no article deals with it in a stochastic context.

We suggest and evaluate a MIP approach (that extends the one presented in Andrés et al. (2008)), a novel meta-heuristic and an efficient hybrid approach that approximates the optimal solution. Besides a stochastic version of the problem is also studied considering uncertainty in operations times and setup times.

The different approaches are experimentally tested on both benchmark and randomly generated instances.