

# The problem of processing total time minimization for identical workpieces

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**Abstract.** We consider the problem of processing identical workpieces with complicated technological route. The problem of processing total time minimization for identical workpieces is NP-hard in cases of four or more machines.

**Keywords:** identical workpieces, complexity, processing total time

It is required to process a batch of  $N$  identical workpieces on a production line [1]. All workpieces are processed by the same technological route that consists of  $n$  successively performed operations. There are machine and processing time are specified for every operation. Simultaneous carrying out two or more operations on one machine is not allowed. As usual, classical conveyor can be used. However, the rapidly changing range of products requires a renovation of the production line, which leads to the introduction of high-priced universal workstations capable of performing many different operations. A workpiece can get to these machines repeatedly in its processing. Similar situation arises in the assembly of aircrafts and rocket launchers, when some team repeatedly comes back to the worksite to develop next operation according to their profile. Asymptotically exact algorithms of minimization of the total processing time of identical workpieces based on cyclic schedules are described in [2, 3].

The problem of processing total time minimization for identical workpieces is NP-hard in cases of four or more machines. This complexity can be proved by reducing of the NP-hard Job Shop problem with three workpieces and three machines [4] to problem with several identical workpieces.

## References

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