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一类多品种小批量混流制造系统作业组织模式与工件排序

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Operation organization modes and parts'sequencing for a category of mixed-model manufacturing system of multi-variety and small-batch

摘要 为解决考虑搬运时间的混流制造系统的资源优化与调度问题,对作业组织模式与工件排序进行了深入研究。建立了以设备停机次数、工件搬运次数、搬运设备数量、搬运次数均衡程度作为第一、第二、第三和第四优化目标,以生产周期作为约束的多目标决策模型,利用该模型选择作业组织模式并确定最优排序方案。分别研究了用于求解该多目标决策模型的各分目标和约束:为不同类型批量工件建立加工时间模型;设计开始和结束搬运时间优化模型;给出平行移动模式的设备停机次数算法。开发了考虑搬运时间的混流制造系统软件程序,并设计了所需搬运设备情况的全局优化算法。通过分析和求解企业订单数据验证了所提方法的有效性。

关键词 : 搬运时间, 混流制造, 作业组织模式, 加工时间模型, 多目标决策模型, 排序问题

Abstract : To solve the problem of resource optimization and scheduling for the mixed-model manufacturing system considering handling time,the operation organization modes and parts'sequencing were researched deeply.The equipment shutdown frequency,parts'handling times,handling equipment amount and equilibrium degree of handling times were taken as the first,second,third and forth optimization objectives and the makespan was taken as the constraint,a multi-objective decision-making model was established to select the appropriate operation organization mode and to determine the optimal scheduling scheme.The different targets and restraint that could be used for solving the model were researched.The processing time models were established and the optimization model of handling time was designed.Meanwhile,a detailed algorithm procedure for the frequency of equipment shutdown was presented.A software system of the mixed-model manufacturing system considering handling time was developed.Besides,a global optimization algorithm for the amount of handling equipment was designed.The effectiveness of the proposed method was validated by the analysis and solution of enterprise order data.

Key words : handling time mixed-model manufacturing operation organization mode processing time model multi-objective decision-making model scheduling problem

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