[2008-1220]强化Dynasearch \& TS算法求解酸轧生产调度问题

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摘要
酸轧生产调度的主要任务是在满足酸轧机组生产工艺和能力约束下,考虑下游机组的流向需求,为保证生产连续性和平滑过渡的要求,从给定候选池中选择适合的板卷构成一个酸轧调度单元. 针对此问题,本文建立了以最小化过渡费用和调度单元剩余容量惩罚费用为目标的整数规划模型,提出了一种嵌入强化dynasearch算法的禁忌搜索混合算法. 该混合算法采用基于最小插入法的两阶段启发式产生初始解,根据采用邻域结构的不同设计双禁忌表,为了避免算法陷入局部最优,在禁忌搜索的每次迭代过程中嵌入swap邻域和inner-insert邻域相结合的多交换dynasearch邻域,并设计了多项式动态规划算法搜索该邻域. 针对问题的特征,提出了block分区结构,基于此分析了多个可行解性质,有效的降低了搜索空间. 与一般禁忌搜索算法比较,结果表明所提出的强化dynsearch \&TS算法求解效果明显优于一般TS算法，平均改进量为3.62\%，算法运行时间大大缩短. 验证了该算法在解决此类问题的有效性.

关键词　　酸轧生产调度,禁忌搜索,dynasearch算法,dynasearch邻域

分类号

A New Enhanced-Dynasearch \& TS for the Pickling-Rolling Scheduling Problem

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Abstract
This paper presents the pickling-rolling scheduling problem (PPSP), which is motivated by pickling-rolling practical production in the steel industry where selection and sequence of coils considering the changeovers cost between adjacent coils. Besides the capacity constraint and practical prodution tecnological constraints, the flow requirement constraint is considered such that the total weight of the selected coils over respective downstream unit should satisfy the production requirement on each downstream unit. The objective is to minimize the total transition cost and the penaty cost on the left capacity. The problem is formulated as an integer programming model. A new tabu search with the enhanced dynasearch algorithm is developed for the PPSP. The two-phase heuristic based on Nearest Insert method is proposed to act the initial feasible solutions of the tabu search. The algorithm designs double tabu list to fit the different neighborhood structure. In order to help the solution escape from the local optima, the enhanced dynasearch neighborhood is embeded at each iteration. The dynasearch neighborhood which is polynomially searchable by dynamic programming can perform the multiple-exchange composite move by combining swap neighborhood and inner-insert neighborhood. Based on the analysis of the characteristics of the problem, block structure is defined and several properties of the feasible solution are direved to accelerate the search process. Compared with the standard TS algorithm, the computational results show that the enhanced-dynsearch \& TS algorithm is effective for solving the problem and outperforms the standard one by 3.62\% on average.

Key words　　Pickling-rolling scheduling　Tabu search　Dynasearch algorithm　Dynasearch neighborhood

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