

the slack matrix guarantees global optimality for KKT points of this problem.

Keywords: Copositive matrices, non-convex optimization, polynomial optimization, quadratically constrained problem, approximation hierarchies, global optimality condition

■ **Mon.B.3**, Monday, July 28, 15:00-16:30, Room 3

Scheduling (II)

Session chair: *Francisco Saldanha-da-Gama*

1. Mixed-model assembly line balancing in the footwear industry

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Footwear is one of the most dynamic and successful industrial sectors in Portugal. Almost all the production is exported around the world. New efficient and automated assembly lines are being designed and installed, replacing mass assembly lines, to address the need to produce various models (always changing) at the same time. Modeling these lines is quite challenging. Critical issues are the wide variety and small quantities of models, graph sequencing of tasks, limited deadlines, multi-functional operators, different types of machines and specific buffers. This work focuses on balancing a mixed-model stitching line in a real company. Optimization models will be presented, taking into account objectives such as the number of workstations and the workload smoothness of operators. Solution methods based on exact and heuristic methods will be described, together with an analysis of the computational results.

Keywords: Footwear industry, assembly line balancing, heuristic methods

2. Scheduling aircrafts' engines repair process: a mathematical model

Isabel Cristina Lopes

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In this talk, we discuss a scheduling problem that originated at TAP - Maintenance & Engineering - the maintenance, repair and overhaul organization of Portugal's leading airline. In the repair process of aircrafts' engines, the operations to be scheduled may be executed on a certain workstation by any processor of a given set, and the objective is to minimize the total weighted tardiness. A mixed integer linear programming formulation, based on the flexible job shop scheduling, is presented here, along with computational experiment on a real instance, provided by TAP-ME, from a regular working week. The model was also tested using benchmarking instances available in literature.

Keywords: Real world scheduling, flexible job shop, mixed integer linear programming

3. The impact of fixed and variable costs in a multi-skill project scheduling

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In this work we investigate a project scheduling problem in which several skills are required for executing the activities. A pull of resources mastering these skills is assumed to exist. Each resource can contribute with at most one skill for the execution of an activity. In turn, each activity may require more than one resource for each skill. Costs are associated with resource usage and are to be minimized. The 'natural' mathematical programming model contains a non-linear objective function which, nonetheless, can be linearized at the expense of one additional set of continuous variables. The linearized model is enhanced using several sets of