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## TOOL SWITCHING PROBLEMS WITH TOOL ORDER CONSTRAINTS

**Abstract:** We present four different variants of the well-known tool switching problem. For each variant, we discuss its complexity and propose a mathematical formulation. Motivated by a real-world application in the color printing industry, the third and fourth variants introduce a novel requirement into ToSP: the tool order constraint. Under this requirement, during the processing of each job, the selected tools must be sorted along the slot sequence in the machine, and the machine will use them for processing the job applying the tools in that order. We show that the new problem variants are NP-hard even when the job sequence is given as part of the input and the setup times are binary. We solve them by using dedicated arc flow models. We evaluate the effectiveness of the models on several instances that were generated with the aim of covering different scenarios of interest.

**About the speaker:** Alberto Locatelli is a post-doctoral researcher at the Department of Sciences and Methods for Engineering at the University of Modena and Reggio Emilia. He holds a master's degree in Mathematics from the University of Padua, and in March 2023, he successfully completed his Ph.D. in "Industrial Innovation Engineering" at the University of Modena and Reggio Emilia.

His research focuses mainly on the study, design, and experimental evaluation of algorithms for solving combinatorial optimization problems. He has a special interest in knapsack problems and tool switching problems. Additionally, he is exploring the integration of optimization algorithms with machine learning techniques to effectively tackle real-world scheduling problems.

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MARDI / TUESDAY

20 juin / June 20th

10h00

Pavillon Palasis-Prince

Local / Room

1307

Ouvert à tous  
Open to all

Café et viennoiseries

Responsable / Organizer

Jean-François Côté