

Research Topic for the ParisTech/CSC PhD Program

Subfield: Industrial Engineering

ParisTech School: Metz campus

Title: Solution space modeling for process platform-based production configuration

Advisor(s): Prof. Ali SIADAT, Centre Arts et Métiers ParisTech de Metz, France
Prof. Linda ZHANG, IESEG School of Management (LEM-CNRS), France,
(<https://www.ieseg.fr/en/faculty-and-research/professor/?id=1776>)

Short description of possible research topics for a PhD:

This project is aimed at modeling the solution space of process platform-based production configuration to ease mass customization.

In the recent past, manufacturing firms worldwide have been pursuing mass customization in delivering families of customized products at affordable costs. Process platform-based production configuration is put forward to help firms effectively produce product families while reusing proven manufacturing knowledge and available facilities. In relation to a product family, a process platform is underpinned by a generic product-process structure. Production configuration entails the process of configuring production processes for a new family member based on the process platform. Its solution space is discrete and combinatorial in nature. Moreover, in light of the product complexities, it involves diverse constraints from different aspects, including operations, operations precedence, and routings. Thus, it is necessary to develop mathematical models for modeling production configuration solution spaces bounded by multiple constraints from the three different aspects, in attempting to facilitate configuration optimization.

Required background of the student: Mathematics, Industrial Engineering, Computer Science, Mathematical Programming.

A list of 5(max.) representative publications of the group:

1. **Zhang, L.** and Jiao, J., A graph rewriting system for process platform planning, *Decision Support Systems*, 2013, 54(2), 1174-1191.
2. **Zhang, L.**, Xu, Q., Yu, Y., and Jiao, J., Domain-based production configuration with constraint satisfaction, *International Journal of Production Research*, 2012, 50(24), 7149-7166.
3. **Zhang, L.**, Xu, Q., and Helo, P., A methodology integrating Petri nets and knowledge-based systems to support process family planning, *International Journal of Production Research*, 2012, 50(12), 3192-3210.
4. Q. XIA, A. ETIENNE, J.-Y. DANTAN, A. SIADAT, « Reconfigurable machining process planning for part variety in new manufacturing paradigms: Definitions, models and framework », *Computers and Industrial Engineering*, 2018
5. Mehrdad MOHAMMADI, Reza TAVAKKOLI-MOGHADDAM, Ali SIADAT, Jean-Yves DANTAN, Yaser RAHIMI, « A bi-objective robust inspection planning model in a multi-stage serial production system », *International Journal of Production Research*, 2017