

# Object oriented modelling to support variety and ramp-up management

## Overview of the topic:

Individualized customer demands led to an increase in the variety of company's offering. Generally, variety leads to more complexity within the production system and throughout the value network of a given product or service. While variety impact is often assumed to be a positive one from customer perspective, complexity impact goes generally in the opposite direction to cost-efficiency. Therefore, approaches such as variety management play a key role in mitigating negative effects associated with variety induced complexity.

Variety management may occur at different points of time throughout product life cycle. For instance, when moving from product development to a stable production process, decisions on how to manage production ramp-up depend heavily on variety and complexity levels. Several research works have already addressed ramp-up management; however the particular context of high variety production still requires further research. In particular, operational frameworks for supporting the decision making on selecting and fine-tuning ramp-up strategies in high variety production environments are scarce.

Some research has already been conducted at Mines Saint-Etienne with two main complementary pillars, the methodological approach and operational tools development. Relatedly, an agent based demonstrator prototype was developed which addresses partly the above issues in the particular context of furniture sector.

This research topic is focused on extending the current agent based model to address further questions about ramp-up management in high variety production environments. The work will involve the definition of a set of requirements for a software tool, which need to be translated into technical functions and then used to deliver a first prototype. According to the candidate background, some support from other resources can be provided in particular during the implementation phase.

The internship will be conducted within the framework of the project *VARIETY – VARIETY and complexity management in the Era of Industry 4.0* supported by AURA Région. The project involves Mines Saint-Etienne and partners from Germany and Denmark. In this sense, the research will benefit from EU collaborations in terms of both the development and test cases.

**Desired candidate skills:** System engineering, object oriented modelling and development, production and supply chain management, any experience with multi-agent systems, modelling with UML or Java development is appreciated.

**Location:** Mines Saint-Etienne.

**Laboratory:** LIMOS (UMR 6158) – Laboratory of Computing, Modelling and Optimization of the Systems.

**Supervisor:** Khaled Medini

**Period:** 6 months starting from March 2020.

**Salary:** Training allowances as per the institution rules.

## Application:

- The application should include: short résumé, cover letter, transcripts of the past two years (including partial results of the current semester, if any).
- Application and any request should be emailed to: [khaled.medini@emse.fr](mailto:khaled.medini@emse.fr)
- Deadline: January 16<sup>st</sup>, 2020.