Modeling and configuration management of Reconfigurable Manufacturing Systems (RMS)

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Abstract

The preservation of a company's place on the market in such aggressive competition is becoming a survival challenge for manufacturers. In this context, survivors are only those who succeed in satisfying their customers' needs as quickly as possible. The production system should be endowed with a certain level of flexibility to eliminate or reduce the rigidity of the production systems in order to facilitate the conversion and/or the change of system's features to produce different products. Therefore, it is essential to guarantee the quality, the speed and the flexibility to survive in this competition. According to literature, this adaptability is referred to as the notion of "change". Indeed, companies are trying to establish a more flexible and agile manufacturing system through several reconfiguration actions. Reconfiguration contributes to the extension of the manufacturing system life cycle by modifying its physical, organizational and computer characteristics according to the changing market conditions. This paper offers a generic model for Reconfigurable Manufacturing Systems (RMS). High-level meta-models for structure, configuration and operations will be presented using the systems modelling language SysML.

Keywords
Reconfigurable Manufacturing Systems (RMS), Reconfigurability, Changeability, Generic Model, SysML

Biographies

Jesus Kombaya holds a master's degree in industrial computer science from University of Picardie Jules Verne in France and is currently preparing a PhD thesis at the University of Paris 8. His research work focuses on the Reconfiguration of Production Systems (RMS), in particular the design and evaluation of the reconfigurability of the production system.

Nadia Hamani is an Associate Professor at the University of Picardie Jules Verne and Head of a Master and Bachelor Program in Logistics. She is a member of the laboratory of Innovative Technology. She obtained a PhD in Industrial Engineering in 2005 at Ecole Centrale de Lille. She is co-chair of international conferences or special sessions and she authored or co-authored more than 90 scientific papers. She is involved in several research networks, projects and associations. Her research interests include sustainable supply chain and transportation, performance improvement of production and logistics systems.

Lyes Kermad is an Associate Professor at Paris 8 University. He is a member of QUARTZ laboratory. He obtained a PhD in Industrial Engineering in 1996 at University of Technology of Lille. He obtained his accreditation to supervise research in 2017. His current research areas cover manufacturing information systems and quantitative risks evaluation in the reconfiguration projects in industrial companies.