



PhD Proposal 2016

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Title: Improving Digital Continuity for Rapid Product Development with Virtual Engineering Technologies and Tools
Scientific field (*): Automation and Robotics, System Engineering, Industrial Engineering
Key words: Digital Continuity, Information Management, Processing Chain, Interoperability, Rapid Product Development, Virtual Engineering

() : Chemical engineering, Computer Science, Image and data processing, applied mathematics, Electrical engineering, Automation and Robotics, System Engineering, Industrial Engineering, Fluid Mechanics, Aerodynamics, Acoustics, Combustion, Material Science, Optics, Electronics, Nano technology, Micro-system, Bioscience, Solid mechanics, Surface Science, Civil engineering.*

Details for the subject:

Background, Context:

Rapid product development strategies with allied enabling technologies have been recognized as a strong support for personalized product development with more flexibility and shorter life cycle, which is one of the main trends of production evolution. Frugal innovation for highly customized product development prescribes new requirements for the rapid sharing of information among different product development stages and reusing of engineering knowledge. Virtual engineering method with its tools are promising ways for speeding up new product development and improve the reusing of product development knowledge to shorten product life cycle and reduce cost & time. However, to turn a CAD model into a physical model so as to realize the product development process, there are many tasks to be done in the processing chain. In each step, there are different types of information to be processed. From design requirement clarification to design specification analysing, functional simulation, process planning, scheduling & manufacturing, monitoring, qualifying, etc., there are diverse data interfaces. To facilitate the data exchanging and information management, there is a need to improve the continuity of the processing chain. Information regarding feedforward, concurrent, and feedback strategies in the processing chain should be supported by interoperability, and should be leveraged to facilitate decision making. Virtual engineering, as one of the data-driven techs, needs to exchange data with different steps in the processing chain through suitable data interfaces. Therefore, the interoperability becomes a key role for improving the digital continuity of the virtual engineering based rapid product development strategy.

Research subject, work plan:

This research will investigate the interoperability issues in the processing chain of rapid product development based on virtual engineering with an objective to improve the information management level, which could be beneficial for automation, knowledge reuse, standard formation, saving time & cost, ensuring production quality etc. The preliminary general work plan for the PhD candidate is given as follows:

1. Investigate diverse processing chain of rapid product development;
2. Investigate different methods and tools used in virtual engineering and their roles in the product development process;
3. Propose a rapid product development strategy based on virtual engineering techs;
4. Develop interoperability solution with open architecture and modularity to support the rapid product development strategy based on virtual engineering;
5. Propose digital continuity evaluation method and KIPs for simulation;
6. Conduct real case study for the proposed methods and tools.

The expected results of the proposed research are several scientific papers with high originality and quality for first-class peer-reviewed journals and international conferences in design and production domains. And, a global solution for interoperability in rapid prototyping processing chain is also demanded as well as a digital continuity evaluation framework.

References:

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