Proposal: PhD

Title: The Development of a novel framework to implement Industry 4 techniques to support advanced manufacturing technologies

Research background and area of work:
Industry plays a central role in the economy of the European Union, accounting for 15% of value added. It serves as a key driver of research, innovation, productivity, job creation and exports. Innovation, automation and sophisticated processes (i.e. advanced manufacturing techniques) are at the root of industrial success strategies and have proven to be critical for organisations in maintaining a leading position. In addition to the new advanced manufacturing technologies, "Industry 4.0" or the fourth industrial revolution has been slowly growing within Europe. Focusing on cyber-physical systems, Industry 4.0 is regarded as the next-generation production framework which uses the advances in information technology, autonomous engineering, internet of things and cloud infrastructure, big data for manufacturing and new technologies such as additive manufacturing.

Large, medium and small organisations will undoubtedly need to change their processes and capabilities in whole or in part to remain sustainable and competitive. This will require often radical new manufacturing / production models which could be built upon a combination of advanced manufacturing techniques and Industry 4 technologies outlined above. The models will need to include:

1. Horizontal integration through value networks
2. End-to-end digital integration of engineering across the entire value chain
3. Vertical integration and networked manufacturing systems

The work will concentrate on the development of a detailed framework to assist senior managers, within a range of manufacturing organisations who are developing new manufacturing techniques and technologies based upon industry 4. The aim is to create a “smart factory” utilising complex production systems which could integrate physical systems and networking/communication systems. A virtual manufacturing model could be created which can monitor and control the production system using data collected from the production equipment. Therefore knowledge of manufacturing informatics and a basic knowledge of software development would be advantages.

Aims:
The aims of the research project are to develop a new approach to support manufacturing organisations to implement advanced manufacturing techniques based upon flexible manufacturing, to include reduce changeover time, reduced downtime and to improve efficiency to improve product design, improve product development, improve production planning and control.

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