Chapter 8.5
The Innovative Production Machines and Systems Network of Excellence

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INTRODUCTION

This article presents the essence of the Innovative Production Machines and Systems (I*PROMS) Network of Excellence. It gives the rationale for networks of excellence, outlines the scope and structure of I*PROMS, and summarizes its program of activities.

RATIONALE FOR NETWORKS OF EXCELLENCE

Manufacturing is a significant wealth generation sector, accounting for over 20% of the European Union's (EU's) gross domestic product. To compete successfully in the global market, the European manufacturing industry needs to be underpinned by well focused advanced production research. Because of the breadth of the field, commercial considerations, and the multinationalism of the EU, production research activities within it have been naturally fragmented.

There is the potential to coordinate precompetitive research for common benefit. Under its Sixth Framework Programme (FP6), the EU has introduced networks of excellence as a new "instrument" to overcome fragmentation of European research and help shape the conduct of research in Europe. The operation of these networks is based on a joint program of activities aimed principally

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at integrating the research activities of the network partners while also advancing knowledge on the topic.

THE I*PROMS NETWORK OF EXCELLENCE

The EU FP6 network of excellence for Innovative Production Machines and Systems (I*PROMS) was inaugurated in October 2004. I*PROMS integrates the production research activities of 30 research centers from 14 countries in Europe: MEC, Cardiff University (UK) (coordinator), Profactor (Austria), Czech Technical University in Prague (Czech Republic), VTT (Finland), CETIM (France), ENIT (France), INRIA (France), Robosoft (France), IAO Fraunhofer Institute (Germany), IPA Fraunhofer Institute (Germany), IPK Fraunhofer Institute (Germany), Schneider Electric (Germany), TUC (Germany), University of Hannover (Germany), University of Patras (Greece), Dublin City University (Ireland), CRF (Italy), FIDIA (Italy), University of Naples Federico II (Italy), PIAP (Poland), University of Minho (Portugal), Fatronik (Spain), Tekniker (Spain), TNO (The Netherlands), Sakarya University (Turkey), University of Warwick (UK), University of Cambridge (UK), University of Manchester (UK), University of Newcastle (UK), and University of Oxford (UK).

I*PROMS addresses production research in an integrated manner to help shape this research area and overcome fragmentation. By creating an EU-wide research community concentrating on future manufacturing concepts, processes, and systems, I*PROMS acts as the main research hub within the EU for the whole area of production machines and systems.

I*PROMS adopts the knowledge-based "autonomous factory" vision for delivering increased competitiveness for manufacturing in 2020. The network focuses on intelligent and adaptive production machines and systems that meet dynamic business and value drivers through advanced information and communication technology.

I*PROMS promotes the development of common concepts, tools, and techniques enabling the creation and operation of flexible, reconfigurable, sustainable, fault-tolerant, and eco- and user-friendly production systems. Such systems should react rapidly to changing customer needs, environmental requirements, design inputs, and material/process/labor availability to manufacture high quality, cost-effective products.

THE CLUSTERS IN I*PROMS

I*PROMS addresses six manufacturing challenges: concurrent manufacturing, integration of human and technical resources, conversion of information to knowledge, environmental compatibility, reconfigurable enterprises, and innovative manufacturing processes and products. Work on those themes is prosecuted by four interconnected clusters (see Table 1): advanced production machines (APM), production automation and control (PAC), innovative design technology (IDT), and production organization and management (POM).

The following sections give an outline of the I*PROMS clusters and their scopes. Further information can be found in Pham, Eldukhri, Peat, Setchi, Soroka, Packianather, et al. (2004); Pham, Eldukhri, Setchi, Soroka, Packianather, Thomas, et al. (2004); Pham, Eldukhri, Soroka, Zlatanov, Packianather, Setchi, et al. (2005), and http://www.iproms.org.

Advanced Production Machines (APM) Cluster

Advanced production machines are the workmen of the factory of the future. These include machines for processing new/nano/smart/high-performance materials, micromanufacture (MEMS) machines, rapid manufacturing machines (rapid prototyping and rapid tooling), and manufacturing robots (sta-