

★ What will manufacturing look like in a decade's time? Professor **Marco Taisch** of Politecnico Di Milano explains how an international consortium of companies and universities is mapping the challenges that must be met in order to develop a highly competitive but sustainable industry of the future

Mapping the future of manufacturing research



A massive, international project is underway to shape the future of intelligent manufacturing and highlight the key innovation milestones needed to achieve a more sustainable and vibrant industry by the year 2020.

The aim of IMS2020 is to predict the challenges to be met if the manufacturing industry is to undergo the “deep industrial transformation” which experts say is needed to meet the environmental, social and economic challenges of tomorrow, says project leader Marco Taisch.

IMS2020 was launched in January 2009 as a 24-month €86 million project (since extended to 30 months), with €million of European Commission funding and an international consortium of 15 companies, universities and research centres from several countries.

Professor Taisch, who is also professor in operations management and advanced manufacturing systems at Politecnico di Milano, says: “My dream is to have a more sustainable manufacturing industry that is still profitable within a highly competitive world but is better for future generations and doesn’t have the huge negative impact that we have on the environment today.

“Customers are becoming more and more interested in green products and the only way to survive in the future will be to provide a green product produced in a green manufacturing environment.”

IMS2020 is conducted under the international, industry-led IMS (Intelligent Manufacturing Systems) Initiative established to develop the next generation of manufacturing and processing technologies, and is partly aimed at supporting global European-centric research.

It is an indication of the high level of industry interest that not only is the website – www.ims2020.net – getting a great deal of hits, but more than 250 organisations worldwide have signed up to the project which is also supported by policy-makers.

“It is very important that if, at European level, we are to become more competitive, we must not just react to manufacturing trends but are able to plan our research in terms of manufacturing systems,” says Prof Taisch.

From reactive to proactive

“This is not just my opinion, it is a thought shared with the policy makers in Brussels who agree that it’s very important to look

into the future in order to anticipate the major trends in manufacturing and therefore be prepared for them. This is about moving from a reactive approach in research to a proactive approach.”

The project’s strength lies in the amount of support and industry involvement it has achieved.

“The stakeholders in this project are not just European; it is sponsored by the international community – IMS is an initiative between European Union, the United States, Switzerland, Korea and Mexico – and the opinions are not just that of a small collective of people but of the international community and the policy makers,” he says.

IMS2020 has five key objectives, the first of which is to prepare a coherent roadmap for future manufacturing research in the five IMS key areas. The roadmap is “the core” of the project, says Prof Taisch.

“It is the tool that enables us to look into the future, analyse the trends and design the way to move from the reactive approach to the proactive approach,” he adds. “It offers us the possibility of creating the future of manufacturing, and to lay one cornerstone for the wealth and sustainability of our society.”

Now roughly halfway through the project, IMS2020 has completed its roadmap which is available on the website and is engaged in creating international and inter-regional research communities in the five key areas of research identified by IMS as vital to the future of manufacturing.

Other objectives include identifying new schemes and frameworks for IMS research; stimulating small and medium enterprises’ participation in international cooperative research and development projects; and preparing the ground for new IMS proposals and manufacturing projects, including paving the way for legislation.

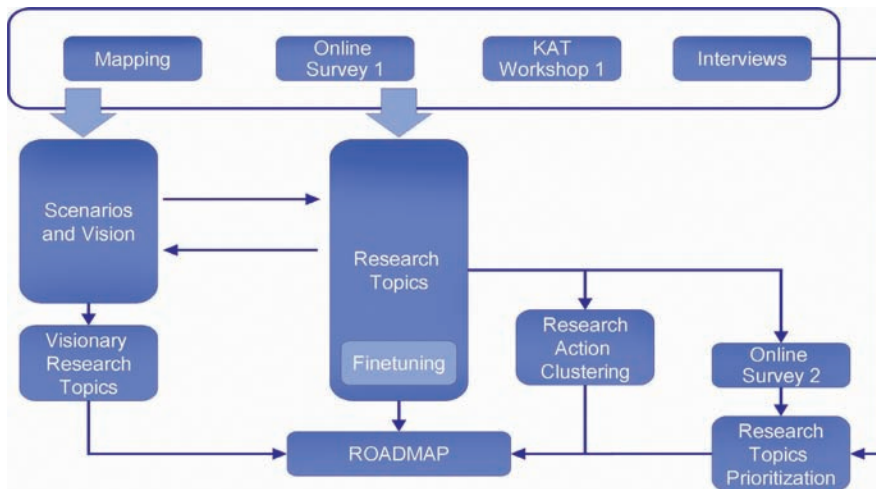
Five Key Area Topics

The five Key Area Topics – or KATs – identified by IMS as vital to developing the intelligent manufacturing systems of the future include sustainable manufacturing, products and services; energy efficient manufacturing; key technologies; standardisation; and innovation, competence development and education.

These have been further broken down into areas of research; for example, there are 26 projects in the sustainable manufacturing, products and services



“Customers are becoming more and more interested in green products and the only way to survive in the future will be to provide a green product produced in a green manufacturing environment”



The IMS 2020 roadmapping process

KAT, ranging from predictive maintenance and sustainable packaging to quality embedded manufacturing, which looks at how machines embedded with smart devices can be wirelessly networked under intelligent control systems to enable real-time data gathering and remote monitoring, thus providing a new environment for enhancing quality management in manufacturing.

In the energy efficient manufacturing KAT, IMS2020 is focussing on how to reduce the use of scarce resources and minimise companies' carbon footprint by considering innovative methods and technologies. In key technologies it is looking at model-based enterprises, nanotechnology, smart materials and robotics which are all expected to make a big impact on the next generation of manufacturing.

Standardisation is critical to the successful uptake of efficient interoperable solutions in the modern globalised enterprises. IMS2020 researchers have examined more than 1000 existing standards to identify the gaps, thus providing an invaluable tool for policymakers. "We have analysed where we are missing standards to offer guidelines for what is needed," says Prof Taisch. And in the innovation, competence development and education KAT, IMS2020 is working to prepare manufacturing engineers for the industry's future needs. That means moving from a pure technology viewpoint to one that integrates technology, business and management, while also taking sustainability and environmental protection into account. Above all,

IMS2020 is trying to take a holistic approach to manufacturing, says Prof Taisch. "Sustainable manufacturing is not just about manufacturing but also products and services. Today you can't speak just about manufacturing, you also have to include the products that the manufacturing system is going to make," he explains.

"Therefore product design is becoming more and more important. And you cannot talk about a product without speaking about the services which are related to that product; when you buy a product, you buy services and when you buy a service, most of the time you buy a product that is behind the services.

"And therefore if you want to deliver a better service, you need to design a product that is more suitable to do that, especially when you are talking about sustainability which means environmental issues, social issues and economic issues. The only way to do is to have a holistic view of the product, services and manufacturing system."

Prof Taisch praises the European Commission for its vision in funding the project and the project officer Roberta Salonna for the good collaboration. It is, he says, a wonderful example of "the fruitful collaboration which public bodies, the policy makers and companies can have together".

He believes IMS2020 will have a major influence in shaping the intelligent manufacturing industry of the future; its World Manufacturing Forum, to be held in 16-17 May 2011 in Como, Italy and attended by the major players in manufacturing, will be, he says, "the first event in a new era of sustainable development".

At a glance

Project Information

Duration:
01.01.2009 – 31.12.2010

Funding:

The project is funded by the European Commission (project no. CSA-CA 233469).

Project Aims:

The main objective of IMS2020 is the creation of roadmaps towards Intelligent Manufacturing Systems (IMS) in the year 2020.

Project Partners

- Institute for Operations Management (FIR) at RWTH Aachen, Germany
- Swiss Federal Institute of Technology Zurich (ETH), Switzerland
- European Committee for Standardization (CEN), EU,
- COMAU, Italy
- Clemson University, USA
- École Polytechnique Fédérale de Lausanne (EPFL), Switzerland
- Fatronik, Spain
- Institute for Prospective Technological Studies (IPTS), EU
- Keio University, Japan
- Korea Advanced Institute of Science and Technology (KAIST), Korea
- Institute of Industrial Technologies and Automation (ITIA), Italy
- Holcim, Switzerland
- Norwegian University of Science and Technology (NTNU), Norway
- Rockwell Collins, USA

A List of the Roadmapping Support Group can be found on www.ims2020.net

Marco Taisch

Project Coordinator

Marco Taisch
Politecnico Di Milano (POLIMI)
E: marco.taisch@polimi.it
T: 0039 02 2399 4815

