

Objective FoF-ICT-2011.7.1 Smart Factories: Energy-aware, agile manufacturing and customisation

The capability to produce large varieties of sophisticated products requires manufacturing sites to be flexible, fast and reactive. Lean and easy-to-implement ICT enables those sites to be resource efficient, safe and cost effective.

Target outcomes:

- a) **Demonstration and benchmarking of novel process automation and control (for discrete, continuous or batch industries):** Systems, strategies and tools for an integrated control and dynamic optimisation of factory assets. The challenge is to develop ICT driven approaches and scalable architectures (e.g. service-oriented architectures or other appropriate architectures) for next-generation production automation and control solutions with flexibility, autonomy, robustness and energy efficiency. Projects should address efficient aggregation of information across existing legacy systems³¹ at all production levels, factory level optimisation of production processes, and include demonstrations in real industrial environments. The aim is to show the operational and economic benefits of new ICT-driven approaches in factories against today's process automation and control solutions.
- b) **Large-scale validation of advanced industrial robotics systems** through user-friendly methods of interaction with, and tasking of, intelligent cooperative robotic systems (including new programming paradigms and direct physical interaction) and through robotics-enabled production processes. Research shall focus on methods that allow workers to productively and safely deploy robots without specialised training. Cooperation between human-robot and between robot-robot should aim to provide easy-to-access and personalised support for skilled or heavy duty tasks on the shop floor. Real-world validation of R&D shall demonstrate its large-scale applicability to flexible, small batch and craft manufacturing. Results should contribute to future benchmarking standards.
- c) **Applications based on factory-wide networks of intelligent sensors and new metrology tools and methods,** demonstrating management of manufacturing information in real time and under harsh conditions, including planning, scheduling and dispatching. R&D should in particular address modularity, reliability/accuracy, safety and energy efficiency aspects of quality control systems and automation/handling equipment supporting discrete manufacturing down to lot sizes of 1. Results should support international standardisation.
- d) **Lasers and laser systems for manufacturing and materials processing** with the following focus: i) High-brilliance active fibre and diode lasers (laser arrays) with nearly diffraction limited beam quality: simultaneous targets are multi kW continuous wave output power, efficiency of 40% or more, coupling into small diameter fibres (100µm or less for fibre lasers and 300µm or less for diode lasers); ii) New wavelengths and on-line adaptation of beam properties: novel lasers and laser systems opening-up new process windows and/or contributing to optimised process efficiencies. This includes widely tuneable lasers, ultra-short pulse lasers, versatile frequency conversion systems and photonic components enabling the on-line adaptation of essential beam parameters in order to produce stable beams of sufficient power and quality for the intended process.

³¹ e.g. ERP, MES, SCADA, DCS

Projects are expected to be industry-driven and to contain a strong validation element with quantifiable targets.

Expected impact:

- Strengthened global position of European manufacturing industry through the introduction of advanced automation into mainstream manufacturing and contributions to international standardisation
- Larger European market for advanced technologies such as electronic devices, control systems, new assistive automation and robots.
- Intelligent management of manufacturing information for customisation and environmental friendliness.
- Reinforced European leadership and industrial competitiveness of laser component and system producers and users and substantial improvement of manufacturing processes.

Funding schemes:

a) and c): IP;

b) and d): STREP

Indicative budget distribution¹⁰

- EUR 40 million with a minimum of 50% to IPs and 30% to STREPs

Calls:

FP7-2012-NMP-ICT-FoF