

Starting date: 1st September 2012
Duration: 48 months
Total Person Months: 936
Total costs: 9.302.070,00 €
EC funding: 6.135.000,00 €
Call identifier: FP7-2012-NMP-FoF-ICT
Objective: FoF-ICT-2011.7.1 – Target outcome c)
Collaborative Project - Grant agreement no: 314145

Coordinator:
 Enginsoft S.p.A.
Reference person:
 Mr. Nicola Gramegna
 Enginsoft S.p.A.
 Manufacturing Business Unit
 Via Giambellino 7 - 35129 Padova - Italy
 Ph. +39 049 7705311
 Mob. +39 348 2509496
 Fax. +39 049 7705333
 Email: n.gramegna@enginsoft.it

music.eucoord.com
 Powered by www.eucoord.com

DISSEMINATION EVENTS

- ♪ **EUROGUSS**
in Nüremberg
14th-16th January 2014
- ♪ **KOLLOQUIUM**
in Aalen
May 2014
- ♪ **GROßE GIEßTECHNISCHE TAGUNG**
in Hamburg
15th – 16th May 2014
- ♪ **METEF+FOUNDEQ 2014**
along with Alomotive in Verona
11th-14th June 2014
- ♪ **Summer School with a "MUSIC session"**
in Aachen
end of July 2014
- ♪ **ANKIROS/ANNOFER/TURKCAST 2014**
in Istanbul
11th- 13th September 2014
- ♪ **GIFA**
in Düsseldorf
14th-20th June 2015

Partner



Smart Factories: Energy-aware, agile manufacturing and customization



Multi-layers control&cognitive **S**ystem to drive metal and plastic production line for **I**njected **C**omponents

For High Pressure Die Casting and Plastic Injection Moulding

Contract no. 314145 - Collaborative IP project - FoF-ICT-2011.7.1

High Pressure Die Casting (HPDC) of light alloys and **Plastic Injection Moulding (PIM)** are two of the most representative large-scale production-line in manufacturing field, which are strategic for the EU-industry largely dominated by SMEs. Due to the high number of process variables involved and to the non-synchronisation of the process control units, HPDC and PIM are most “defect-generating” and “energy-consumption” processes in EU industry showing less flexibility to any changes in products and in process evolution. In both, sustainability issue imposes that machines/systems are able to efficiently and ecologically support the production with higher quality, faster delivery times, and shorter times between successive generations of products. Therefore, the MUSIC is strongly aimed at leading EU-HPDC/PIM factories to cost-based competitive advantage through the necessary transition to a demand-driven industry with lower waste generation, efficiency, robustness and minimum energy consumption. The development and integration of a completely new ICT platform, based on innovative Control and Cognitive system linked to real time monitoring, allows an active control of quality, avoiding the presence of defects or over-cost by directly acting on the process-machine variables optimisation or equipment boundary conditions. The Intelligent Manufacturing Approach (IMA) will work at machine-mould project level to optimise/adapt the production to the specific product and can be extended at factory level to select/plan the appropriated and available production line. The sensors calibration and quality measurements will be the pre-requisite of Intelligent Sensor Network (ISN) to monitor the real-time production and specific focus will be also devoted to Standardisation issues. The challenge of MUSIC is to transform a production-rate-dominated manufacturing field into a quality/efficiency-driven and integration-oriented one to exploit the enormous (and still underestimated) potential of HPDC/PIM through collaborative research and technological development, along the value chain with research groups, design, engineering and manufacturing companies and through advances in manufacturing, ICT and model process technologies.



PROJECT RESULTS:

The MUSIC Project consists of a well-articulated set of RTD, Demonstration, Training & Standardization activities, focused on weak points of **HPDC/PIM processes**, headed and actively participated by SMEs, and supported by a consistent work-plan with 8 WPs.

WP1

Design of Intelligent Sensor Network

It's an RTD activity finalized at defining the Product-Process requirements → Design of multi-level monitoring system based on Intelligent Sensor Network and new self-adaptive parts of the die to allow more agile production.

WP2

Real-time management of Manufacturing Information

It's an RTD activity finalized at developing the acquisition system at machine, equipment and post-operation level including traceability of the product.

WP3

Control & Cognitive system database

It's an RTD activity finalized at developing modules for different sequence steps of production unit and definition of corresponding DB structure.

WP4

Multi-layers Control & Cognitive software

It's an RTD activity finalized at developing a unique software based on control system, cognitive model and optimisation method working on real-time process data and quality prognosis.

WP5

ICT implementation at manufacturing sites

It's an RTD activity finalized at testing, through pilot implementation at manufacturing sites, the Cognitive model, the updating method, the optimization algorithm and the Quality/Energy/Cost objectives.

WP6

Validation of agile manufacturing and customisation

It's an demonstration activity finalized at validating a Control & Cognitive System in different Demonstrator-processes transferring the knowledge to industry.



From Music to Symphony
in Smart Factory

PROGRESS BEYOND THE STATE OF THE ART

Introducing intelligent manufacturing systems in HPDC, made available by autonomous and self-adaptive devices, will totally change the actual organisation and potential of this process. According to the experience of MUSIC Partners, which are well-established players in the HPDC and PIM manufacturing scenario, **six main challenges** have to be faced for the progress in this field which can be identified in terms of :

1. leading HPDC and PIM processes to “zero-defect environment”
2. introducing real-time tools for process control
3. monitoring and correlating all the main process variables
4. making the process set up and cost optimisation a knowledge-based issue
5. involving to multi-disciplinary R&D activities
6. impacting on EU HPDC and PIM Companies, by dissemination and standardization activities

EXPECTED END RESULTS AND INTENTIONS FOR USE AND IMPACTS:

The Intelligent System coming from MUSIC will lead to an optimised and intelligent design and manufacturing of HPDC/PIM components for different industrial sectors. The consequences of this are manifold: weight reduction of products, better use of natural resources, new applications (in automotive and in other fields) of materials. The positive impacts will affect all categories in a transversal way:

SMEs:

- ♪ increased efficiency of HPDC/PIM manufacturing will give the bases for increased production, sales and use of these components
- ♪ competence/know-how developed in the project will be further utilised in EU manufacturing industry, contributing to improving the quality of their products, to win the competition with low cost/low quality products coming from some Asian Countries;
- ♪ increase in the process yield and in the quality content of castings (these are their specific MUSIC outcomes) will lead to new applications;
- ♪ for **SMEs** engineering companies, the availability of the Intelligent System will give them more reliability since the design stage, thanks to an improved material and process knowledge.

Industries:

- ♪ for end-users industrial companies, the possibility of employing new-concept components will improve the technological margin of their products (improved reliability and safety, cost optimisation).

Universities and Research Centres:

- ♪ for universities and research centres, leading the diffusion of a new knowledge based approach in manufacturing & engineering, developing specific educational programmes, is a demanding challenge.

The **benefits for consumers** are clear: “zero-defect manufacturing” for HPDC/PIM products means increased safety (for any kind of product considered) and decreased costs (no scraps, better efficiency in processes, less energy consumption).