



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

Selves adapting system
for casting production lines

ELECTRONICS

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Gravity Casting

Efficiency

Die Casting

Customer Focus

Traceability

Monitoring

Achieving Energy
Awareness

Improve
Casting Process
Optimization

Savings

Quality Parameters

Analyze
Control
Measure

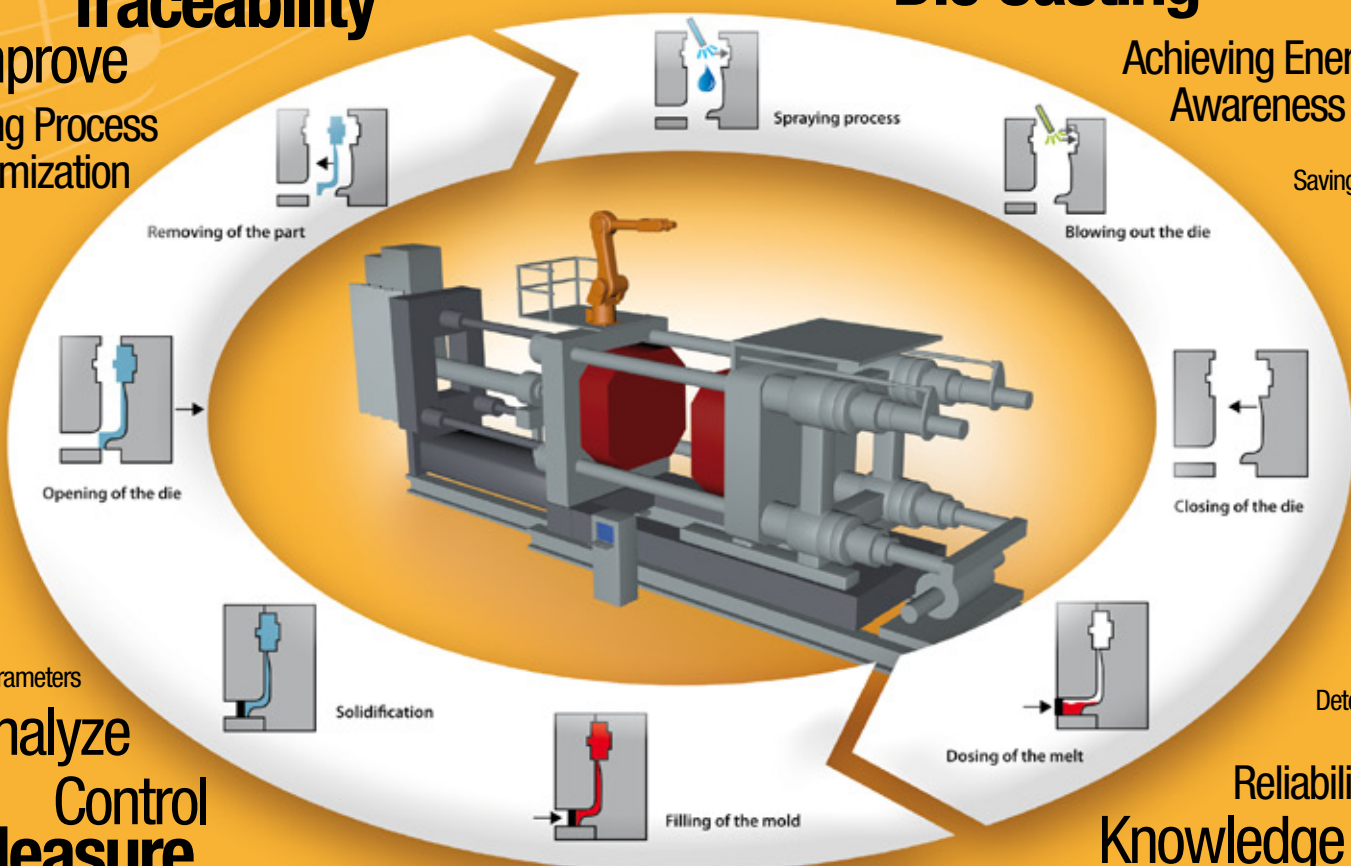
Cost Reduction

Low Pressure
Casting

Documenting

Understanding
Integrate

Reliability
Knowledge
& Experience



FP7-2012-NMP-FoF-ICT Smart factories:
Energy-aware, agile manufacturing and customization;
Collaboration IP Project; Contract no. 314145

Starting date: 1st September 2012
Duration: 48 months
Total Person Months: 936
Total costs: 9.302.070,00 €
EC funding: 6.135.000,00 €

Coordinator: Enginsoft S.p.A

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MUSIC

Multi-layers control & cognitive System to drive metal and plastic production line for Injected Components

For High Pressure Die Casting and Plastic Injection Moulding

Project Concept

Due to the high number of process variables involved and to the non-synchronization of all process parameters in a unique and integrated process control unit, High Pressure Die Casting (HPDC) and Plastic Injection Moulding (PIM) are "high energy consuming industries" and most "defect-generating" processes in EU industry showing less flexibility to any changes in products and in process evolution. MUSIC project 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.

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.

Project Challenges

Introducing intelligent manufacturing systems in HPDC, made available by autonomous and self-adaptive devices, will totally change the actual organization 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 optimization 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

Projects Structure

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.

Design of Intelligent Sensor Network: 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.

Real-time management of Manufacturing Information: finalized at developing the acquisition system at machine, equipment and post-operation level including traceability of the product.

Control & Cognitive system database: finalized at developing modules for different sequence steps of production unit and definition of corresponding DB structure.

Multi-layers Control & Cognitive software: finalized at developing a unique software based on control system, cognitive model and optimization method working on real-time process data and quality prognosis.

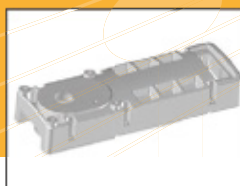
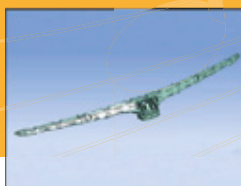
ICT implementation at manufacturing sites: finalized at testing, through pilot implementation at manufacturing sites, the Cognitive model, the updating method, the optimization algorithm and the Quality/Energy/Cost objectives.

Validation of agile manufacturing and customization: finalized at validating a Control & Cognitive System in different Demonstrator-processes transferring the knowledge to industry.

Expected Results

The Intelligent System coming from MUSIC will lead to an optimized 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, industries, Universities and Research Centres.

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)



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