WARRANT GROUP®

2014 LET'S

Let's 2014 – *Workshop*

BRINGING NANOTECHNOLOGY RESEARCH INTO THE EUROPEAN PRODUCTION INDUSTRY

DAY 3 - OCT 1

Bologna – *Palazzo della Cultura e dei Congressi – Sala Modulo 1*

INTRODUCTION

BACK TO THE FACTORY OF THE FUTURE

INTRODUCTION

Research PPPs Info-Day, Brussels, 11th-12th July 2011

INTRODUCTION

PPP FoF NMP Call Topics in WP 2012

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EUROPEAN COMMISSION
DG for Research and Innovation
Unit G2: New forms of production

Disclaimer: Note that this presentation is not legally binding and does not represent any commitment on behalf of the European Commission

Research PPPs Info-Day, Brussels, 11th-12th July 2011

INTRODUCTION

FoF.NMP.2012-5 High precision production technologies for high quality 3D micro-parts

Kai.Peters@ec.europa.eu

FoF.NMP.2012-6 Knowledge-based tools and approaches for process planning and integrated process simulation at factory level

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FoF.NMP.2012-7 Innovative technologies for casting, material removing and forming processes

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INTRODUCTION

FoF.NMP.2012-7 Innovative technologies for casting, material removing and forming processes (1/4)

Technical content/scope: Manufacturing technologies shall move towards sustainable, low resource consuming, flexible and high performance processes at low cost to ensure competitiveness. The recycling aspect is also a key issue for future manufacturing processes. New process technologies are needed to support casting and forming processes, material removing and additive manufacturing technologies, considering product and process life-cycle impacts as well as the performance requirements for these processes (e.g. tolerances, accuracy, surface quality, robustness, and higher properties). New approaches are demanded for low resource consuming processes and process intensification, integrated with hybrid processes, as well as knowledge-based processes exploiting advanced modelling, simulation and optimisation techniques for processes and equipment.

INTRODUCTION

FoF.NMP.2012-7 Innovative technologies for casting, material removing and forming processes (2/4)

Technical content/scope: In addition, the European industries are increasingly working with new materials including nano-alloys to take advantage of enhanced functionality, lower weight, lower environmental burden and improved energy efficiency all along the production process. This is needed to achieve a sustainable manufacturing base when moving to high added value products and customised production. New materials pose new challenges for cost efficient and sustainable manufacturing. These new materials include, among others, 'carbon neutral' materials as well as materials for improved product quality, versatility, weight saving and improved behaviour and functionality.

INTRODUCTION

FoF.NMP.2012-7 Innovative technologies for casting, material removing and forming processes (3/4)

Technical content/scope: In order to ensure the industrial relevance and impact of the research effort, the active participation of industrial partners, including SMEs, represents an added value to the activities and this will be reflected in the evaluation, under the criteria Implementation and Impact.

The proposals should cover both research and demonstration activities. Prototypes and pilot implementations in real industrial settings represent a clear added-value. Whilst there is no lower or upper limit on the requested EU contribution, the target is that proposals allocate around 50% of the total eligible costs of the project (excluding management costs) to demonstration activities and this objective will be taken into account in the evaluation under the criteria S/T Excellence and Impact.

INTRODUCTION

FoF.NMP.2012-7 Innovative technologies for casting, material removing and forming processes (4/4)

Funding Scheme: DEMO-targeted collaborative projects.

Expected impact: Manufacturing companies are nowadays facing more and more demanding production processes, while they cannot compete with the low labour costs of emerging countries. Thus, research addressed in this topic should contribute to their competitiveness. The development of new casting, material removing and forming manufacturing technologies should contribute to some of the following objectives:

- Have a direct economic impact on innovation and research in manufacturing, for reducing process chains from raw material to finished parts being applicable across many industrial sectors;
- Facilitate the development of cost-effective, safe, capable, affordable and sustainable technology and its incorporation into an industrial environment;
- Increase the efficiency of material use including improved recyclability and of energy consumption in the range of around 20%, depending on the specific technologies;
- Performance and capability of processes with high value added materials and engineered materials for new functionalities of products.

INTRODUCTION

EFEVE PROJECT

PROJECT OBJECTIVES

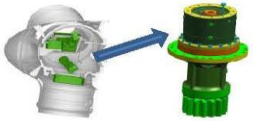
The general objective of EFEVE project is to develop, implement and demonstrate real solutions to improve casting components performance, reduce weight, energy and costs. Real solutions to priority sectors of the industry like the automotive, wind power or construction, which are demanding new efficient and versatile processes to produce competitive and innovative casting components. The approach to achieve the objectives will be through the combination of new developments in light-(nano-reinforced) materials, casting processes and new design (simulation).

→ Implementation of 3 pilot plants for monitoring and gathering date. Assessment of the economic and environmental improvements achieved in the project compare with the state of the art, and integrate them in a holistic optimization guidelines for the implementation of the developments in other manufacturing sector.

- LPSC plant pilot for new aluminium alloy by automotive and construction sector, and wind power sector
- SCMg plant pilot for new magnesium alloy by automotive sector.
- INSA plant pilot for new aluminum alloy by automotive

EFEVE PROJECT

WP2 – Requirements Analysis and Specification of Components

Crash relevant vehicle body cast part	Petrol engine Cylinder Head	Turbines pitch drive cast covers	Safe/Ergonomic handling parts
			

Challenges Automotive:

- Downsizing components for efficiency and compliance of new emissions regulations:
  - Higher operating temperatures and pressures: new power density engines (>100KW/lt) will require 25% increase in YS and UTS at 250ºC
- Weight reduction in car body structures:
  - Magnesium based crash component (35% lighter)

Challenges Eolic:

- Weight (efficiency increase):
  - Aluminum instead cast iron (60%)
  - Lower mass in rotation in the hub
  - Easier maintenance
  - Easier handing
- Cost:
  - Reduce machining time
  - Hole make by casting
  - Material cost
  - Avoid painting

Challenges Construction:

- Safety/Ergonomic (high performance):
  - Lightness
  - Corrosion resistance
  - Crushing/abrasion

Environment

Energy consumption

Cost

Competitiveness

Safe

Ergonomic

EXPECTED IMPACTS

Expected results / technologies / processes / materials	Expected impacts in EFEVE for another relevant industries
Development of nano-reinforced aluminium alloys	The nano-reinforcement has two different aspects, the material itself and de adding or mixing process to the aluminium base alloy. So both sectors will be directly affected, the producer of nano-reinforcement and the manufacturers of mixing systems.
Development of nano-reinforced magnesium alloys	The nano-reinforcement has two different aspects, the material itself and de adding or mixing process to the magnesium base alloy. So both sectors will be directly affected, the producer of nano-reinforcement and the manufacturers of mixing systems.
New SC Magnesium alloys casting process	Increasing the possibilities of conforming high properties magnesium components allows the engineering departments to improve designs looking for lighter and more efficient structures and assemblies. In the same way, the SC or HPDC machine manufacturers have the possibility of producing new systems and facilities with higher add-value for non-ferrous foundry sector.
New LPSC Aluminium alloys casting process	Increasing the possibilities of conforming high properties aluminium components allows the engineering departments to improve designs looking for lighter and more efficient structures and assemblies. In the same way, the LP or SC machine manufacturers have the possibility of producing new systems and facilities with higher add-value for non-ferrous foundry sector.
New INSA surface coating technology	Surface improvement through nano-composed multilayer coating is directly related on improvements of wear resistance and roughness of the components. This will allow minimize maintenance costs and represents a possibility for the coating producers, the coating system manufacturers, and the foundries, to diversify their production.

CONSORTIUM & FUNDING

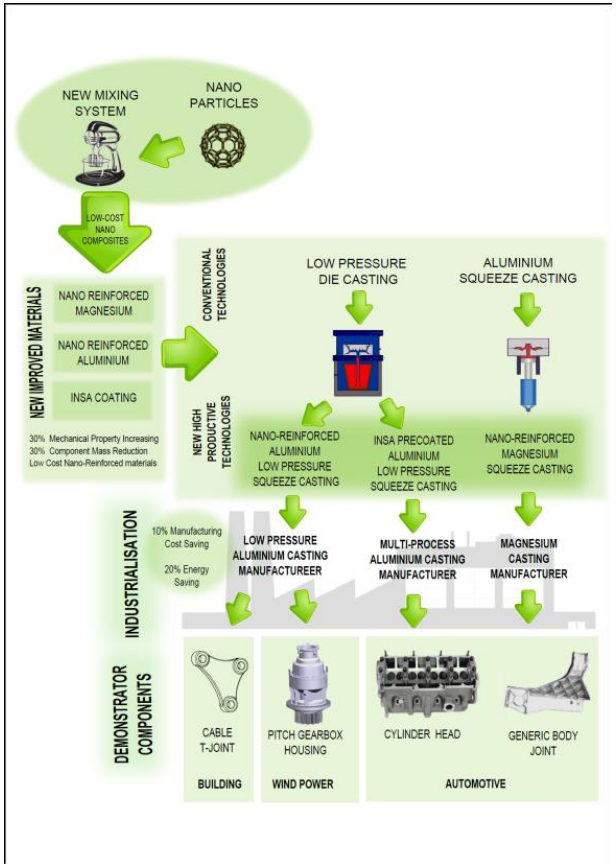
List of Beneficiaries

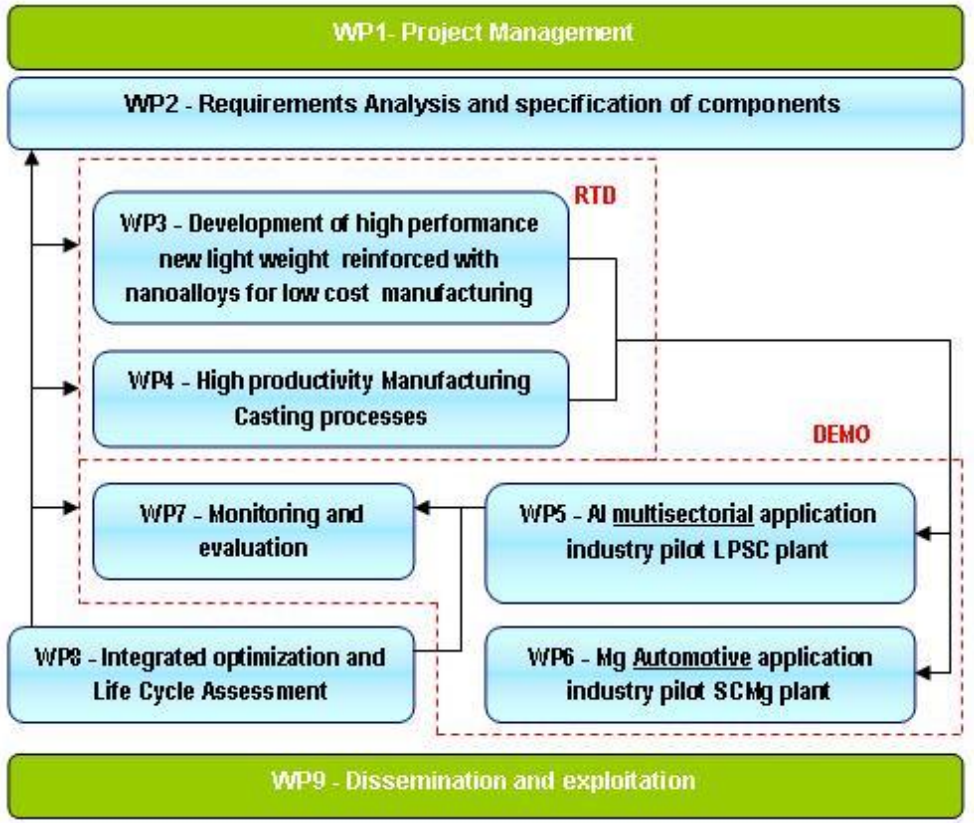
No	Name	Short name	Country	Project entry month[10]	Project exit month
1	FUNDACION TECNALIA RESEARCH & INNOVATION	TECNALIA	Spain	1	42
2	GRUPO ANTOLIN-INGENIERIA SA	GAI	Spain	1	42
3	FORD FORSCHUNGSZENTRUM AACHEN GMBH	FORD	Germany	1	42
4	NEMAK SA	NEMAK	Mexico	1	42
5	MARION TECHNOLOGIES S.A.	MARION	France	1	42
6	SEMATEC SERVICIOS MEDIOAMBIENTALES Y TECNICOS SA	SEMATEC	Spain	1	42
7	FUNDACION CIRCE CENTRO DE INVESTIGACION DE RECURSOS Y CONSUMOS ENERGETICOS	CIRCE	Spain	1	42
8	IMPRIMA COSTRUZIONI SRL	IMPRIMA	Italy	1	42
9	WARRANT GROUP S.R.L.	WG	Italy	1	42
10	MODELLERIA BRAMBILLA	BRAMBILLA	Italy	1	42
11	NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY "MISIS"	MISIS	Russian Federation	1	42
12	GIMA CAST GMBH	GIMA	Germany	1	42
13	PRENSAS Y TRANSFORMACIONES SA	PRETRANSA	Spain	1	42
14	AURRENAK S COOP	AK	Spain	1	42
15	BONFIGLIOLI RIDUTTORI SPA	BRI	Italy	1	42

Budget: 7.931.354€ / Funding: 4.900.000€

EFEVE PROJECT

WORKPLAN





STATE OF PLAY

WP2, Requirements analysis and Specification of Components:

- Four demonstrators have been selected and defined to measure the performance of the EFEVE project.
- The approach, to achieve the objectives of the project, has been defined to be through the combination of new developments in light (nano-reinforced) materials, casting processes and design (simulation) concepts.
- The expected impact will be mainly; direct economic impact, environmental and safe.

WP3, New light weight reinforced alloys:

- Cost effective nanoreinforcements suitable for magnesium and aluminium casting have been developed, technologies to minimize agglomerations and selection of alloy/reinforcements systems preliminary defined in the absence of final conclusions.
- Criteria for the final selection will be based on cost and mechanical properties.

STATE OF PLAY

In the <u>WP4</u> related with the development of manufacturing processes:

- Assessment and validation at lab scale of the innovative SCMg process for the selected and developed magnesium based alloys.
- Assessment at lab scale of the innovative LPSC process for the selected and developed aluminium based alloys. In this part the modifications of the mould to make the validation are resulting more complex than initially planned.
- Re-design of the demo components based on the properties obtained from the new materials and processes.

In the WP5 (recently started), related with the construction of the new LPSC equipment:

- Pre-technology analysis of future LPSC process.
- Design of the new LPSC equipment.

STATE OF PLAY

In <u>WP6</u> (recently started), where the objective is to validate an industrial manufacturing process employing squeeze casting for automotive magnesium parts, the most significant results for this period have been;

- Start with the analysis of the pilot line and Study of the new developments needed in the current HPDC line.
- Define planning for construction, assembly and starting up of the new developments or adaptations.

In <u>WP8,</u> assessment of the economic and environmental improvements achieved in the EFEVE project compared with the state of the art, the progresses have been;

- Assessment of tools and methodology for the Life Cycle studies; Assessment of tools and methodology for Thermoeconomic analysis and energy optimization.
- It has been decided for these analysis to select the reference values of the different industrial processes from existing internationa standards and datasets (i.e. ILCD database).

STATE OF PLAY

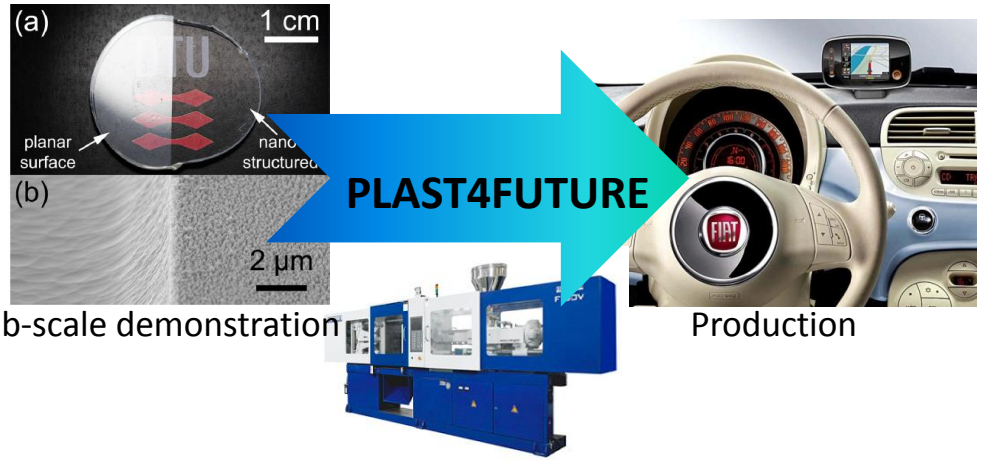
During the first 18-months period the expected activities of **WP9, Dissemination and Exploitation**, have been performed:

- The project Website has been created and maintained.
- The dissemination material has been released and updated.
- The first Exploitation Strategy Seminar (ESS) has been held. A positive experience and good value

PLAST4FUTURE PROJECT

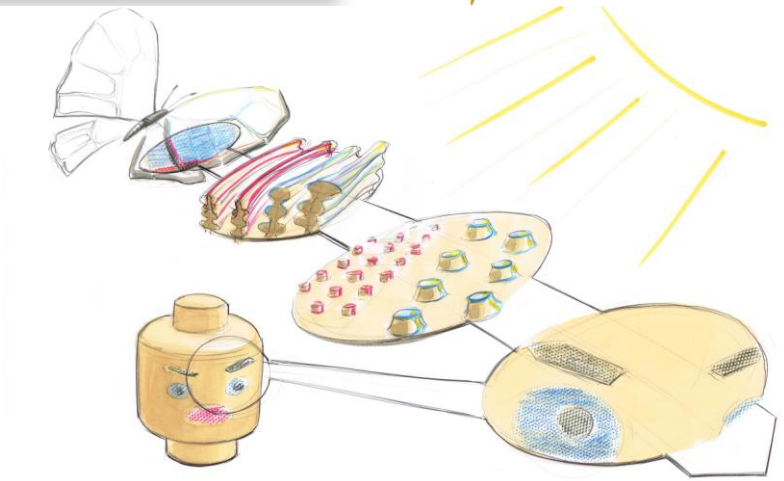
PROJECT OBJECTIVES

Injection moulding production technology **for multi-functional nano-structured plastic components** enabled by Nano Imprint Lithography.



Lab-scale demonstration

Production



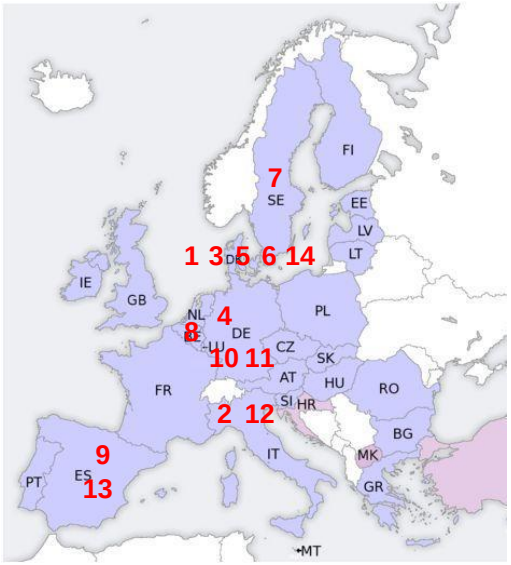
EXPECTED IMPACTS

Injection moulding production technology for **multi-functional nano-structured plastic components** enabled by Nano Imprint Lithography.

- → **Extend Lateral resolution of injection moulding tools from current >10 μm to 100 nm using NanoImprint Lithography**
- → **Enable injection moulded multifunctional surfaces**
- → **Reduce number of materials in products**
- → **Remove addtional process steps for decoration**
- → **Simplify production/assembly**
- → **Revert outsourcing of production**

PLAST4FUTURE PROJECT

CONSORTIUM & FUNDING

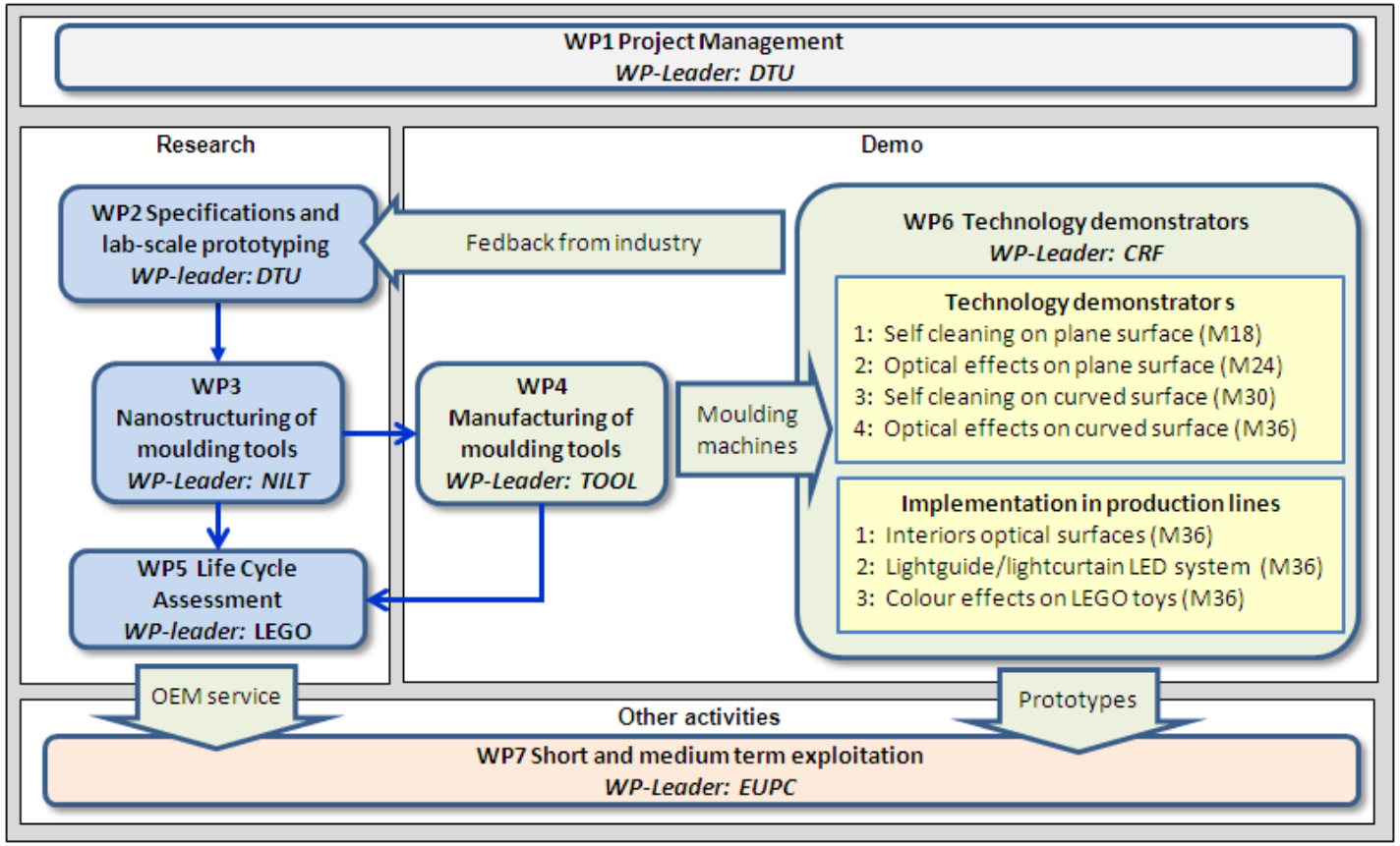


1 Danmarks Tekniske Universitet (DK)
2 Centro Ricerche FIAT S.c.p.A. (IT)
3 NIL Technology ApS (DK)
4 IPT Fraunhofer (DE)
5 ToolPartners A/S (DK)
6 CemeCon Scandinavia A/S (DK)
7 Uddeholm AB (SE)
8 European Plastic Converters (BE)
9 Catalan Institute of Nanotechnology (ES)
10 microresist technology GmbH (DE)
11 Karlsruhe Institute of Technology (DE)
12 Centro Ricerche Plast-optica S.p.A (IT)
13 Maier S. Coop. (ES)
14 Lego System A/S (DK)

2013-2016
15 partners
Total Budget 9.6 MEUR
EC Funding: 6 MEUR

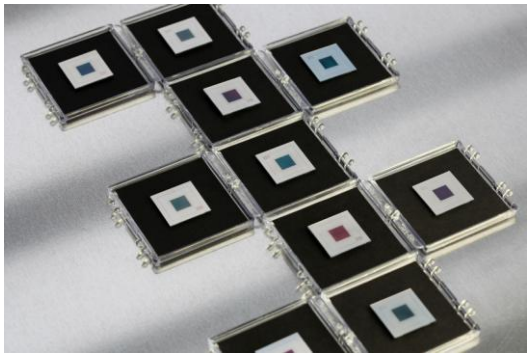
www.plast4future.eu

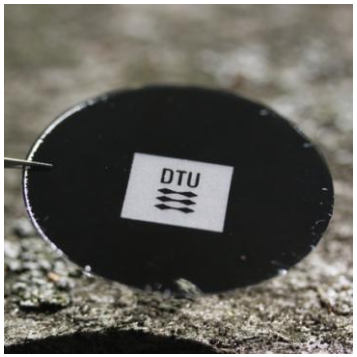
WORKPLAN


WP1 Project Management
WP-Leader: DTU
Research
Demo
WP2 Specifications and lab-scale prototyping
WP-leader: DTU
Fedback from industry
WP6 Technology demonstrators
WP-Leader: CRF
Technology demonstrator s
1: Self cleaning on plane surface (M18)
2: Optical effects on plane surface (M24)
3: Self cleaning on curved surface (M30)
4: Optical effects on curved surface (M36)
WP3 Nanostructuring of moulding tools
WP-Leader: NILT
WP4 Manufacturing of moulding tools
WP-Leader: TOOL
Moulding machines
Implementation in production lines
1: Interiors optical surfaces (M36)
2: Lightguide/lightcurtain LED system (M36)
3: Colour effects on LEGO toys (M36)
WP5 Life Cycle Assessment
WP-leader: LEGO
OEM service
Prototypes
Other activities
WP7 Short and medium term exploitation
WP-Leader: EUPC

STATE OF PLAY

WP2: Lab scale demonstrators





WP3: Nanostructured Injection Moulding tools