

1. – PUBLISHABLE SUMMARY

1.1 Background

Rotofast project is about developing and validating a novel rotomoulding machine, with newly developed heating and cooling systems which enhances energy efficiency and reduce cycle times, without becoming more expensive.

The purpose of Rotofast is to allow the challenged European rotomoulding sector to compete with low cost goods coming from eastern countries as well as to compete with other plastic manufacturing techniques, as injection moulding and blowing moulding.

1.2 The need

The need that has motivated the project has different sources. Three separated issues converged in time and challenged a sector very much dominated by SMEs. Therefore this need has three clearly differentiated components:

- Current sector threats
- Environmental component
- Economical component

Current sector threats:

Different internal and external factors are currently threatening European SMEs in the Rotomoulding industry:

- Relatively small market.

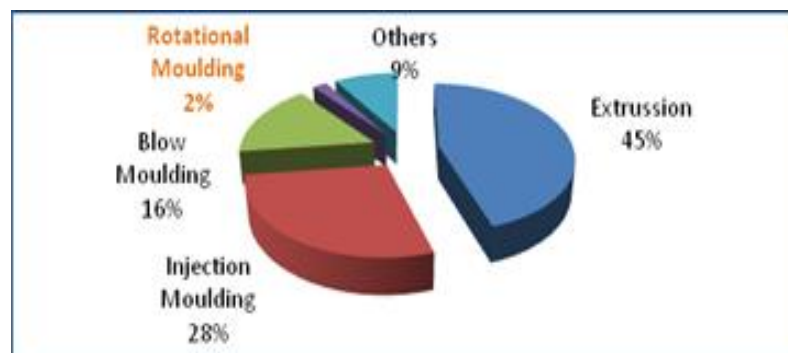


Figure 1: Market segments on plastic industry

- Low productivity/Low technological development.
- Technological ceilings reached.
- Long thermal cycle times.

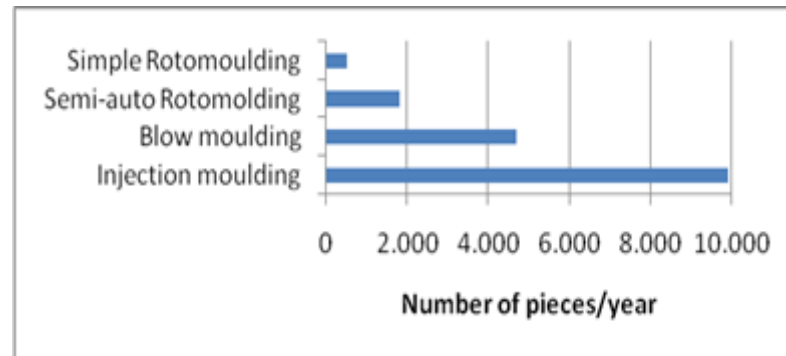


Figure 2: Estimate productivity of different manufacturing techniques

- Relatively high energy consumption.
- Eastern competence (Logistics Vs. Personnel costs).
- Fuel costs increasing (Oil and Gas)
- Polymer costs increasing.

Environmental component:

Rotofast project is aiming to improve workers health and safety as well as environmental impact of rotomoulding industry by:

- Using 20% less raw material.
- 100% Coolant will be recovered.
- 0% Natural gas used in the process.
- 70% more energy efficient process.
- Safer process (no risk of fire or gas explosion).

Economical component:

The consortium foresees a positive economic impact on different sectors by using Rotofast technology.

- Supply chain: Newly developed heating/cooling systems will create an increased demand on induction heating systems industry and on ionic liquids manufacturing sector.
- Rotomoulding machine manufacturers: A completely new product will be developed during the project. Big potential demand for this product is foreseen (see description of work for exploitation plan details).
- End users: More efficient and faster machines will be at plastic manufacturer's hands. Lower costs and higher margins are expected, and higher success in the competition with other plastic manufacturing techniques is also expected.

- Consumers: European consumers would profit from this project by being able to buy plastic manufactured parts at lower prices and with an enhanced degree of quality.

1.3 Project Objectives:

The purpose of the Rotofast project can be divided into a number of technical objectives:

1. To develop an induction heating system to optimize heat generation and to enhance energy efficiency reducing 70% of energy consumption per unit manufactured.
2. To develop a multilayered mould made up of thermal insulation material and magnet flux concentrator with overall density in order to get homogeneous heat at all points of the mould decreasing heat losses up to 80% with respect to radiant heat ovens.
3. To find the ionic liquid coolant for internal cooling containing a special cation and counterion and able to produce a cooling curve 20% shorter in time than present internal cooling without any losses.
4. To develop a Rapid Prototyping Protocol (RPP) based on CAE software tools, able to simulate for a certain mould design, the electromagnetic fields in the system, induced heating, temperature distribution in the mould and heat exchange between the mould and the polymer.
5. To achieve total cycle time savings up to 50% with respect to the average current rotational moulding processes, and heating/cooling cycle timings that make the process available for other raw materials (nylons, polypropylene and polycarbonate) as well as for multiple layers of different materials, namely ethylene-vinyl alcohol and foams.

1.4 Current Status (1st year)

The ROTOFAST project has started on the 1st of August 2010. The project is structured into seven work packages and the planned duration is 36 months. At the time of writing this report, the project has gone throughout its first year. Currently, work is progressing according to planning and we are confident the original objectives of the project will be successfully achieved by the end of the project.

The 1st year has been focused on finalising tasks of WP1 and partially achieving the scientific objectives in relation to WP2, WP3 and WP4:

- WP1: Development of a deep scientific knowledge of application of innovative systems of polymer heating and cooling in rotational moulding process. Modelling and characterizing both induced electromagnetic fields and ionic liquid flows within the mould during heating and cooling cycles respectively.
- WP2: Design, implement and test a cost effective, safe induction heating system to enhance energy efficiency reducing up to 70% energy consumption against current rotational moulding techniques. This system will heat the mould tool cavity developed during WP4 to get an homogenous polymer melt 30% faster than current heating technologies used in rotational moulding machines.
- WP3: Design, implement and test an ecological and effective mould cooling system based on ionic liquids capable of reducing cooling cycle times by 20% over current techniques. The system will be integrated into the mould developed in WP4 in such a way that it will cool external surfaces and internal cavity through the use of a closed loop design. The system will be such that it will avoid any liquid losses and withstand pressures and temperatures associated with the conventional rotational moulding process.
- WP4: Develop a rotational moulding tool system to incorporate the induction heating system and cooling system based on ionic liquids and withstand the thermal cycling and pressures of the ROTOFAST process. This moulding tool will be built with suitable materials to ensure the flux magnetic concentration, higher thermal insulation and it will have channels to allow ionic liquids cool outer and inner mould surface. It will also include an electronic unit to control the process parameters.

1.5 Consortium Members

PARTNER	Short name	Beneficiary type	Country
CONFINDUSTRIA BERGAMO UNIONE DEGLI INDUSTRIALI DELLA PROVINCIA	CONF	SME-AG	IT
TECPART VERBAND TECHNISCHE KUNSTSTOFF-PRODUKTE e.V.	TECPART	SME-AG	DE
THE BRITISH PLASTIC FEDERATION	BPF	SME-AG	UK
ASOCIACION ESPAÑOLA DE INDUSTRIALES DE PLASTICO	ANAIP	SME-AG	ES
ROTOTEK LIMITED	RTEK	SME	UK
SOLVIONIC SA	SOLV	SME	FR
FROG PLASTIC OÜ	FROG	SME	ET
TERMOMACCHINE S.r.l.	TERM	SME	IT
PERSICO SpA	PERS	OTH	IT
QUEEN'S UNIVERSITY BELFAST	QUB	RTD	UK
KUNSTSTOFF-INSTITUT LUEDENSCHIED	KIMW	RTD	DE
TECNOLOGÍAS AVANZADAS INSPIRALIA S.L.	ITAV	RTD	ES

1.6 Project Contact and Logo



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