

DEVELOPMENT OF A DEGASSING SYSTEM FOR ALUMINIUM CASTING PROCESSING BASED ON ULTRASOUND

PROJECTS INCENTIVE

- ❑ The use of aluminium alloys for light-weight applications is limited by the quality and limited mechanical properties of the cast parts that suffer from gas porosity due to the presence of hydrogen in the molten metal.
- ❑ The current degassing techniques, based on the purge of a gas mixture through the melt, have been proved to be expensive and harmful to one's health (often containing chlorine or fluoride). Moreover, they have shown limited efficiency.

The aim of DOSHORMAT is the industrial adaptation of the prototypes developed in the ULTRAGASSING project. Both projects targets at applying an ultrasonic degassing procedure to light alloys, increasing significantly the value of the cast parts produced by the EU foundries in terms of safety and quality.

- ❑ Two Prototypes were constructed in ULTRAGASSING and validated on 3 different industrial casting technologies (*High Pressure Die Casting with vacuum; Low Pressure Die Casting; and Gravity Casting*).

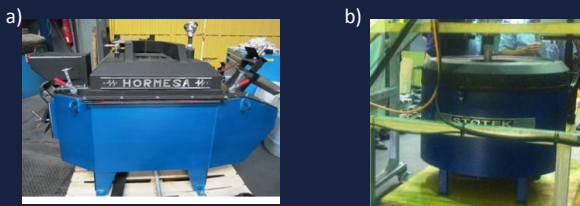
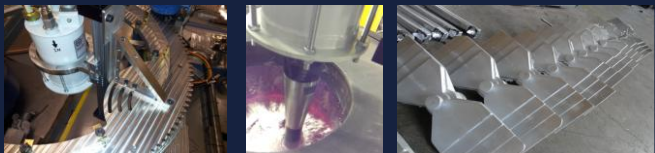


Figure 1. a) Prototype for HPDC; b) Prototype for LPDC & GC

- ❑ The technology developed within these projects will allow the participating SMEs to solve at least two problems:

- Eliminate not safe and healthy hazardous technologies currently used.
- Improve degassing efficiency and product quality.



CONSORTIUM

Coordination by:



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OBJECTIVES

1. Provide the European light-alloy foundries with an environmentally friendly and safe means to improve the quality of their cast parts by applying an **ultrasound degassing treatment**.
2. Establish a **link between ultrasonic degassing parameters, melt quality and casting parameters**, so as to develop a technology **to be applied in different casting processes**.
3. Demonstrate under **standard production conditions** the efficiency of the developed Ultrasonic degassing technology compared to the currently used techniques.
4. Design of **two ready-to-market ultrasonic degassing machines**.

INNOVATION

- ❑ Complete elimination of harmful and environmentally unfriendly gases.
- ❑ Elimination of rotational, porous and fragile contaminant components.
- ❑ Optimized scheme that allows short treatment time with maximum benefit.
- ❑ Applicability to both continuous and batch processes and to a wide range of casting processes and liquid metals.

MAIN RESULTS

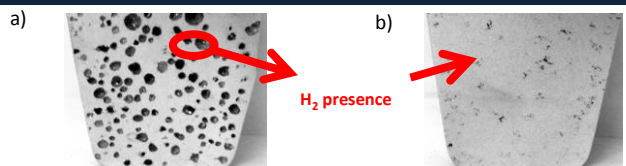


Figure 2. Reduced Pressure Test samples of A380 alloy at 720°C: a) BEFORE Ultra Sound Treatment; b) AFTER 2 min of UST and 5 min of idle time.

- ✓ Establishment of the relationship between the parameters of degassing ultrasonic (acoustic power, time, design), quality of the molten material (gas and oxide content), and casting parameters (temperature, flow rate).
- ✓ Definition of basis for the selection and design of ultrasonic equipment (transducer and sonotrodes) and the electronic required.
- ✓ Definition and implementation of a new numerical model for the design and optimization of the acoustic system.
- ✓ Design and construction of two prototypes for aluminium degassing based on ultrasounds, one for specific purpose (High Pressure Die Casting) and other for general purpose (Gravity Casting and Low Pressure Die Casting).
- ✓ Demonstration of ULTRAGASSING technology efficiency compared to current degassing technologies.

"Mechanical properties and porosity using ULTRAGASSING are similar or better compared with traditional technologies, with the added value of the absence of harmful gases and less dross formation".

With the support of:



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