

PROJECT

HardALU

Fluidised Bed Heat Treatment Furnace for HPDC engine blocks and other transport components offering new opportunities for lightweight, cost competitiveness and energy saving

Funding: European (Horizon 2020)

Duration: Jun 2015 - Jul 2018

Status: Complete with results

Total project cost: €909,250

EU contribution: €636,475



Call for proposal: H2020-SMEINST-2-2014

[CORDIS RCN : 196598](#)

Objectives:

Advanced manufacturing technologies are needed in order to facilitate the production of high performance lightweight aluminium components. HPDC is a highly productive process but the conventional heat treatment technology cannot be applied due to the formation of blisters of entrapped gas. This project offers to the foundries and automotive companies industrial FB lines able to heat treat the key parts and thus it will lead the company growth for the next years from a high technology solution developer to an important stakeholder in the automotive industry.

Since its foundation in 1989, HORMESA has specialized in the equipment, materials and turnkey solutions for non-ferrous foundries, mainly Aluminium and Copper alloys. Customer driven attitude and continuous technology development allow us to offer practical solutions for industrial processes. Specialization and globalization are two forces that strongly influence this entity with result of a consolidated 25% growth during the 2009-2012 period.

This project is “natural next step” as it is the next phase to develop the company's strategy:

- To enable heat treatment of High Pressure Die Cast “HPDC” parts (which are not heat treatable with conventional furnaces), thus increasing their tensile strength by a 100 % and making it possible to reduce their weight or replace heavier iron castings, particularly in the case of engine blocks.
- To reduce by 2% CO2 emission by increasing replacing iron (a reduction of 28 kg is expected from replacing a iron engine of block of average 55 kg by an aluminium one)
- To generate a new niche market of heat treatment lines for HPDC parts: 1 industrial line for FB heat treatment of HPDC engine blocks in the first year after finishing the project, and 3 lines in the second year (engine blocks or others).
- Additional 30 % of reduction of CO2 emission associated to the reduction of gas consumption when the alternative FB T6/T7 heat treatment is applied

Parent Programmes:

[H2020-EU.3.4. - Horizon 2020: Smart, Green and Integrated Transport](#)

[H2020-EU.2.3. - Horizon 2020: INDUSTRIAL LEADERSHIP - Innovation In SMEs](#)

Institute type: Public institution

Institute name: European Commission

Funding type: Public (EU)

Lead Organisation:

Hornos Y Metales Sa

Address:

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Organisation Website:

<http://www.hormesa.com>

EU Contribution: €636,475

Technologies:

Electric road vehicles
Aluminium front vehicle structure

Development phase: Research/Invention

Key Results:

Periodic Reporting for period 3 - HardALU (Fluidised Bed Heat Treatment Furnace for HPDC engine blocks and other transport components offering new opportunities for lightweight, cost competitiveness and energy saving)

At the present, the European transport sector has to meet several challenges, such as competition of emerging countries, as well as more restrictive legislation regarding CO2 emissions. HardALU project aims at reduction of weight by substituting iron by light and high performance aluminium castings, in particular engine blocks. This will be achieved by making High Pressure Die Castings (HPDC) heat treatable using Fluidized Bed (FB) Technology, which allows reducing significantly the heat treatment time and thus avoiding blistering.

Advanced manufacturing technologies are needed in order to facilitate the production of high performance aluminium components. HPDC is a highly productive process but the conventional heat treatment technology cannot be applied due to the formation of blisters. Whereas, all the other manufacturing technologies for engine blocks, allow the application of conventional T6 heat treatment. At present FB is not industrially applied to any aluminium casting in Europe. However, FB heat treatment offers a much higher rate of heat transfer than conventional furnaces.

On the other hand, aluminium casting manufactured by other technologies: sand, low pressure, etc. that are nowadays heat treated (T6/T7) in conventional air furnaces, could also benefit from the shortened heat treatment in FB furnaces by a reduction of 80% in time and a reduction of 30% of energy consumption.

The main innovations of the application of FB heat treatments in the manufacturing process of HPDC are:

- To enable heat treatment of "HPDC" parts, thus increasing their mechanical properties and making it possible to reduce their weight or replace heavier iron castings
- To reduce by 2% CO2 emission by replacing iron (a reduction of 28kg is expected from replacing a iron engine block of average 55kg)
- Additional 30% of reduction of CO2 emission associated to the reduction of gas consumption when the alternative FB T6/T7 heat treatment is applied.
- To generate a new niche market for heat treatment lines for HPDC parts

Industrial problem:

-The most typical HPDC parts in cars are engine block, gear box and a vast number of brackets and accessories. At present, these HPDC parts cannot be fully heat treated (T6 or T7) due to the problem of blistering.

-Other important automotive parts such as cylinder heads, suspension parts, wheels and brake components are usually not casted in HPDC and require a conventional T6 or T7 heat treatment. The T6/T7 heat treatments account for 12-25% of the value added of these castings.

-Conventional T6/T7 treatments include a quench in water from 490–540°C to 60–80°C. However, water quenching also causes severe internal residual stress, as well as distortion in the case of castings with a complex geometry and with high differences in thickness. Air quench or oil quench can avoid these problems, but the tensile properties are notably lower or a subsequent post-treatment (cleaning) is needed.

This innovative business will boost the company internationally in the heat treatment market as there is no competitor for this technology in Europe. Moreover, its HPDC foundry clients will be able to produce components with enhanced performance at levels above actual standards; a new niche market is expected. Within the strategy of HORMESA the transfer to other markets such as railway and aircraft castings, is considered in the following years with the companies own resources.

STRIA Roadmaps: Vehicle design and manufacturing

Transport mode: Road transport

Transport sectors: Passenger transport, Freight transport

Transport policies: Other specified

Geo-spatial type: Other