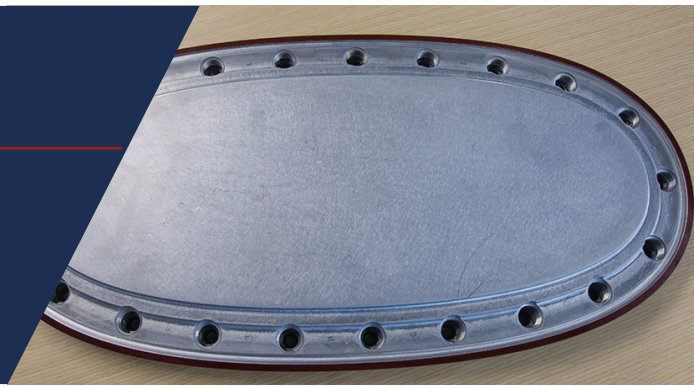


Technology Project Abstract:

Melt 5b – Thin-Wall Aluminum Die Casting Development



Lead Industry Partner: Boeing

Technology Pillar: Melt Processing

Lead Research Partner: The Ohio State University

Project Summary

This project focuses on the development of High Pressure Die Casting (HPDC) technologies for aluminum alloys that are required for producing high quality thin-wall aluminum die cast components.

Technology Gap / Need

The current technology gaps in the area of thin-wall aluminum HPDC castings create three opportunities for improvements:

- Reducing the minimum wall thickness of die castings to less than 3 mm in parts with larger surface areas, and still achieve complete mold fill.
- Reducing the variability of, and increase the minimum mechanical properties of HPDC castings, which currently limit their use for structural applications in both automotive and aerospace industries.
- Creating custom processes for designing die castings. Current casting design practice applies the minimum mechanical properties of cast alloys uniformly to the whole casting, which generally results in over-design of a casting, especially when a large safety factor is used.

Proposed Technology

Integrate key process technologies (super vacuum die casting and shortened heat treatment) with integrated computational materials engineering (ICME) tools for 300 series (Al-Si-Cu-Mg based) die casting alloys to reduce the variability in quality and improve the mechanical properties of high pressure die castings.

Project Benefits

- Reduction of the minimum wall thickness of parts to reduce weight
- Use of HPDC to replace unitized thin aluminum sheet metal built-up assemblies for manufacturing cost reduction

- Establishment of a mechanical property test database and design/ICME methods that are repeatable across the die casting supplier base, thereby increasing the competitiveness of domestic manufacturing of aluminum products.

Workforce and Educational Impact

The American Foundry Society (AFS) and the North American Die Casting Association (NADCA), through workshops, webinars, technical conferences, and training programs, will assist in the dissemination of knowledge and create new courses on how to manage this new thin-wall aluminum die casting in a production environment. LIFT will support the development of ICME workforce development initiatives.

Period of Performance

Start Date: July 2015

End Date: June 2017

Funding

Total Project Value: \$2.2M

Participants

Industry Partners

Alcoa
American Foundry Society
Boeing
Comau
Eaton
NADCA
Nemak

Research Partners

Massachusetts Institute of Technology
Southwest Research Institute
The Ohio State University
University of Michigan
Worcester Polytechnic Institute

