

Industrial Technologies Program

Manufacturing Advanced Engineered Components Using Lost Foam Casting Technology

The Lost Foam Casting Process produces high value parts by consolidating several cast components into one single casting, improving energy efficiency by reducing machining and assembling costs, achieving better metal yields, reducing materials consumption by eliminating cores, and improving casting dimensional accuracy. All of these unique process features reduce the energy consumption during manufacturing.

Lost foam casting production has grown in value from about \$5,000,000 per year in 1988 to \$800,000,000 in 2002. This is the result of persistent investment by the industry with financial assistance from the DOE Industrial Technology Program to support technical developments. During this time period, many

technical issues have been resolved and the technology has been transferred to the production floor, resulting in scrap reductions from 25 percent to less than three percent.

The proposed R&D program led by a research team at the University of Alabama at Birmingham would further decrease casting scrap and mature the technology through expanding the Lost Foam marketplace. Reducing porosity and fold defects will improve (1) production efficiency, (2) mechanical properties, and (3) marketability of castings. All three benefits will reduce energy consumption in the casting process.

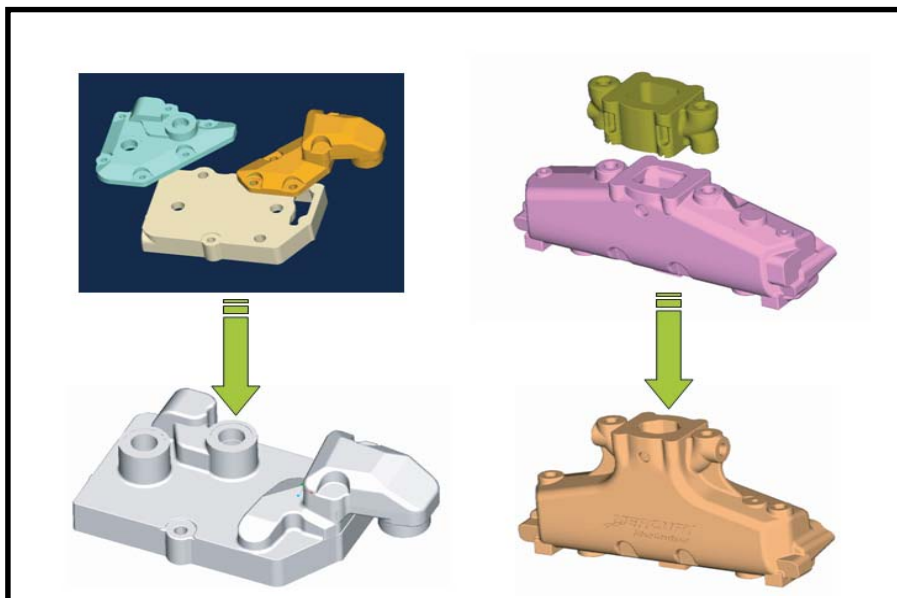


Benefits for Our Industry and Our Nation

- Increase lost foam casting quality.
- Improvements in production efficiency.
- Reduction in energy consumption.
- Improvement in marketability of castings.
- Reduction in scrap.

Applications in Our Nation's Industry

Reduced porosity and fold defects in lost foam castings will increase production efficiency, mechanical properties, and marketability of lost foam castings. The European Lost Foam Council at Paderborn University formed last year recognizes the successes of this approach for the rapid development and commercial deployment of lost foam casting technology.



Project Description

There are five objectives listed below.

1. Increase understanding of the metal/pattern replacement process to reduce casting defects and improve computational models.
2. Improve pattern quality and consistency to reduce casting defects.
3. Develop innovative techniques to expedite pattern pyrolysis product removal to reduce casting defects and improve casting quality.
4. Develop techniques and procedures for solidification under pressure to improve casting quality for safety-critical applications.
5. Develop a design package for casting designers and implement a marketing plan to increase Lost Foam casting applications.

Milestones

1. Pattern Replacement and Solidification Modeling.
2. Improve Pattern Quality and Consistency.
3. New Pattern and Coating Materials.
4. Solidification Under Pressure.
5. Design Data and Marketing Plan.
6. Technology Transfer.

Project Partners

University of Alabama-Birmingham
Birmingham, AL
American Founders Society, Schaumburg, IL
Cast Metals Coalition Partnership
Charleston, SC
American Foam Cast, Sylacauga, AL
Arena Flow, Albuquerque, NM
BMWAG, Landshut, Germany
Bombardier, Spruce Pine, NC
Carbo Ceramics, New Iberia, LA
Citation Foam, Columbiana, AL
Copeland Corp., Chicago, IL
ESI North America, Annapolis, MD
Flow Science, Santa Fe, NM
Foseco Moval, Bessemer, AL
Fundilag, Torreón, Mexico
General Kinematics, Barrington, IL
GM Powertrain, Saginaw, MI
HA International, Westmount, IL
Lovink -Terborg b.v., The Netherlands
Magma Software, Arlington Heights, IL
Mercury Marine, Fond du Lac, WI
Montupet, Belfast, N. Ireland
Mueller Co., Chattanooga, TN
Mueller Co., Albertville, AL
Nemak, Monterrey, Mexico
PSA Peugeot Citroen, France
Southeastern Foundry Products
Alabaster, AL
Styrochem Int., Fort Worth, TX
Teksid Aluminum, Sylacauga, AL
Vulcan Engineering, Helena, AL

A Strong Energy Portfolio for a Strong America

Energy efficiency and clean, renewable energy will mean a stronger economy, a cleaner environment, and greater energy independence for America. Working with a wide array of state, community, industry, and university partners, the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy invests in a diverse portfolio of energy technologies.



U.S. Department of Energy
Energy Efficiency
and Renewable Energy

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