

INTEGRATED DIE CASTING

CDME's Manufacturing Innovation Learning Laboratory is home to an industry leading die casting cell that is capable of creating near net shape components in both aluminum and magnesium alloys. The cell is a first of its kind at any U.S. university and offers industry the opportunity to access these capabilities for development of advanced lightweight structures. When coupled with the engineering resources of the CDME and the Center for Simulation Innovation and Modeling (SIMCenter), industry has the ability to develop, test and prototype their unique application designs on a pilot or pre-production scale prior to making the capital investments required for product commercialization.

The specialized die casting cell has been utilized at near production rates of 60 shots per hour on magnesium alloy AM50. The cell has also been fitted with a high vacuum pump which affords it the capability of conducting vacuum die castings for both aforementioned material systems.

CAPABILITIES

- Bühler H-250 SC Die Casting Cell with a 2-ft x 2-ft die bed, 250-ton press and 2-mm thin section capability integrated with:
 - » Busch 30-inHg vacuum pump and accumulator tank
 - » MPH 500-lb Aluminum Furnace and Crucible
 - » Metamag 500-lb Magnesium Furnace and Crucible
 - » Pyrotek Star 2500 Rotary Degasser and Flux Injection system
 - » Bühler Dataaccess Controller
- ProCast Foundry Simulation software can be used to iteratively test casting designs via SIMCenter and the State of Ohio's Supercomputer.
- Mechanical and Metallurgical qualification testing via EWI's ISO/IEC testing services group
- Electron and Optical Microscopy on developmental and prototype die cast parts using the skilled technicians and equipment at the Center for Electron Microscopy and Analysis (CEMAS)



FACULTY

Alan Luo, professor of Materials Science and Engineering (MSE) and Integrated Systems Engineering (ISE), Jerald Brevick, associate professor of ISE, and a team from Ohio State adapted the Metamag furnace and melt transfer system.

MATERIALS

Magnesium and aluminum, the lightest structural metals, have emerged as promising structural materials for replacing cast iron and steels in automotive and other transportation industry products. The design and manufacturing of these materials are critical given the recent industry trends towards lightweight structures for automotive and aerospace industries.

APPLICATIONS

According to statistics compiled by the National Science Foundation, Ohio State ranks 3rd nationally among all research universities in industry-sponsored research. Whether your interest is in licensing, sponsored research, joint ventures, investment corporate giving or placement of our best students, Ohio State is here to help accelerate your business through innovation.



THE OHIO STATE UNIVERSITY

CDME is supporting the commercialization of technologies that emerge from Ohio State's annual research efforts. Ohio State has one of the largest research and development budgets of all universities. The amount of annual funding is a leading indicator of the breakthrough innovation occurring within the University. Recent annual highlights from OSU:

- » \$934 Million: Total research and development (R&D) expenditures
- » \$470 Million: Federal R&D expenditures
- » \$101 Million: Industry-sponsored research expenditures

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KEY FEATURES AND BENEFITS

- Low cost of machines leading to cost effective automation.
- Increased requirements for system flexibility to produce multiple parts.
- Increase in safety for workers.
- Variety of production rate requirements.
- Cycle time requirements by station or operation.
- Product handling requirements.
- Maintenance requirements.
- Safety standards related to heat and gas exposure in casting operations.

MARKET OPPORTUNITIES

- The Global Automobile Parts Die Casting market registered revenue of \$34.94 billion in 2015 and is expected to touch \$48.83 billion by 2020.
- Employing aluminum die-casting parts has also been the latest trend and it was observed that cutting down the weight of the vehicle by 15% could enhance the fuel economy by 25%.
- The global market for die casting will register revenue of \$55.47 billion by the end of 2015 and is expected to touch \$76.345 billion by 2020,
- The United States has one of the largest automotive markets in the world and is home to over 13 major auto manufacturers.

Categories

Automotive, Manufacturing, Welding, Joinery.

College

College of Engineering (COE)
Department of Materials Science and Engineering
Department of Mechanical and Aerospace Engineering

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