

# Industrial Technologies Program

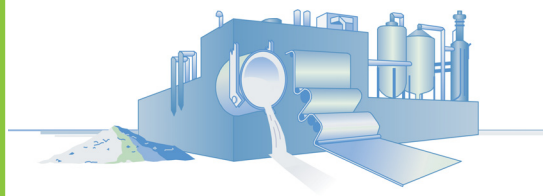
## Development of Thin-Section Zinc Die Casting Technology

Thin-section casting of all metals is limited by casting properties of the liquid metal; the thermal properties of the mold or die; the geometry of the component to be cast; and the design of the metal introduction system, including the gates and the runners. An approach to developing thin-section casting technology must include developments in alloy composition, die design, and processing parameters. Benefits of reducing casting wall thickness for the casting industry will result in reduced materials handling, as well as melting costs and scrap. Currently, zinc die castings are limited in minimum thickness to approximately 0.75 mm. This is a thinner section than is possible with many other metal alloy systems or casting processes.



Zinc die castings are already used in a wide array of shapes and sizes for heat sink applications. Their efficiency and weight, particularly in transportation applications, will be greatly improved by reducing their section thicknesses.

A research team led by the International Lead Zinc Research Organization (ILZRO) is developing an approach, utilizing zinc alloys to reduce casting section thickness to 0.3 mm or less. This will include developments in alloy composition, die design, and processing parameters. The research team recognizes that the critical factors to success in thin-section zinc die casting will include heat and fluid flow in the die and the use of high fluidity alloys.



### Benefits for Our Industry and Our Nation

- *More efficient and lightweight die cast heat sinks*
- *New heat dissipation areas for die casters in the electronic industry*
- *Capability of thinner wall, lighter weight component design*

### Applications in Our Nation's Industry

*Reducing zinc casting thickness will make heat sinks much more efficient and lightweight. The availability of thinner zinc castings will provide die casters the opportunity to provide heat dissipation solutions in the electronics industry.*

## Project Description

The goal of this project is to develop a thin-section zinc die casting technology. An approach to develop thin-section casting technology must therefore include developments in alloy composition, die design, and processing parameters. The critical factors to success in thin section zinc die casting will include heat and fluid flow in the die and the use of high fluidity alloys.

## Milestones

The milestones for this project are:

1. Design of Phase I Test Alloys
2. Manufacture of Phase I Test Alloys
3. Die Design-Flat Plate
4. Die Modifications-Flat Plate
5. Die Casting Machine Calibration & Matching to Die
6. Die Casting Trials
7. Assessment of Phase I Castings
8. Phase I Analysis & Reporting
9. Design of Phase II Test Alloys
10. Manufacturing of Phase II Test Alloys
11. Die Design-Practical Component
12. Die Modifications-Practical Component
13. Die Casting Machine Calibration & Matching to Die
14. Die Casting Trials
15. Assessment of Phase II Castings
16. Phase II Analysis & Reporting

## Project Partners

*International Lead Zinc Research Organization (ILZRO)*, Durham, NC

*North American Die Casting Association*, Wheeling, IL

*Cast Metals Coalition Partnership*  
Charleston, SC

*Brillcast Inc.*  
Grand Rapids, MI

*DeCardy Diecasting Inc.*  
Chicago, IL

*Dkaba Ilco Inc.*  
Montreal, Canada

*Kennedy Die Castings Inc.*  
Worcester, MA

*Quality Metal Finishing Co.*  
Byron, IL

*Teck Cominco*  
Vancouver, B.C.

## 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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