

METALCASTING E-SMARRT

Energy-Saving Melting and Revert Reduction Technology



High Fluidity Zinc Die Casting Alloy Reduces Part Cost and Improves Energy Efficiency

As a partner in the Energy-Saving Melting and Revert Reduction Technology (E-SMARRT) program, the North American Die Casting Association (NADCA) has sponsored the development of new technologies for improving energy efficiency. One such technology is the high fluidity (HF) zinc die casting alloy developed by the International Lead and Zinc Research Organization (ILZRO). This HF alloy has 40% higher fluidity than Zamak 7 – the previous commercially available zinc die casting alloy of highest fluidity. Information on this alloy has been transferred to the industry through the NADCA Product Specification Standards for Die Castings document. ILZRO is also providing design assistance to companies for proper implementation of the new alloy. The benefits of this technology include:



- Casting of thinner walls
- Fill of more complex geometries
- Minimization of scrapped unfilled parts
- Shorter cycle times
- Higher productivity
- Enhanced energy efficiency



SUCCESS STORY

Problem: There was an excessive and unacceptable 20 minute cycle time to machine the front and back of each HTC One V Windows-based cell phone made from forged 6000 series aluminum blanks.

Solution: The front and back components of the case were redesigned as die castings utilizing the HF zinc alloy. Dies for the two castings were designed for a 4-slide zinc die casting machine to accommodate undercuts and other details of the configurations not achievable with current aluminum and magnesium die casting alloys. Based on computer simulations showing acceptable flow and fill analyses, die sets were fabricated and cast cell phone cases were successfully produced. With a higher yield strength and ultimate strength than the original forged aluminum alloy, the ability to be cast to the desired 0.4 mm wall thickness (slightly less than 0.016 inch), and an estimated machining time of only 2 minutes, the HF zinc alloy was a game changer.

Benefits: Converting the HTC cell phone case to die cast HF zinc alloy from machined aluminum forgings provided large cost and energy savings. Based on a production level of one million cell phones per month, the cost savings for machining alone is \$60,000 per month or \$720,000 per year. The energy savings for machining, coupled with the savings in melting zinc for die casting versus melting aluminum for forging stock, is estimated to be 3.8 billion BTU per month or 45.6 billion BTU per year.

"Brillcast has had the privilege of running the initial test tools with HF alloy and were very pleased with the increased fluidity. We recently modified the wall stock of a retired tool from .045" to .022" to gain further knowledge of the alloys capabilities. We produced thousands of castings at .022" wall over a 4" x 2.5" plate. The finish was class A acceptable. We are excited at the prospect of what the HF alloy can mean for opening up new applications for zinc die castings."

--Brad Doornbos, President / CEO, Brillcast Inc.



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