OEM Tech Brief

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Chicago White Metal Casting
High-Tech Al, Mg, & Zn Die Casting and Miniature 4-Slide Zn & ZA-8 Die Cast Parts
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The Plastic vs Die Casting Process Decision

Mag Offers Light Weight, Extra Strength, Stiffness and Built-in Shielding– with Greener Design as a Bonus

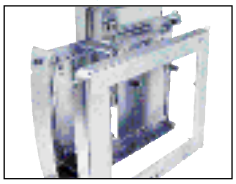
When a structural component application requires stiffness and extra strength, a proposed plastic part is usually a good candidate for production as a light weight magnesium die casting. If EMI shielding and green recyclability are a concern, die cast mag can be the hands down choice.

Injection molded plastic is no longer a given for cost-effective custom production of light weight structural parts.

Magnesium die casting can be the competitive option for a wider range of engineered plastic applications. The growing number of conversions from plastic to magnesium highlight the metal's optimal physical properties, as well as its die casting design advantages.

Superior Material Properties

Plastics used in structural applications are most often engineered resins such as ABS, reinforced nylon or polycarbonates. Added resin reinforcements help give a plastic the strength needed to meet specific requirements, but this also adds the weight of added material density.



Fiber-optic monitor case: 20% saving over plastic

Mg digital camera case: .25 lb. weight reduction

The density of magnesium die casting alloy is very similar to that of reinforced plastic, so the weight of the two materials is very close. While the strength of each is on a par, mag has superior stiffness which is essential in many structural applications. Poor stiffness means plastic parts may vibrate excessively in use and are more prone to bend as well.

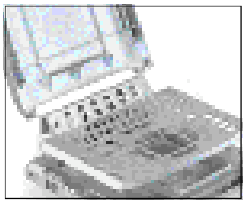
Magnesium alloys offer an elastic modulus of around 6.5 million psi, while the stiffest plastic offers a modulus os 1- to 2-million psi. Mg die casting alloy has excellent dimensional stability and high impact and dent resistance. Its damping capacity and low inertia make it a good choice for parts that will undergo frequent and sudden changes in the direction of motion.

Design Optimization Advantages

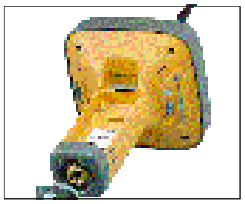
The reinforcements used in plastic resins to beef up its strength generally prevent the material from achieving walls any thinner than 0.12 in. (3 mm). Mag alloy is routinely die cast to 0.12 in. wall thicknesses and with many housings as thin as 0.03 in. (0.76 mm) wall thickness. Maintaining thin walls with reinforced plastic can result in added manufacturing costs.

Plastic's properties also work best when wall thicknesses are uniform. Varying thicknesses can require extra molding steps or eliminate plastic as an alternative entirely.

Thanks to the excellent fluidity of magnesium, it is easily cast to varying thicknesses and shapes, with dimensional accuracy and minimum draft requirements. Mag's thinwall capability often allows it to achieve lower total part weights compared to reinforced plastics. The combination of Mg's properties often offers part consolidations for a one-piece net-shape design at a lower weight and unit cost plus better performance than aluminum, plastic or reinforced nylon.



Four Mg ultrasound case castings weigh 1.73 lbs.



Rugged 11.2 oz. Mg die cast GPS case takes 6.5 ft. drops to concrete

Where a design is not feasible for net-shape die casting, Mg is more rapidly and easily machined than most structural metals.

Built-in Shielding & a Green Bonus

The durability, light weight and thinwall die casting capability of magnesium, combined with its inherent conductivity and EMI shielding characteristics, makes it ideal for electronic housings such as medical, GPS and commercial and consumer computer products (see examples pictured).

Mag die cast housings and components also deliver an increasingly important green bonus: production of recyclable products from recycled alloy, using an infrastructure injection molded plastics have yet to achieve. ■

For more on how CWM's innovations, skills, and unique experience in magnesium die casting can help assure die cast project success, contact CWM.

Excerpted from Engineered Casting Solutions magazine, "Fair Fight for the Light Weights".

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