



**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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## Converting Machined Parts to Die Casting Why Should You Make the Move?

Is your business currently using machined parts and looking to cut costs, improve design, and help the environment? If so, it may be time to make the conversion from machined parts to die casting. From the automotive field to medical applications, many industries choose die casting because it allows them to develop intricate designs that can be cast to their exact dimensions.

### Why Die Casting?

The die casting process offers many advantages that machined parts cannot.

- Die casting is accurate and detailed.
- It is a less expensive option due to rapid production rates and the fact that material is only utilized where it is needed and only as much as is required.
- It provides a good mix of mechanical properties, surface finish, and dimensional consistency, which provides a better product at a lower cost.

One of the main benefits of die casting is that it offers a significant opportunity for cost savings. These savings could be 80% or more compared to typical machining costs. In addition, die casting provides a major reduction in cycle time. For example, a part might cast once every 60 seconds while the machining process produces 2-5 parts an hour. At a \$60-\$90 an hour machining rate, you can see how the savings accumulates. If a high volume machined hogout cost \$30.00 dollars a part to machine and it cost \$6.00 to cast, the \$24 savings at a volume of 10,000 parts a year would equate to \$240,000 in annual savings.

Another benefit of die casting is the exceptional repeatability over a long useable life. The die casting process can produce a hundred thousand or more of identical castings within specific tolerances before additional tooling may be required. Even when replacement is eventually required, the entire die does not necessarily need to be replaced. Often only specific sections need to be replaced or repaired.

Die casting is also a great environmental option. The industry as a whole is based on recycling. After the trim die removes excess metal from a part, the scraps are re-melted in a central furnace and redistributed to the die casting machine. Alternatively, scraps can be sent to a local recycler to be cast into certified alloy ingots.

### How to Convert

Your conversion will begin with a design phase. Die casting designs require draft angles and radii to be incorporated into the final design. Therefore, it's important to work with a die caster early during this phase. One of the key benefits of die cast designs over machining is the fact that this process allows you to have a wall thickness of about 2.5mm (.100") or less while still having outstanding tensile strength.

After deciding on your specifications, it's time to select the appropriate alloy to use. Alloy selection is based on many factors including the part geometry, functional requirements, and cosmetic requirements. Other factors include your weight and strength requirements, possible corrosion resistance needs, surface finish or coatings, and

the projected lifetime pieces required for your design.

Where the die casting process is quick and efficient, the process of machining parts takes much longer. Although machining has low setup and tooling costs, long machining times may be required making it unaffordable for larger quantities. As a result, machining is most often used for limited quantities. The process is usually reserved for fabrication of prototypes or custom tooling for other manufacturing processes because of time consumption and high cost.

The more complex a design's shape, the more machining that will be required to complete the job. This can make die casting a better option. With the development of new technologies, die casting is able to take even the smallest part design and turn it into a strong, 3-dimensional, closely toleranced part. Though die castings cannot match the physical attributes of wrought alloys, most parts are able to compensate for any compromise in material strength with minor design alterations.

### **CWM's Process**

Chicago White Metal has developed a complete solution to convert machined parts to die-castings. We offer design help from a staff of qualified engineers, extensive CNC facilities, as well as trained toolmakers to help ensure a quality product. This hands-on approach even goes as far to help develop different finishes for your product by working with outside finishing companies to help get you the most cost effective socially responsible solution.

The alloy choices Chicago White Metal offers are aluminum, magnesium, and zinc. Each metal provides unique benefits. Aluminum is a lightweight alloy and is used in projects that require corrosion protection, electrical conductivity or dimensional stability. Magnesium offers the best strength-to-weight ratio making it ideal for portable applications. Zinc alloys provide good impact strength, excellent surface for additional finishing, and it has the ability to be cast very thin while still maintaining its strength.

Depending on the metal being cast, a hot or cold-chamber die casting machine is used.

When making a casting out of zinc or magnesium, the hot chamber casting process is the most reliable option. This system is the most beneficial because the alloys are actually melted at the die casting machine itself and molten metal enters the "gooseneck" automatically. The hydraulic powered vertical piston then forces the metal through the gooseneck and into the die. This provides for a very fast cycle with little to no operator involvement.

The cold chamber casting process is used to cast aluminum. Large quantities of aluminum are melted in a separate furnace and then transferred to the die casting machine where it is held in the machines "holding furnace". When the cycle starts, a specific amount of aluminum is "ladled" into an unheated injection cylinder and a hydraulic piston pushes it into the die.

Following the solidification of the metal inside the die cavity, the machine's hydraulic clamping system releases the moving die half, allowing the ejection system to push the casting out of the mold. Castings then are transferred to the next stage where they are placed into a trim die. This operation removes the excess material from the part. This excess includes the gate, runners, overflows and flash from the casting.

### **Die Casting is the Clear Choice**

While there are a number of situations where machined parts are a good option, it is clear that even with fairly low volumes, die casting is something that should be considered and is often the better option. The conversion is simple as long as you have a professional, reliable caster. Chicago White Metal has perfected the machining to die cast conversion process. Through our years of experience, we've seen a spike in manufacturing efficiencies coupled with a drastic cost reduction. Expert design services coupled with the best die casting practices is the key.