

Industry SPOTLIGHT

Chicago White Metal



AUTOMOTIVE

The Automotive Industry: Today

One of the largest markets for high pressure die casting is the automobile market. Since the recession, revenues generated from the automotive industry have been steadily increasing. The graphical data illustrates the trend of auto sales since 1990, which has sustained annual sales of approximately 17 million cars for the past 3 years. Experts claim that sales above 16 million cars is healthy, but not everyone believes it is sustainable.



Electric vehicle manufacturers were excited at the prospect of an upwards trend in EV sales, but overestimated the market for these vehicles. With only about 1% of the total auto sales, industry analysts project EV sales will plateau in 2018. The Chevy Bolt, Nissan Leaf, and Tesla Model 3 have been the top mass-market vehicles that are either showing unexpected success or pre-ordered promise. Analysts claim that electric vehicles sales may increase if more affordable versions become available, which has yet to be seen.

Technology is a major factor driving sales. Innovation in

cameras, sensors, and electronic communications has led to significant safety and technological successes. Federal regulations that address distracted driving continue to pose a challenge to engineering teams to develop a safe, smart-phone-friendly environment.

Automotive Manufacturing & Die Casting

Die castings are widely used in the automotive component industry. The high-pressure die casting method is ideal for an automotive application for four main reasons:

- 1) High-speed production
 - a. Die casting allows complex part shapes to be cast near net shape quickly and at high volumes.
 - b. Tooling may produce hundreds of thousands of castings before needing replacement.
 - c. Die casting cycle times are lower than any other metal casting process and are competitive with stamping and injection molded plastic.
- 2) Dimensional accuracy and stability
 - a. The high pressure die casting process makes excellent durable and dimensionally-stable parts possible at close tolerances.
- 3) Strength and weight
 - a. A good mix of physical and mechanical properties, along with near net shape design and thin wall die casting methods, make the parts strong and lightweight.
- 4) Multiple finishing options
 - a. The surface of die cast parts normally require little to no surface preparation.

In the past few decades, aluminum and magnesium have played an increasingly important role in the growing automotive market. There are a few major benefits of switching from steel to either aluminum or magnesium.

- At less than half the weight of steel, aluminum is a very effective material for light weighting.
- At ¼ the weight of steel and 2/3 the weight of aluminum, magnesium is the most effective material for light weighting.
- Lightweighting provides performance, safety, and environmental benefits.
- Aluminum and magnesium both have a good set of predictable mechanical and physical properties.

The diagram (right) illustrates the parts that are current and planned for aluminum on a particular car. The darker blue shade indicates the current parts of a vehicle that are aluminum. The sky blue color indicates aluminum parts planned for construction in the near future.

In addition to the many powertrain and structural uses of high pressure die casting, there are many non-structural components inside of the vehicle that use the high pressure die casting process for production. Some of these parts include: electronic housings, ECU encasements, mirror mounts, headlight assemblies, vehicle camera systems, GPS systems, transmission housings, and hundreds of other potential parts that go into a modern day vehicle. Chicago White Metal manufactures millions of vehicle components annually.

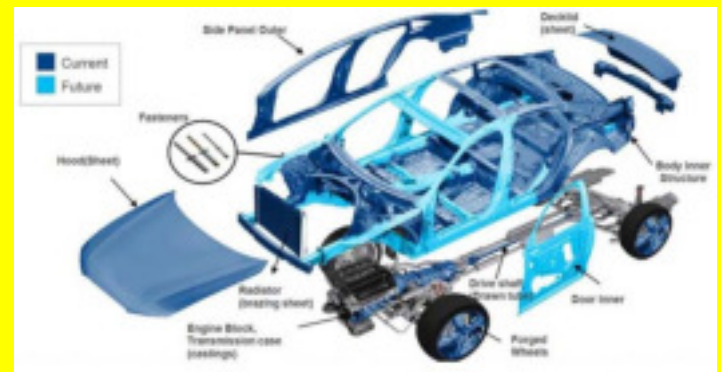


Diagram: Aluminum

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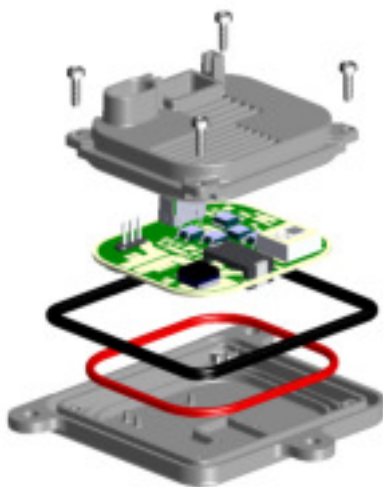
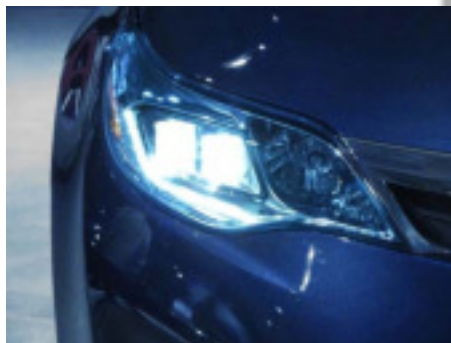
Case Studies

Case Study #1

HID LIGHT BALLAST UNIT HOUSING

Material: Magnesium AZ91D

These parts are the cover and base of the High Intensity Discharge (HID) light ballast unit, used in various automobile makes and models. Chicago White Metal manufactured three different mounting options – a plain cover, a cover with 4 mounting holes, and a cover with 3 mounting holes. CWM collaborated with the customer on designing parts that were manufacturable for die casting, making sure the tight tolerances and critical points met requirements.



Case Study #2

TRANSMISSION RANGE CONTROL MODULE (TRCM) HOUSING

Material: Aluminum A380

This part is an aluminum housing for the Transmission Range Control Module (also called "Shift-by-Wire" system). The control module mounts externally to the transmission housing in several different GM, Buick, and Cadillac vehicles. CWM helped design the part, which followed strict standards of the automotive industry. The team provided engineering assistance to hold critical tolerances, and eliminate additional processes by casting the mounting holes instead of machining them.



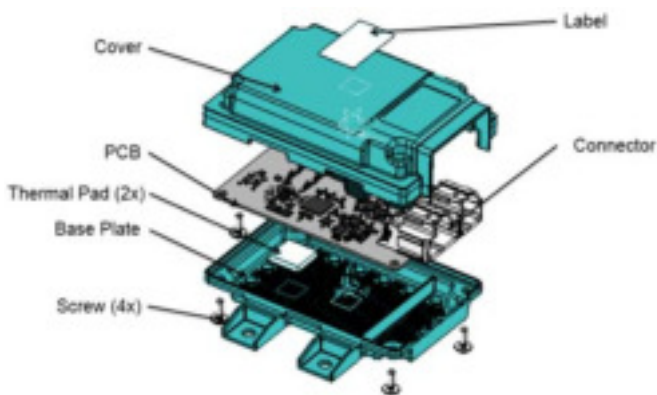
Case Study #3

FORD HYDRA ECU UNIT HOUSING

Material: Aluminum A380

The cover and base plate castings, shown in blue in the schematic to the right, serve as the outer housing for the PCB board and components of a Vehicle Camera System. There are two different cover options to facilitate two different sizes of connectors.

As a new design, CWM and the customer focused on discussions on around feature and tolerance changes to make the parts more manufacturable.



Have the Chicago White Metal Casting Team take a look at your project and determine if High Pressure Die Casting is a solution for you!

Email sales@cwmtl.com or give us a call at +1 (630) 595-4424 to speak with one of our engineers.