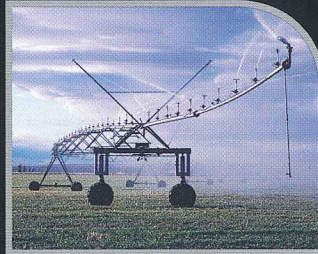


# PERMANENT MOLD CASTING PROCESS

**YOUR  
SINGLE  
SOURCE  
MANUFACTURER**



## STARTING THE PROCESS

It all starts with you, the customer. L A Aluminum Engineering can take your idea, drawing, print or sample and present it to our Manufacturing team: They will develop a strategy to manufacture a permanent mold for your specific casting situation. **In some cases we are able to recommend design modifications that will increase productivity, enhance the functionality of a part, or reduce mass and other changes that will reduce the cost to the customer.**

Once the strategy is decided upon, we move onto the design and mold making process. This is where our Tool Maker creates a 3D model using SolidWorks modeling software.

## MOLD MAKING

Our Tool Maker writes a program in SURFCAM (3D CNC program) and sends it to one of the FADAL CNC machining centers at L A Aluminum. From there, the actual cutting of the cast iron mold takes place. Cast iron is used because of the stability of the alloy and excellent tool life, which saves the customer time and money. This is also the phase of the process where any shell cores or steel

cores are made. Shell cores are made from fine sand and are only used once, then destroyed.

After machining the mold, we are ready to actually pour the first casting for a first article that will be submitted to the customer for evaluation. This is where any final changes are made to the design and all dimensional and cosmetic items are verified by the customer. After approval is given, we move on to the casting process.

Once the mold has been prepared with the mold coat (used to help release the casting and reduce wear to the mold), a casting is made. There may be inserts in the casting, a shell core for semi-permanent mold applications, or solid steel cores, if required.

## ONLY THE BEST ALUMINUM

Now we are ready to melt some aluminum alloy. Each ingot is certified as to its purity. Only primary aluminum is used at L A Aluminum. The ingot is placed in the crucible which is heated to approximately 1300 degrees F. L A Aluminum has four crucible melting / holding furnaces with a total melting capacity of 5,800 pounds per hour.

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The permanent mold aluminum casting process consists of these five basic steps:



1. apply refractory mold coating to internal sections of preheated mold sections



2. set mechanical, shell, or sand cores, as required, and close mold



3. pour properly heated aluminum into sprue openings



4. after casting has solidified, remove from mold



5. trim gates and risers



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Temperature control is important in all aspects of the pouring process. The use of thermocouples and laser temperature sensors are utilized to insure optimum temperature control.

The aluminum is ladled into the mold and allowed to freeze or solidify over a predetermined time period. Once this is completed we remove the casting from the mold and place it on a conveyor for its journey through the rest of the process.

Removal of risers, gates and inlets are performed on the saw. Then the part travels through the heat treating and aging process. Parts are carefully loaded into wire baskets to be heat treated. The amount of time in the heat treat and the temperature are critical factors since the temper of the alloy is determined in this process.

## MACHINE SHOP

**CNC MACHINING** - MAZAK lathes and FADAL machining centers are used to provide additional value to the customer. The parts come from the finishing department and heat treating to the machine shop. Our machine shop is run by well trained machinists and operators who program the CNC machines to meet customer specifications.

We specialize in machining aluminum, brass or free machining steel up to 8" round by 36" long. We have 4<sup>th</sup> and 5<sup>th</sup> axis machining capabilities. Tolerances possible: (under 1" =  $\pm .0005$ ), (1" to 2.5" =  $\pm .001$ ), (over 2.5" =  $\pm .002$ ). Our Computer Numeric Control turning centers can perform a wide variety of operations.

Our Fadal Vertical Machining CNC centers (Made in the USA) have a 30 Tool Automatic Tool Changer. These centers offer spindles with the torque for milling steel and high speeds for cutting aluminum. We mill aluminum or brass up to 18" by 36" with tolerances of boring =  $\pm .001$  and millwork =  $\pm .003$ .

**From simple turning operations on the lathes to complex machining tasks on the 4th and 5th axis FADAL machining centers and horizontal machine, L A Aluminum provides its customers a turnkey project solution to fit most modern requirements. These combined capabilities allow us to take responsibility for projects from start to finish.**

## FINAL DETAILING, PLATING & POWDER COATING

Finish work which includes deburring, sanding, grinding, plating and powder coating provide additional job cost savings. Reducing the amount of work required in the customer's shop means that cost is reduced by lessening or eliminating the need for extra handling of the part. Light assembly such as stamping part numbers, attaching labels, bagging and packaging to customer specifications are all available at L A Aluminum Casting Company. Complete assembly is offered as an additional service to improve the customer's profit margin. One stop, one shop, and your product will be shipped to the location of your choice.

## GO OR NO GO

During many of the procedures and upon completion of all the machining operations L A Aluminum performs quality checks to ensure the manufactured part meets the exact customer specifications. These tasks vary from performing S.P.C. (Statistical Process Control) on machined castings, to using "go/no-go gages" (to determine if threads are correct) to pressure testing using a testing apparatus. Additionally, we verify our heat treat process by testing the hardness using the military spec MIL-H-6088F.

Our quality program is always improving as we change to meet our customer's requirements. Seminars, in-house training, along with the certification of all testing apparatus(s) guarantees we are on the leading edge of the latest technology.

The Quality Assurance Program at L A Aluminum is designed to meet a wide variety of industries, including medical, dental, commercial, military, automotive, industrial, and agricultural. Our primary goal is to meet or exceed customer requirements. Specific casting control measures include: Heat Treat Certification, Hardness Testing, First Article Inspection and Pressure Testing. All equipment and tools are certified at regular intervals to MIL-STD 45662.

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