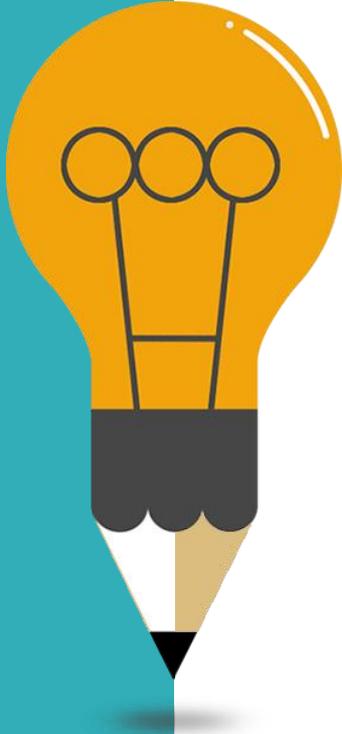




An Introduction to Purchasing Castings

The basics of sand casting design and manufacturing

How Its Made



01

Design of Product

What are you making?

02

Design of Tooling

How are the molds going to be made?

03

Casting Process

How the does casting process work?

04

Finishing

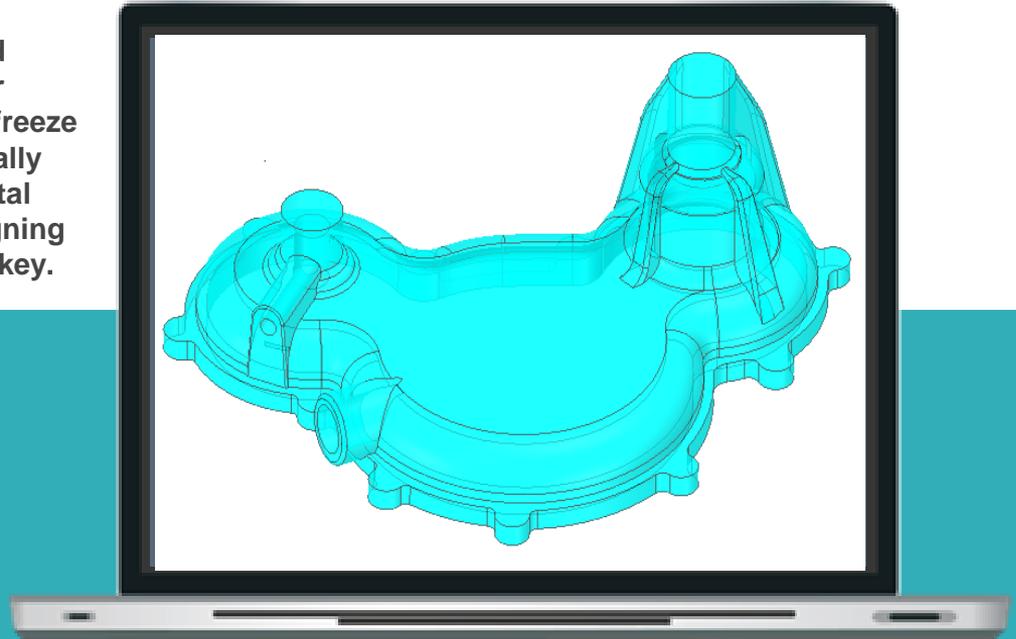
How are parts finished?

Design of Product

What are you making?

Once a concept or model has been developed, it is important to review the design with your foundry supplier. Casting limitations are best reviewed and remediated before the prototype is even made. For example: If walls are designed too thin, metal will freeze before filling the cavity. If they are too thick, naturally occurring dimensional shrink will leave a void. Metal needs flat areas to flow into the castings. So designing flat locations on the outer areas of the castings is key.

Material selection is critical. While some materials like A206 aluminum appear to have the best properties, the castability and risk for defects is high. Alloys like A356 provide sounder castings while still providing formidable strength.



Design of Tooling

The typical styles of tooling are shown below. Depending on whether or not the product has been modeled, how many castings you will require, and how quickly you will require them, there are a variety of choices available – each with their own purpose.

Low Volume (1-10 castings)

High Volume (10-1000 castings)



3D printed

\$100-\$1000

Rapid Prototyping,



Styrofoam

\$100-\$1000

Fast, Cost Effective



Wood

\$500-\$5000

Cost Effective



REN

\$1000-\$20,000

High Volume

Product of Tooling & Quality

Each particular style of tooling will yield a unique finish. For parts where appearance is not critical or a prototype is needed quickly, 3D printed and Styrofoam castings are good selections. Where appearance affects function, consider wood or REN patterns.

Coarse Finish

Smooth Finish



3D printed

Roughest

Complex



Styrofoam

Rough

Simple



Wood

Smooth

Simple and Complex



REN

Smoothest

Complex

Casting Process

How the does casting process work?



Molding

With the pattern, sand is formed and cured to develop the cavities for the metal to flow.



Melting

There are a wide variety of materials that can be selected. Material properties such as, strength, coating, appearance, conductivity, etc.



Pouring

Temperature and speed of the flowing liquid metal is critical in yielding a sound casting.



Shakeout

Once the metal has cooled, the casting is broken free from the sand mold.



Cutting

Gates and risers used to aid in solidification and moving liquid metal is removed.



Rough Finishing

Rough areas are polished down with grinding equipment and a final sand blast used to finish the casting.

Finishing Processes

Depending on the finish and quality requirements, secondary processing may be required:

Radiographic Testing

Using X-rays, verify the integrity of the casting



Penetrant Testing

Using a fluorescent liquid, verify there are no surface cracks



Machining

Removing material in specific areas to yield a final product



Heat Treatment

Fine tune final material properties through controlled metal heating and cooling



Hardness Testing

Simple way of testing the final strength of the material



Compositional Testing

Using a spectrograph, verify the material composition



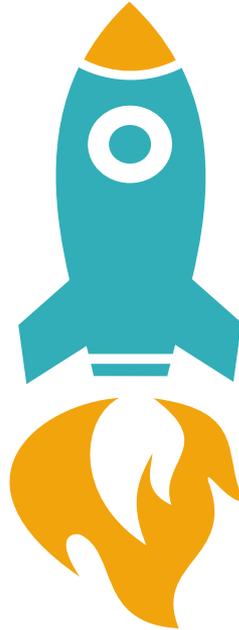
Dimensional Inspection

Using a CMM or light scan, verify the shape of the casting meets the print/model



Coating

Anodizing, plating, or painting depending on the final properties desired





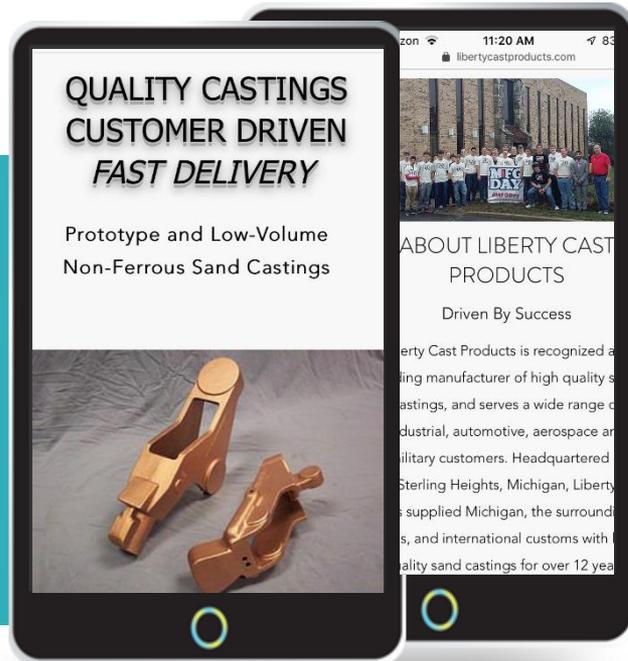
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