



The differences between forging and casting

Introduction of forging and casting

Forging, one of the most important methods of metal manufacturing, is mainly used in shape forming and property modification, which means to improve metal's mechanical properties and internal structures.

Forging can solidify the shrinkage and porosity structures of cast parts, crush the coarse structures, known as dendritic grains, into tiny grains and reform them into fiber structures. Accordingly, the mechanical properties of products will be improved by reasonable distribution of fiber structures along the parts' contour. Therefore, the forged parts have higher strength and can withstand larger impact loads.

Under the same strength of impact load, the forged parts can be reduced in dimension to save raw material. For instance, US producers used 315MN Hydraulic Press to forge two hundred and seventy-two parts and three thousand two hundred screws for Delta Dagger F-102. As a result, the weight of whole girder of the plane was lightened 45.5 to 54.5kgs



Casting is a common manufacturing method with low producing cost and high processing flexibility. By pouring the molten metal liquid into casting molds, the cast parts will be formed into desired shapes and properties after metal liquid cooling down and solidification. Complicated and big parts can be obtained by casting and contributes big share in the mechanical manufacturing, e.g., machine tool accounting for 60-80%, automobile accounting for 25%, and tractors accounting for 50-60%.

As the demands on quality, accuracy, cost control and automatic standards are getting stricter, the casting technology is developing in a way of more delicate accuracy, larger scale, better quality, higher automation and more hygiene.



The differences in definitions between forging and casting



Forging: is a manufacturing process to form the amendable metal materials into certain sizes and dimensions by some methods like hammering. It changes the physical properties of the metals.

Casting: is a manufacturing process to mold the molten metal into desired shapes after solidifying and cleaning. It can make various complex shaped parts.

The differences in manufacturing between forging and casting

Forging: is a process in which a forging machine is used to press on a metal blank to produce a plastic deformation in order to get forged parts with certain mechanical properties, shapes and sizes. It is usually combined with stamping/pressing as twins.

Casting: is a process in which the molten metal is poured into a casting cavity which is designed according to the shape of parts to get the final products or blanks after the molten metal is cooled down and solidified.

The uses of forging and casting

Forging is usually used to make simple shape and size parts.

Casting is usually used to make complex shape parts. It is a relatively more economical way for blank forming.

The advantages and disadvantages of forging and casting

The advantages of forging

Forging can eliminate the defects like porosity and optimize the micro-structure during the manufacturing process. Meanwhile, as the complete metal streamline is well preserved, the mechanical properties of forging parts are normally better than that of the casting parts made by the same materials. Forgings are often used for important parts with high load and severe working conditions in related machinery, except for those with simple shape that can be rolled, shaped or welded.





The advantages of casting

1. It can produce complex-shaped parts, especially those blanks with complicated cavities.
2. It adapts widely in all commonly used industrial metal materials, products ranging from several grams to hundreds of metric tons.
3. It has a wide range of raw material sources and a low cost, e.g., scraps, wastes and chips are all usable.
4. The shape and size of the casting parts are very close to the final products, which reduces the amount of cutting, and can be treated as non-cutting machining.
5. The forged products are widely used, e.g., accounting for 40%-70% in agricultural machines and 70%-80% of the weight of machine tools.



The disadvantages of forging

traumatic accidents are easy to happen in the forging process.



The disadvantages of casting

1. Mechanical properties are not as good as those of forging parts. For instance, it has shrinkage structures and more defects such as porosity, pinholes, warping, fusion, etc.
2. In sand mold casting, usually the parts are in single piece or small batches which costs worker's higher workload
3. The casting quality is unstable because of complicated process and more uncertainties. Therefore, it is easy to occur many defects.



SERVICE IN QINGDAO CASTING QUALITY INDUSTRIAL

- I SAND CASTING
- I INVESTMENT CASTING
- I SHELL CASTING
- I PERMANENT MOLD CASTING
- I CNC MACHINING
- I CAD/CAM DESIGN



As a professional manufacturer in China, We Casting Quality focus on Metal Parts OEM industry, and provide solutions and services in Metal Casting field as following:

1. **Sand Casting**
2. **Investment Casting, Lost Wax process**
3. **Shell Casting**
4. **Lost Form Casting**
5. **CNC Machining**
6. **CAD Design**
7. **Tools/Mold Design**

Material Supplied

- I Cast Iron Castings (Grey Iron, Malleable Iron, Ductile Iron)
- I Carbon Steel and Alloy Steel Castings
- I Stainless Steel and Duplex Stainless Steel Castings
- I Aluminum Castings
- I Bronze and Brass Castings
- I Titanium and Cobalt Alloy Castings

What We Can Do

Ø Design Ability

Our engineers will help you to improve the designs based on casting technology, then The simulation software will be processed to verify the casting pouring system. Pro/E, Solidworks, AutoCAD and ProCast are available in Casting Quality Industrial.

Ø Saving Cost

Some manufacture processes may lead high cost. We will analyse the designs and advise the suitable methods to our customers. The best solution will be adopted.

Ø Quality Control

From the raw material selecting to bulk production processing, all procedures will follow PPAP program if necessary. The certificates will be provided including chemistry, hardness, mechanical property or NDT testing.

Ø Production Capacity

The max iron/steel castings can reach 30tons in weight, meanwhile the minus casting is around 1gram only.

We also have prototyping and 3D scanning ability for sample plan.

Ø Logistic Service

The products will be delivered directly to customer's workshop, which will save plenty of work for clients.

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