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Casting and Foundry Definitions

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The last hundred years has seen marked improvements and innovations in the ancient art of casting [1]. Casting: Manufacturing process where molten metal is poured into a mold and allowed to cool and solidify. Casting is a versatile process that offers exceptional freedom in forming intricate components. It is also conducive to high-volume production runs, where material quantities can be efficiently controlled to minimize waste and reduce cost. The casting process is also called foundry. Casting can refer to the solid product of the casting process.

Foundry: Facility that produces metal castings and offers related services such as mold-making, melting, pouring, degating, heat treating, surface cleaning and other finishing operations.

Centrifugal casting: Casting method that involves rotating a permanent mold at high speed to force molten metal against inside walls. It allows castings to be formed at almost any length at different thicknesses – without the use of a core. Finished products are free from parting lines and gates and risers. Centrifugal casting is often used to make stock pipes and tubes for further machining.

Die casting: Casting method that involves injecting molten metal under pressure into a mold, or die. Two dies are cast and machined, then pressed together to form the mold cavity. Once injected metal has cooled, dies are separated and

the casting ejected. Die casting can achieve high dimensional accuracy, great detail and smooth cast surfaces that require minimal additional machining. Dies are expensive to produce, making them more suitable for high-volume runs. Ferrous metals are rarely used as an injection material.

Investment casting: Casting method used typically for intricate products requiring a high degree of accuracy with minimal machining. It can be used to create products with smooth surfaces and no parting lines. Due to higher setup costs, it is often more suitable for high-volume production. Investment casting typically involves using an injection mold to form wax patterns in the shape of the final product; coating wax patterns in ceramic to form disposable molds; heating ceramic molds to melt and drain wax; pouring molten metal into ceramic molds; removing ceramic molds to reveal the final casting; removing any gates, risers or other excess metal from the finished product. Investment casting is also referred to as *lost-wax casting*.

Sand casting: Casting method characterized by the use of sand as a mold material. Sand is typically mixed with a bonding agent such as clay and moistened with water or other liquid to create suitable mold strength and plasticity. (Sand prepared in this way is also known as *green sand*.) Sand is compacted into a mold box, or flask, around a model, or pattern, in the shape of the final desired product. Once molten metal has been poured and cooled, sand is removed to reveal the final casting. Finished surfaces are not as smooth as with other methods, and additional machining, including the removal of gates and risers, is typically required. Sand casting is one of the most common methods used by foundries and can be used for both short- and long-run productions.

The final step in the process of casting usually involves grinding, sanding, or machining the component in order to

achieve the desired dimensional accuracies, physical shape and surface finish.

Removing the remaining gate material, called a gate stub, is usually done using a grinder or sanding. These processes are used because their material removal rates are slow enough to control the amount of material. These steps are done prior to any final machining [2].

After grinding, any surfaces that require tight dimensional control are machined. Many castings are machined in CNC milling centers. The reason for this is that these processes have better dimensional capability and repeatability than many casting processes. However, it is not uncommon today for many components to be used without machining.

A few foundries provide other services before shipping components to their customers. Painting components to prevent corrosion and improve visual appeal is common. Some foundries will assemble their castings into complete machines or sub-assemblies. Other foundries weld multiple castings or wrought metals together to form a finished product.

References:

1. Алёхина М.С. Английский язык для металлургов / М.С. Алехина. – Москва. – 2001. – 173 с.
2. Mode of access: <http://www.reliance-foundry.com/castings/glossary-casting>. – Date of access: 15.04.2016.