

ALUMINUM

Castings and Machining

FROM CONCEPT TO CASTING THRU FINAL MACHINING
CAST METALS PROVIDES TECHNICAL SERVICE AT EACH STEP

FOUNDRIY TERMS and DEFINITIONS

- Aging:** Changing the physical properties of a metal to improve its hardness and strength.
- Alloy:** Two or more elements combining, at least one of which is metal, to change the properties of the material and potentially lower its cost.
- Annealing:** A process that softens metals via heat treating above the critical temperature and slow cooling to reduce hardness and improve machinability.
- Airset Core:** Using sand mixture with two-part resin, hand packed into a core box to form a sand core.
- As-Cast:** No heat treat or finishing condition.
- Bath:** Molten metal in a crucible or ladle.
- Binder:** Agent used to bind mold or core sand to improve strength.
- Blast Cleaning:** Metal shot used to clean or remove sand from castings.
- Brinell Hardness:** Testing method for hardness of a material using a specific ball diameter and applying a load (BHN).
- Burn-on Sand:** Sand that has adhered to a cast surface that is hard to remove.
- Castability:** How well a metal flows through the mold to create an accurate casting.
- Chaplet:** A metal insert used to support a core during casting.
- Charge:** Material placed into a furnace.
- Chill:** Metal insert in a sand mold that causes heat loss to control solidification of a casting.
- Cleaning:** Removing gates, risers, flash, and parting lines from a sand casting.
- Cold Box:** Air set cores from a resin binder system in a core box.
- Cope:** Top of a parted mold.
- Core:** Molded sand component that creates the cavity in a casting that the pattern cannot form.
- Core Box:** Tool used to create cores, usually wood, metal, or plastic.
- Core Print:** Area on a pattern that holds a core in place in the mold.
- Core Wash:** Material applied to cores to improve the surface of the casting.
- Coupon:** A test sample of metal used to test properties of the alloy.
- Crucible:** Used to melt or hold molten metal.
- Deburring:** Removal of sharp edges from castings.
- Draft:** Angle of a surface required to pull the core or sand mold without defects.
- Drag:** Bottom of a parted mold.
- Ejector Pins:** Pins that assist in removing the core or casting from the tool.
- Elongation:** Measurement of permanent extension in a tensile test, represented in a percentage.
- Fillet:** Material used to create a radius to eliminate sharp edges on a parted pattern or core box.
- Fin:** Thin, excess metal on a casting, usually at the parting line.
- Finish Allowance:** Allowable machining stock on a casting surface.
- Finish Mark:** A drawing symbol indicating a casting surface is to be machined.
- Flask:** Rigid metal or wood frame used to hold the sand of which a metal casting mold is formed.
- Foundry Returns:** Re-melting of gates, risers, or scrap castings.
- Gate:** Area the metal enters the mold cavity.
- Green Sand:** Type of molding sand made with mixing clay and water.
- Heat:** Lot of castings from one furnace charge of metal.
- Heat Treating:** Heating and cooling operation timed and applied to an alloy in a solid state that will produce desired mechanical properties.
- Holding Furnace:** Furnace that maintains metal at the proper pouring temperature.
- HIP:** Hot Isostatic Pressing or HIP, process to remove internal porosity using heat and pressure.
- Impregnation:** Sealing process for castings to eliminate leaks.



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FOUNDRY TERMS and DEFINITIONS (continued)

Inclusion: Particles of slag, refractory materials, sand or deoxidation products trapped in the casting during pouring solidification.

Ingot: Metal cast in a size and shape that can easily be used to remelt in a furnace.

Inserts: Items placed in a mold to become part of a casting.

Isocure Core: A cold process using special binders mixed with sand then blown by compressed air into a core box. Gas is then injected into the core box to set the core.

Ladle: Tool used to move molten metal from a furnace to a mold.

Master Pattern: The object from which a die can be made; generally a metal model of the part to be cast with process shrinkage added.

Mechanical Properties: Elasticity and elongation results from a tensile test performed.

Miss-run: Casting defect caused by incomplete filling of a mold which results in a casting not being fully formed.

Mold: Product formed that contains a cavity in which to pour melted metal.

Mold Cavity: The impressing in a mold that forms the casting.

No Bake: Resin-bonded, air-setting cores or molds that harden after a specified time.

Normalizing: Part of the heat treating process when castings cool to room temperature.

Over Aging: The process of aging a nonferrous, precipitation-hardening alloy under conditions of time and temperature greater than those needed to obtain maximum strength and hardness.

Oxide: Casting defect caused by oxygen gas in the metal.

Parting Line: Area where the two halves of a mold meet.

Pattern: Tool used to form a mold cavity in the sand, usually wood, metal, or plastic.

Pattern Draft: Angle of a surface required to pull the core or sand mold without defects.

Pattern Layout: Drawing showing the design or layout.

Patternmaker's Shrinkage: Shrinkage allowance made on all patterns to compensate for the change in dimensions as the solidified casting cools in the mold from freezing temperature of the metal to room temperature. The pattern is made larger by the amount of shrinkage characteristic of the particular metal in the castings and the amount of resulting contraction to be encountered.

Physical Properties: Density, hardness, conductivity, expansion, and specific heat of a casting.

Porosity: Holes in castings due to gas trapped in the metal.

Quenching: Cooling process of heat treating by submersion into water or a solution.

Riser: Forms the reservoir of molten metal needed to control shrinkage in the gating system.

Roto Lift: Type of machine used for loose patterns, prototypes, large castings and other castings requiring special attention.

Runner System or Gating: Routing the molten metal travels from the sprue to the mold cavity.

Sand Holes: Voids on the surface of a casting caused by loose sand in the mold cavity.

Shakeout: Separating the casting from the mold material.

Shell Core: Created by heating a core box, usually iron, and introducing plastic resin coated sand into the core box. The heat fuses the sand grains together creating a shell. The longer the cycle, the thicker the shell becomes. Excellent options for medium to high volume runs.

Shrinkage: Amount the casting shrinks in the mold when solidifying. Also used to describe lack of material or metal during the feeding of the mold.

Sprue: The channel that molten metal is introduced to the mold.

Squeezer: A manual green sand molding machine for low volume sand casting production.

Stress Relieving: Using heat for a certain amount of time to reduce stresses in a casting.

Surface Treating: Treatment to protect castings surfaces for certain applications.

Test Bar: Sample or test piece used to perform tensile testing.

Warpage: Deformation of castings due to process, handling, or heat treating, etc.