



Casting Process: High Pressure Die Casting

HPDC is a highly automated process in which molten metal is forced, at very high speed and under extremely high pressure, into a sealed mould cavity. The controlled and constant pressure exerted on the molten metal as it enters the mould and solidifies compensates for shrinkage reduction in volume as the metal cools and expels any trapped gases. Cooling within the die allows for rapid cycle times. High pressure die casting (HPDC) can be divided into “cold-chamber” and “hot-chamber” processes. Hot chamber HPDC is used mainly with low melting point magnesium and zinc alloys whereas cold chamber HPDC is most commonly used with aluminium alloys.

This process data sheet describes the basic steps involved in the HPDC process as well as the benefits and limitations of the process:

In the cold-chamber process:

- 1** Molten metal is injected into a cold chamber for each machine cycle (or shot).
- 2** The molten metal is forced by a single plunger through a narrow feeder channel (or gate), into the die cavity, by the application of pressures ranging from 1500 to 25,000psi.
- 3** The die is water-cooled so the casting cools rapidly, usually within a fraction of a second, while pressure is maintained until solidification.
- 4** Once solidified, the dies are opened and the casting is removed using ejector pins. Most castings will have flash where the two die halves come together, which is usually removed in a trimming die.

In the hot-chamber process:

- 1** A gooseneck shot sleeve is submerged in a heated pot of molten melt.
- 2** A plunger descends and forces the molten metal into the die.
- 3** Once cooled, the casting is ejected by ejector pins.
- 4** As the piston retracts, the cylinder is filled with metal and the process repeats.



High Pressure Die Casting

Why use NovaCast High Pressure Die Casting?
HPDC delivers many benefits including:

- The capability of casting large quantities
- The ability to cast complex shapes quickly and accurately
- Castings are high strength
- Surface finishes can be exceptionally good
- Production rates are rapid
- Production lines are not labour intensive
- Scrap metal can be recycled

Limitations of the process

There are some disadvantages to this process including:

- The need to trim components.
- Equipment and tooling costs are high.
- Die life is limited.
- Lead times to set up production can be long.

About NovaCast

NovaCast has over 40 years of ferrous and non-ferrous metal casting experience extending into markets as diverse as transport, utilities, offshore and general engineering. The company's non-ferrous foundry, based in Melksham, England, is supported by a fully risk-managed supply chain that extends out to the Far East allowing NovaCast to provide a single source solution for precision cast and machined components. Metals cast include alloys of Carbon and Stainless Steel, Copper, Aluminium and many others with a full range of testing, machining, surface treatment and finishing options.

To find out more, get a quote or just to discuss your project, give us a call on +44 (0)1225 707466 or email sales@novacast.co.uk