

Investment Casting

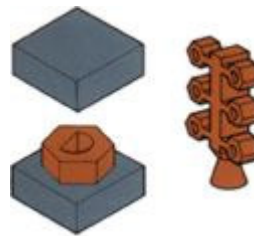
Materials

- ✓ Stainless Steel
- ✓ Low to High Carbon Steel
- ✓ Tool Steel
- ✓ Nickel Based
- ✓ Cobalt Based
- ✓ Brass
- ✓ Bronze
- ✓ Copper
- ✓ Aluminum
- ✓ Hastalloy
- ✓ Monel
- ✓ Inconel
- ✓ Beryllium Copper
- ✓ Stellite

Process Description

Investment casting is defined as casting metal into a mold, produced by surrounding (investing) an expendable pattern (wax or plastic) with a refractory slurry that sets at room temperature, after which the wax or plastic pattern is removed through the use of heat. It is also called precision casting, or the lost-wax process.

Wax or plastic patterns are made in metal dies. Single or multiple wax patterns are removed then assembled with wax gates and risers on to a specially designed wax tree.



The assembly is dipped in slurry or refractory powder and forms a skin. This is dried and the process is repeated until the desired thickness is achieved.



After curing, the entire pattern is placed in steam autoclave and the wax is melted out and reclaimed. The molds are fired in a high temperature furnace to achieve hardness and strength. What is left is a clean mold cavity to receive the molten metal.



Because the mold is formed around a one-piece pattern, (which does not have to be pulled out from the mold as in a traditional sand casting process), very intricate parts and undercuts can be made. A variety of alloys are melted in induction furnaces to be poured into the ceramic molds. After cooling, the

ceramic is chemically removed, and the pieces are mechanically cleaned.



Investment castings have an exceptionally smooth surface finish. Depending on the alloy chosen, the as-cast product of the mold is relatively smooth and free of surface defects. The average micro finish is 125 RMS, with the range for the process being between 60 and 200,

depending upon the characteristics of the metal. Considerable intricacy of design and detail is available, and a minimum of finishing is necessary. Investment casting assures tight linear tolerances of an average $\pm .005$ in/in, with even more accurate tolerances depending on the part size and complexity. Parts made with investment castings often do not require any further machining, because of the close tolerances that can be achieved.