

# Investment Casting Process

## Die Design

A wax injection die is made to receive molten wax injected under pressure from the designer's blueprint.



## Wax Injection

Wax is injected into the die to produce a pattern. These disposable wax patterns are the same as the finished parts but with allowances made for shrinkage.



## Pattern Assembly

The wax patterns are fastened by the gate to a runner, which is attached to a pouring cup, to form a cluster. The cluster is commonly known as a tree, which is needed to produce the ceramic mold.



## Shell Building

The shell is built by dipping the assembly tree in refractory slurry and then into a bed of extremely fine sand. After drying, this process is repeated again and again until a self supporting shell is formed.



## Wax Removal (De-Waxing)

The ceramic shell is placed in a high temperature steam autoclave, and the wax will melt out of the shell. This leads the ceramic shell into a cavity of the desired casting shape that can be filled with the molten metal.



## Mold Preheat

The ceramic shell is fired to about 1100 ° C (2000 ° F) to burn out the last traces of wax, as well as to develop the high temperature bond of the ceramic system, and to preheat the mold in preparation for casting.



## Pouring

The molten metal is poured into the fired ceramic shell by gravity pouring. As the metal cools, the whole assembly pattern becomes one solid casting.



## Casting Shake Out & Cut Off

After the metal has cooled and solidified, the ceramic shell is broken off by vibration or water blasting. The individual casting parts are then removed from the cluster by the high speed friction saw and cut-off wheel.



## Gate Grinding

Any remaining protrusions left by gates are removed by gate grinding. After the operation, the casting process is completed, and the metal part is identical to the original wax pattern.



## Finished Casting

The castings are now ready for any secondary operations such as heat treating, straightening, machining, and for any inspection is specified.

