Investing

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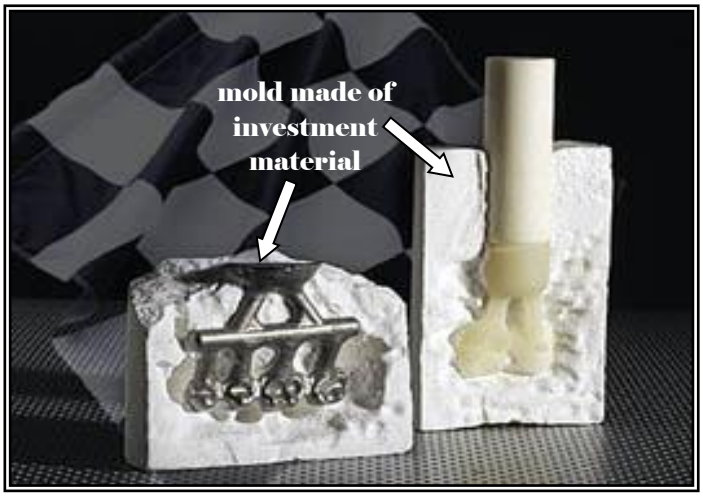
It is the surrounding of the wax pattern with a mold of heat resistant material that can accurately duplicate the shape and anatomical features of the wax pattern to obtain a mold after burning out the wax pattern.



Objectives of investing:

1. It should provide an accurate reproduction of the anatomical form of the wax pattern.

2. It should provide sufficient strength to withstand the heat of the burnout procedure and the actual casting of the molten metal.

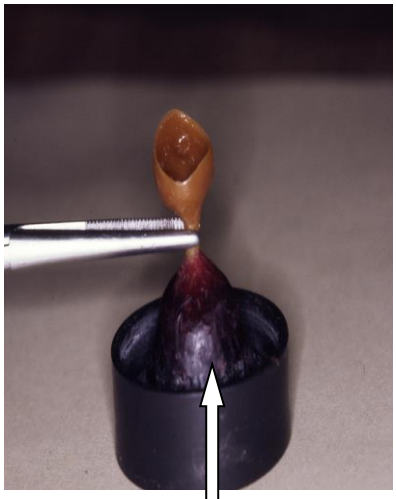
3. It should provide compensation expansion equal to the solidification shrinkage of the metal; therefore, the mold cavity should be larger than the wax pattern (if this does not happen, the restoration will be smaller than the wax pattern).

To do investing we need:

-Casting ring.
-Ring liner.
-Crucible former.
-Investment material.

Casting ring

Ring liner



Crucible former

Casting Ring:

The casting ring is made of metal and is used to hold the investment material in place during its setting and to restrict its expansion. If we use the casting ring alone we will not have expansion, so we need to use the ring liner to allow certain degree of expansion.

Ring Liner:

The liner is used to line the inside of the casting ring. It is made from a compressible material. e.g., asbestos (0.6mm thick) that allows the investment material to expand to some degree, but as it is carcinogenic other materials as fiberglass may be used. If there is no room for expansion outward the mold cavity would produce a small casting. The liner should be 3mm shorter than both ends of the casting ring because it will bind the investment to the ring to prevent the slipping of the whole mass during casting procedure.

Advantages of the ring liner:

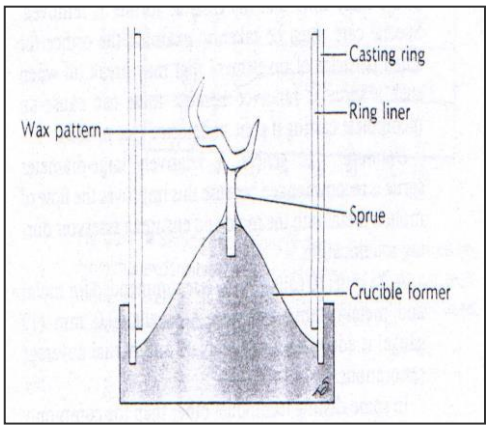
1. It provides a room of pliable material against which the investment can expand to enlarge the mold cavity to compensate for solidification shrinkage of the metal.

2. It permits easier removal of the investment and casting from the ring after the burnout procedure.

3. It acts as an insulator against loss of heat during the casting procedure.

Crucible Former:

It is a cone-shape base made of rubber or metal, which forms the base of the casting ring, and to which the other end of the sprue is attached.



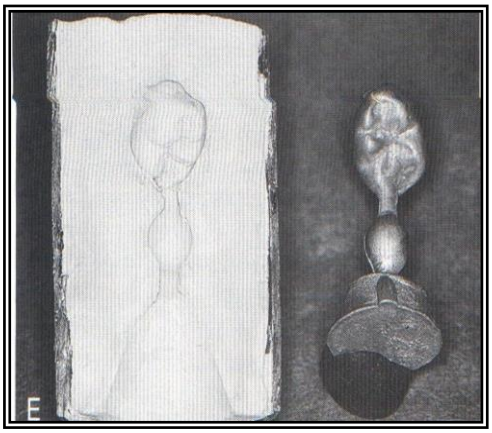
Purposes of using conical crucible former:

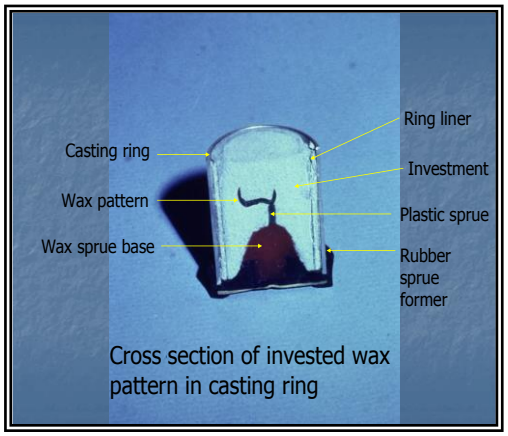
1. To get proper position of the wax pattern inside the casting ring.

2. To create a cone-shape way for easy entrance of the molten metal.

Mold Cavity:

It is the space created inside the investment after the burnout procedure which was occupied by the wax pattern, sprue and crucible former.





Investment materials:

According to the type of the binder we have 2 types:

1. Gypsum-bonded investment material.

2. Phosphate-bonded investment material.

Both consist of a binder and a refractory material (silica).

1. Gypsum-bonded investment material:

The binder is calcium sulfate hemihydrate. It is used with an alloy which has a low melting temperature. At high temperature, decomposition of calcium sulfate occurs which results in the release of sulfur into the mold and mixes with gold resulting in brittle casting, so it is unstable in burnout temperature above 650 ºC.

2. Phosphate-bonded investment material:

The binder is magnesium phosphate and ammonium phosphate. The binder can withstand high casting temperature; therefore, it is used for investing and casting alloys with higher casting temperatures.

Methods of mixing the investment material :

1. **Manual:** mixing and pouring of the investment is done by the spatula manually.
2. **Mechanical:** mixing is done by a vacuum mixer to ensure that the mix is completely free from any bubbles. Pouring the investment is done by one of the following methods:
   i. Brush technique: the investment is applied to the wax pattern by a brush and then we fill the casting ring.
   ii.Vacuum technique: the casting ring is attached to the vacuum mixing bowl. The bowl is inverted under vibration to fill the casting ring.

vacuum mixing machine