CROWN AND BRIDGE

Lecture: 8 **Dr. Farid**

Methods for mixing investing material

In investing, the following points should be considered:

1. The manufacturer's instructions of the water-powder ratio, heating temperatures etc… should be followed.
2. The mix should be free from air bubbles.
3. Temperatures of water should be at room temperature to avoid distortion of the wax pattern.

The methods of mixing the investment material are:

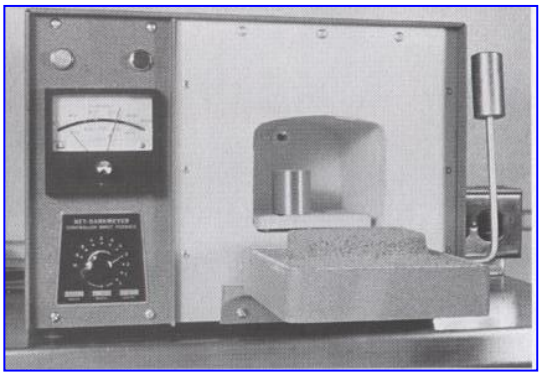
1. Manual: mixing and pouring of the investment is done by the spatula manually.

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 bowel is inverted under vibration to fill the casting ring. The filled casting ring is left for 1 hour for setting of the investment, and then the crucible former is removed from the ring which is now ready to the burnout procedure.



Burnout procedure:

It is heating of the invested ring in a thermostatically controlled oven until the traces of wax are vaporized so that the mold cavity is created into which the molten metal can enter.

Advantages of burnout procedure:

1. Elimination of the wax and plastic material from the mold cavity of the investing ring.

2. Elimination of moisture or water from the ring.

3. To produce the necessary expansion in the investment to compensate for the solidification shrinkage of the alloy after casting procedure.

4. To raise the temperature of the mold to the proper point that permits the flow of the molten metal into the mold cavity.

The burn-out procedure step by step:

1. After we separate the ring from the crucible former we place the ring inside the oven and increase the temperature to 200 C and hold for 30 minutes. The wax and water vaporize from the mold cavity.

2. The ring is heated to 480-650 C for the final burnout and left for 45 minutes.

3. The position of the ring should be in the center of the oven so that the atmosphere surrounding the ring is the same that as recorded on the thermal indicator.

4. A too rapid increase of the burnout temperature may cause cracking of the investment and distortion of the mold cavity so the ring should never be placed in an overheated oven.

Casting:

It is defined as introducing the molten alloy into the mold cavity in the investing ring.

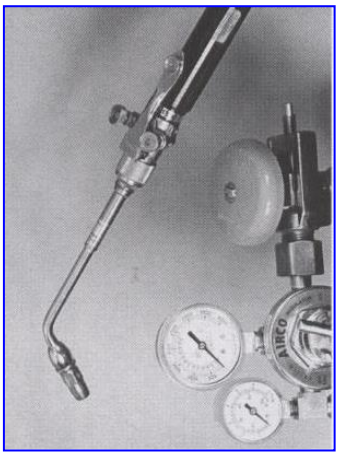
Casting equipment:

The casting machine requires:

1. Heat source to melt the alloy.

2. Casting force to force the molten alloy to the mold cavity.

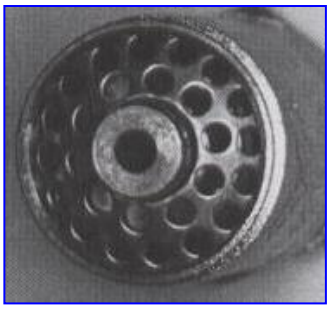
1. The heat source can be either the reducing part of the flame produced from a pipe torch, or electricity.



According to the melting temperature of the casting alloy we have 2 types of pipe torches:

i) Gas-air blow torch or pipe: It is used for melting casting alloy of low melting temperature (gold alloys II, III).

ii) Oxygen-acetylene torch or pipe: It has either a single or multi-orifices. It is used to melt alloy of high melting temperature as porcelain fused to metal. The single orifice torch is used for melting sliver palladium alloy. The multi-orifices torch is used to melt base metal alloy (nickel chromium).



2. The casting force must be enough to overcome:

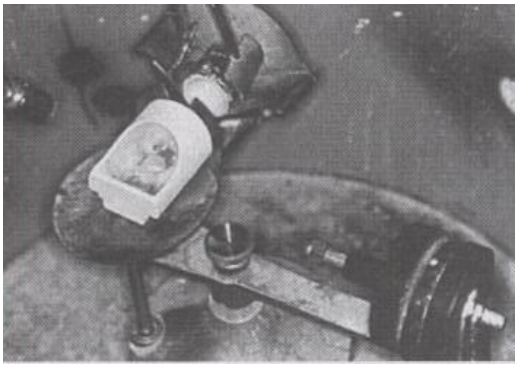
i) The high surface tension of the molten alloy.

ii) The resistance of gas within the mold.

The most common casting machine is the centrifugal casting machine which consists of a device for melting the casting alloy (crucible), and another part for throwing the molten alloy quickly by the centrifugal action into the mold cavity.

Casting procedure:

1. The casting machine gives three clockwise turns (four if metal ceramic alloys), and locked in position with the pin.



2. Adapt a wet asbestos liner to the bottom of the crucible of the casting machine, and then start to heat the liner in place using the flame obtained by pipe torch (the liner will prolong the life of the crucible and protect the metal from contamination).

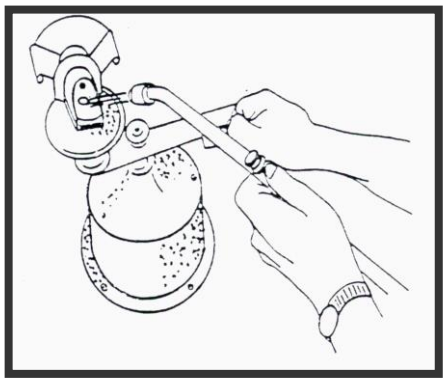
3. Place the casting alloy on asbestos liner and heat the gold alloy with the reducing part of the flame (which is the hottest part of the flame and doesn't produce any contamination) until it flows up and appear yellowish mirror like surface.

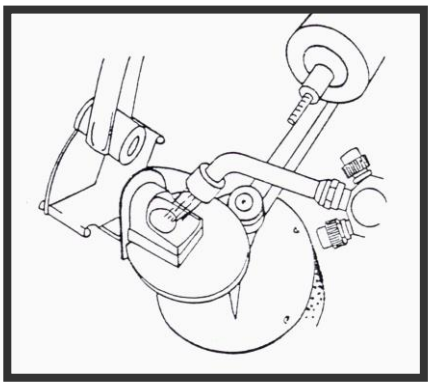
4. Add small amount of flux to the alloy (flux: it is a deoxidizing agent used to prevent oxidation of the alloy and to increase the fluidity of the molten alloy).

5. Remove the ring from the oven and place it on the cradle of casting machine.

6. Slide the platform against the ring.

7. Release the machine (pin), and allow the machine to spin until it stops.





Differences between alloy of low and high melting temperature in casting procedure:

1. The single orifice torch is used to melt gold platinum and silver palladium alloy, and the multi-orifices torch is used to melt base metal alloys.

2. Quartz made crucible is used in melting high melting alloys. The asbestos liner is not used here because the high temperature decomposes the asbestos and cause contamination to the molten alloy.

3. No flux is added to the porcelain fused to metal alloys during melting because it will upset the balance of the alloy and interfere with bonding later.

4. It needs extra winding of the arm of the casting machine to complete casting of the melting temperature alloy.

5. Casting temperature for the gold-platinum (1300 F), base metal alloy (1500 F) which differs from casting temperature of gold alloy (1200 F).

Cleaning of the cast restoration:

1. After casting procedure is completed the casting ring is taken from the casting machine, and thrust under running water or a large rubber bowl. This procedure is called Quenching.

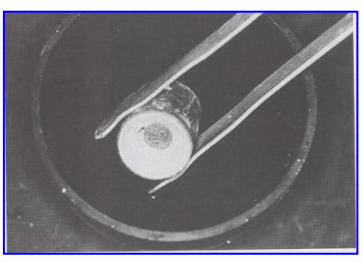
2. After quenching, the cast restoration is cleaned from the investment material by a sharp hand instrument and a tooth brush.

3. The cast restoration is sandblasted to remove the remaining residues of the investment material.

Sandblast: it is a machine that throws sand and compressed air on the cast restoration to clean it.

4. The cast restoration is placed in the pickling solution which a solution is made of 50% hydrochloride acid. It is used to remove the oxide from the surface of the metal and any remnants of investment material.

Now the cast restoration is ready for the next procedure which is the finishing procedure

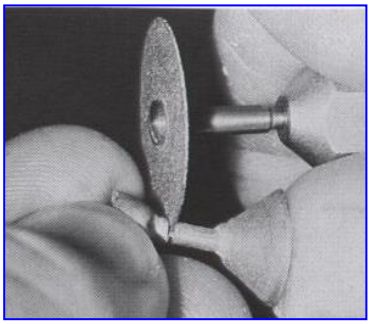


Advantages of quenching:

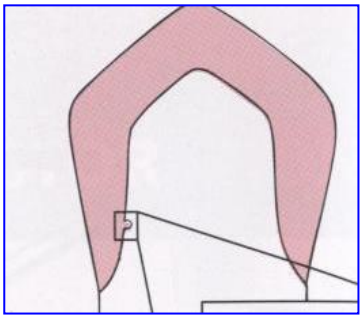
1- To anneal the alloy to provide better working qualities during finishing.

2- Disintegration of the hot investment material when it contacts cold water.

Finishing procedure:



1. The sprue is cut by a separating disc. The excess in the cut area is removed, recontoured and refined with a stone bur to reestablish the proper coronal morphology of the cast restoration.



2. The next step is to inspect the inner surface of the cast restoration for any nodules, bubbles of the alloy that might interfere with seating of the cast restoration on the die. All these irregularities should be removed using a round bur rotating at high speed.

3. The cast restoration is seated on the die. It should seat without any pressure but if there is any interference then the inner side of the cast restoration is inspected and the contact areas are relieved. If the cast restoration is seated with pressure the die will cracked and distorted.

4. After complete seating of the cast restoration on the die, the die is seated on the working cast and slowly adjusts the interproximal relationship to achieve a slight contact with the adjacent teeth.

5. The axial walls of the cast restoration are smoothed by a rubber wheel bur. The areas near the margin of the cast restoration are smoothened by placing the wheel bur parallel to the margin. Afterwards, the occlusal surface is finished with use of small finishing burs.

Finally, the cast restoration is ready to be tried inside the patient's mouth.

Reference: Contemporary Fixed Prosthodontics