

Working cast and die

Working cast (master cast): It is a replica of the prepared tooth (or teeth), ridge area, and other parts of the dental arch. It is obtained from the final impression, and on which the wax pattern is made (laboratory work).

Requirements of good working cast:

1. It must reproduce all the details captured in the impression.
2. It must be free from air bubbles especially at the area of the finishing line and the occlusal surface.
3. It must be free from any distortion.
4. It should be trimmed at the margins of the prepared tooth (or teeth) to ensure access for carving of the wax pattern (ditching).
5. It should allow precise articulation.

Die: It is the positive reproduction of the individual (single) prepared tooth on which wax pattern is done. It is obtained from the final impression.

Requirements of the die:

1. It must reproduce the prepared tooth exactly.
2. It must be free from air bubbles and voids.
3. It must return to its exact position on the cast when it is removed.
4. It must be stable even when the cast is inverted.

Types of dies according to material's type:

The two critical properties of the die material are the dimensional stability (or accuracy) and abrasion resistance during the construction of the wax pattern.

1. Silver-plated dies.
2. Copper-plated dies.
3. Amalgam dies.
4. Stone dies.

Stone die:

Advantages of stone die:

1. Easy to be prepared.
2. Can be used with all types of impression material.
3. Cheap.
4. Need less requirements and easy to manipulate.

Types of dental gypsum products (according to ADA Specification):

1. Type I: impression plaster.
2. Type II: model plaster.
3. Type III: dental stone.
4. Type IV: high strength dental stone (die stone).

Types of die:

1. Working cast with separated dies.
2. Working cast with removable dies:
 - a. Straight dowel pin.
 - b. Curved dowel pin.
 - c. Pindex system.
 - d. Di-Lok tray
 - e. DVA Model System and the Zeiser model system :

Working cast with separated dies (Multiple pour system):

The final impression is poured twice to obtain two working casts: one of these casts is sectioned to obtain the individual dies that are separated from that cast, while the other working cast is articulated on the articulator.

Working cast with removable dies:

The final impression is poured for one time only to construct a working cast that involves removable dies.

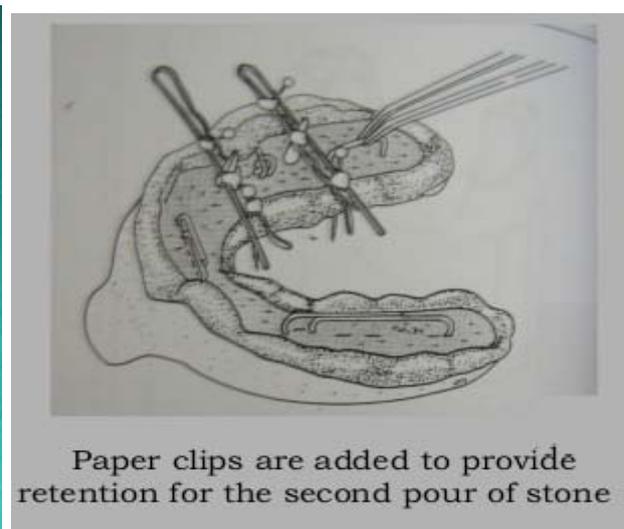
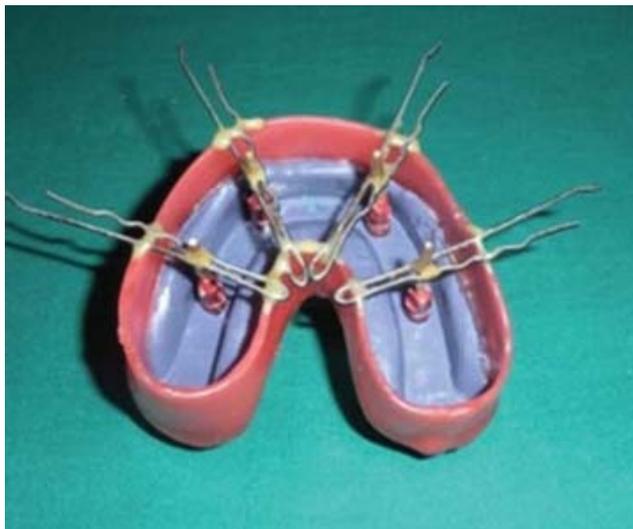
Construction of a stone die (working cast with removable dies):

Dowel pins: these are ready-made metal pins which are used as a means of orienting the die(s) to the original working cast, which allow the die(s) to be easily removed and accurately replaced into the working cast. The dowel pin is tapered and cylindrical with one flat side for positive seating.

Clinical procedure to obtain a working cast with removable dies:

1. Dry the impression.
2. A dowel pin is used for each prepared tooth. It is placed over the center of the prepared tooth parallel to its long axis. A bobby pin is used to hold the dowel pin in this position by placing it between its arms. The bobby pin is positioned buccolingually across the impression so that the dowel pin is centered directly over the prepared tooth. Then a straight paper pin is inserted between the arms of the bobby pin and into the impression buccally and lingually. The dowel pin is then stabilized within the bobby pin and the bobby pin itself against the straight pin with sticky wax.

3. The impression is placed over the vibrator and dental stone is added in small increments to about 2 mm above the cervical margin. The dental stone should cover the serrated end of the dowel pin.
4. A retentive means is placed in the poured stone before its setting such as paper clips to provide retention to the second layer of the stone that is going to be poured later.
5. When the first layer of the stone has set, the bobby pin(s) and the paper pin(s) are removed from the impression. A ball of soft wax is placed on the tip of each dowel pin.
6. The surface of the first layer of the stone is lubricated with a separating medium, and a second layer of stone is poured (base) that should cover the dowel pin(s) completely.
7. After complete setting of the second layer of the stone, the cast is removed from the impression. Then using a sharp knife the wax ball which is placed on the tip of each dowel pin is removed.
8. A saw is used to section the proximal sides (mesial and distal) of each prepared tooth bucco-lingually to obtain the die. The cutting should be through the first layer only, and the cutting should be diverged toward the occlusal surface to facilitate removal of the die.
9. The end of the dowel pin is tapped gently with a hand instrument to loosen the die.



Pindex system:

In the pindex system a reverse drill is used to create a master cast with dies that can be removed and replaced repeatedly with great precision. The impression is poured without positioning and attaching dowel pins.

The machine accurately drills parallel holes from the underside of a trimmed cast.

Technique:

Pour the impression in a usual manner, adding approximately 20 mm of stone beyond the edge of the tray. Allow the cast to set 60 minutes and remove it from the impression, trim the side and the bottom of the cast, The cast should be trimmed until all rough, irregular, and undercut areas are removed from its underside. The cast should perfectly flat on the tabletop, and its thickness from the base to preparation finish must be a minimum of 15 mm. If the bottom of the cast is flat, it insures that the pinholes drilled into it will be parallel. Mark the location of each dowel on the occlusal surface. Two dowels are needed to stabilize each segment. Alternative single pins are used for small preparation.

Position the cast on the drill stage; a light indicates the location of the drill. Hold the cast firmly and press the lever; this activates the drill, which penetrates into the cast.



Di-Lok Tray

The Di-Lok technique involves the use of a specially articulated tray for precise reassembly of a sectioned definitive cast. The impression is poured, and the cast is trimmed into a horseshoe configuration that fits in the special tray. The tray is filled with a second mix, and the cast is seated. When the stone has set, the tray is disassembled, saw cuts are made on each side of the preparation, and the resulting die is trimmed. The cast and die can be reassembled in the tray, which is then mounted on an articulator. A disadvantage of this system is that the overall size of the tray can make articulation and manipulation awkward and difficult.

DVA Model System and the Zeiser model system :

They are new systems include all auxiliary items necessary for the production of very professional appearing models and dies.

These Systems include a specially designed Pin Alignment and Drilling Machine, which determines dowel pin locations prior to the pouring of the model; pre-manufactured Base Plates; and specially designed dowel pins.

Interocclusal Record (Bite Registration)

Objective of bite registration:

To transfer the relation between the upper and lower dental arches from the patient's mouth to the articulator we need bite registration. Proper interocclusal record is important to orient the die (s) of the same arch to the opposing arch.

When enough teeth are present in both dental arches we can transfer the relation by hand articulation of the casts. i.e., no bite registration is needed in such cases, so we can occlude the opposing casts by hand, and then we mount them on the articulator.

If the remaining teeth are insufficient to produce hand articulation of the casts, we have to record the bite by using either of the followings:

1. Pink base plate wax.
2. Bite registration paste.
3. Bite rim or occlusal rim.

How to record?

Whatever the material used to record the relation between the upper and lower dental arches, we have to guide the mandible to the required relation (centric or eccentric). So, the patient is asked to close and guide him, put reference points, and then we put the record material and register the relation.

The most widely used material to record the relation is pink base plate wax. The procedure is by softening the wax at first, then we ask the patient to bite on it, keeping in mind that we have to guide the mandible to the reference points that we have marked to have the correct bite registration. Meanwhile, the patient is asked to mold the wax at the lingual area by his tongue, while we adapt the wax on the labial and buccal sides by our fingers. After complete setting of the wax, we remove it from the patient's mouth, trim the excess wax, and attach it to the cast and transfer it to the articulator.

Bite rim: The bite rim is used in the following cases:

1. Free end saddle.
2. When we need to restore the anterior teeth.
3. When we don't have enough teeth to obtain the centric relation.



Di-Lock Tray

