Laboratory Procedures (Working cast & die)

Working cast (master cast): It is a replica of the prepared teeth, ridge area, and other parts of the dental arch. It is obtained from the final impression.

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. These replicas prepared for easier handling during wax pattern fabrication and finishing of inaccessible areas of the cast.

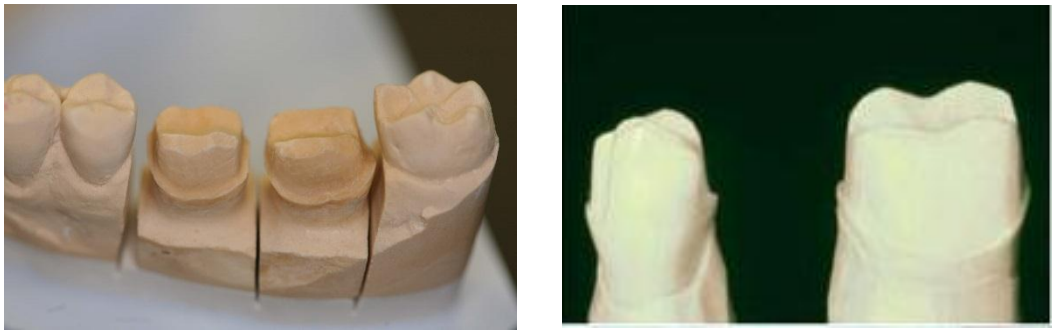

Fig.(1) Working cast & die

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 allow precise articulation.

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, and must be stable even when the cast inverted.
4. Adequate access to the margin is imperative.

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. **Stone die.**

2. **Epoxy resin.**
3. **Electroplated die (silver or copper).**

Stone die:

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).

Advantages of stone die:

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

Construction of a stone die:

- **Working Cast and Separate Die:** Here, two casts are poured from a single impression and one cast is sectioned and used as a die and the other is not sectioned and is used as the working cast. The wax pattern is prepared on the die and later transferred to the working cast. The main disadvantage of this method is the wax pattern may get distorted while transferring it from the die to the cast.
- **Working Cast with Removable Dies:** The final impression is poured for one time only to construct a working cast that involves 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.

Fig. (2) Dowel pin

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 bucco-lingually across the impression so that the dowel pin is 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.

Fig.(3) A bobby pin is used to hold the dowel pin in this position by placing it between its arms

Fig.(4) working cast with removable dies