



Impression Trays and Casts



Intended learning outcomes

By the end of this session the student should be able to :

- › Identify different types of impression trays and casts.
- › Understand the reasons for fabricating the Custom tray.
- › Know the different materials used for fabricating special trays
- › Fabricate a tray spacer.
- › Construct a custom tray.

Introduction

Impression :

An imprint or negative reproduction of an object from which a positive likeness or cast can be made.



Introduction

Dental Cast/ model :

It is a positive reproduction of the anatomical form of the dental arch over which denture bases or other dental restorations may be fabricated.



Impression Tray

Definition:

It is a device used to carry, confine and control impression materials while making an impression.



Functions

1. Supports the impression material in contact with the oral tissues while making the impression.
2. Supports the impression material while removing and insertion in the mouth and pouring the cast.

Parts of an Impression tray

Body : consists of the **Floor & Flanges**

Handle:



- ▶ .The difference between the upper and lower is that in the upper tray there is the palatal portion we called (vault) and in the lower tray there is the lingual flanges.



Types of Trays

STOCK TRAY:

a prefabricated impression tray typically available in various sizes and used principally for taking preliminary impressions



CUSTOM or Special TRAY:

an individualized impression tray made from a cast recovered from a preliminary impression. It is used in making a final impression



STOCK TRAYS



Functions of Stock impression trays

Used for making the preliminary impression.

Ideal features:

- › Rigidity.
- › Ease of modification.
- › Compatibility with the impression material.
- › Smoothness and comfort in the oral environment
- › Ability to be sterilized or disposability.

STOCK TRAYS



Classification:

Stock trays can be classified according to:

- A. Their use in edentulous or dentulous arches.
- B. The nature of impression material.
- C. Size of the dental arch.
- D. Material of construction
- E. Ability to be sterilized.

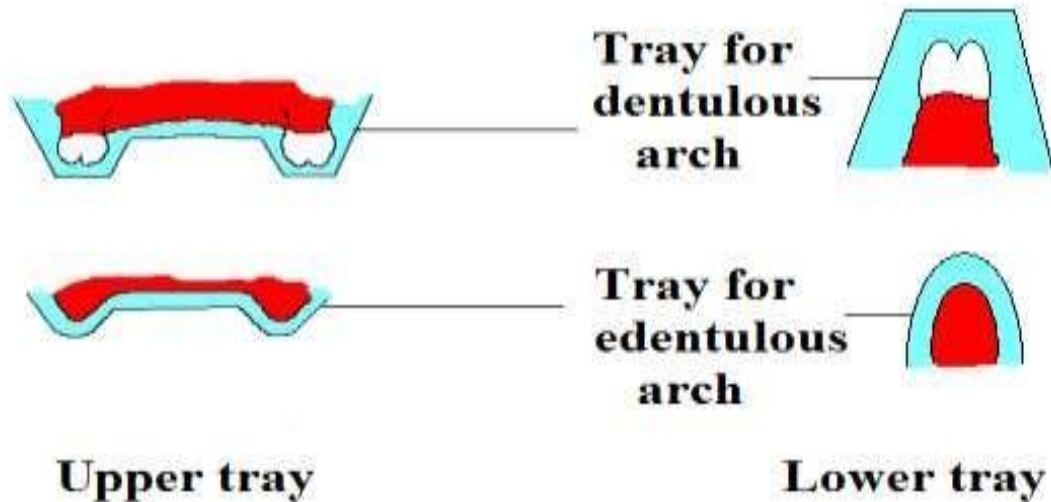
A. According to the use in edentulous or dentulous arches:

1. Trays with flat/square floor are used for Dentulous arch
2. Trays with round /oval floor for used in Edentulous cases



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B. According to the nature of impression material:

1. **Plain trays:** → for materials of good adhesive properties.
e.g. Impression Compound.
2. **Perforated trays:** → for materials of poor adhesive properties. e.g. Alginate.
3. **Rim – lock trays:** → the periphery of tray serves as an undercut to prevent detaching of the material.
4. **Water – cooled tray:** → for materials that need cooling during setting. e.g. Agar-agar.

Stock trays can be classified according to impression material in to two types:

1. Perforated stock tray.

- a. Perforated stock tray without rim lock.
- b. Perforated stock tray with rim lock (rim lock stock tray). These types used with alginate impression material.

2.

Non - perforated stock tray.

- a. Non - perforated stock tray without rim lock used with impression compound.
- b. Non - perforated stock tray with rim lock used with alginate impression material.

Types of stock trays (according to impression material):

Perforated stock tray.

A. Perforated stock tray without rim lock used with alginate impression material.



B. Perforated stock tray with rim lock (rim lock stock tray). These types used with alginate impression material



2. Non - perforated stock tray.

A. Non - perforated stock tray without rim lock used with impression compound.



B. Non - perforated stock tray with rim lock used with alginate impression material.



C. According to size of the dental arch:

1.Small – Medium – Large

2. Numerical: (# 1 ,#2 , #3).



D. According to the material of construction:

1. Metallic:

- a. Aluminum.
- b. Stainless steel.

2. Non metallic:

- a. Plastic trays.
- b. Disposable plastic trays.



Factors effect in selection of stock tray

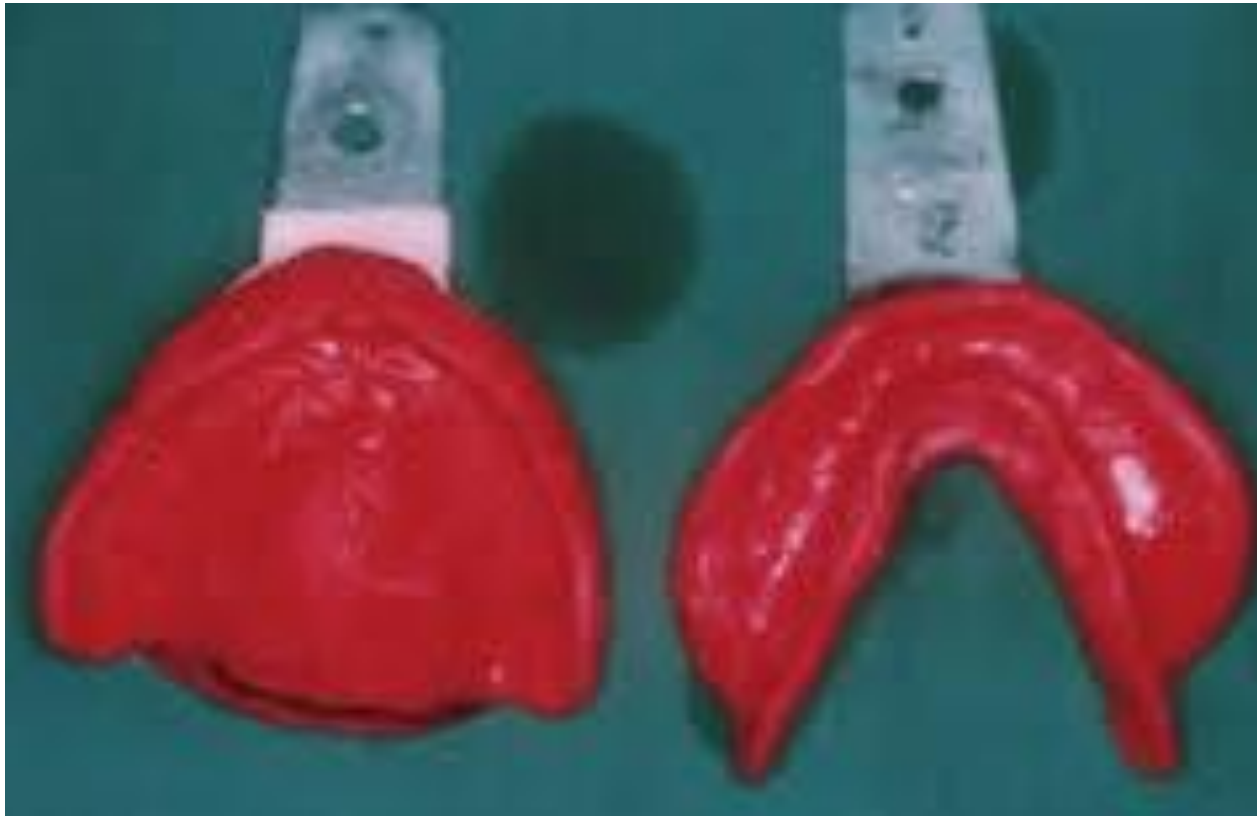
- 1- The type of impression material used in the primary impression procedure.

Example; with impression compound we used non-perforated tray because it will be stick on the tray. And if we use alginate impression material we should use perforated stock tray.

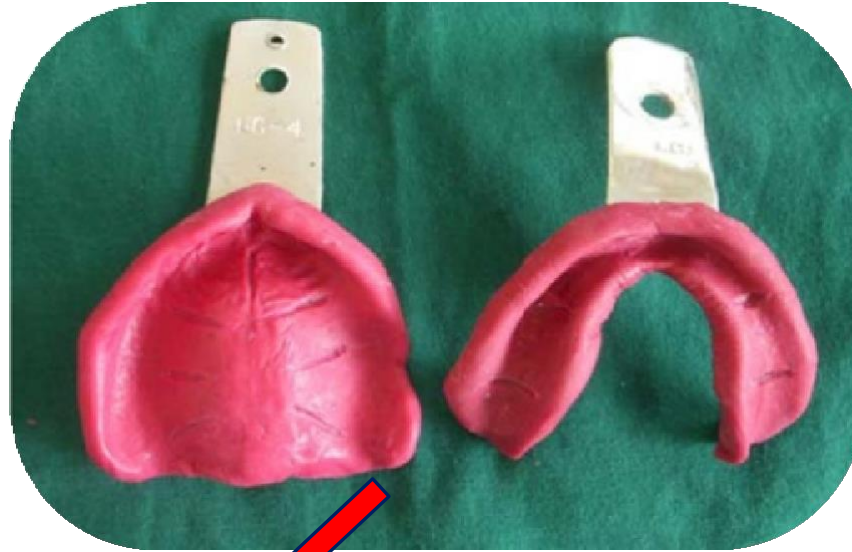
- 2- The stock tray must cover all the anatomical landmarks needed in complete denture and this is a most important point.
- 3- Stock tray should give a sufficient space to impression material in all direction (the stock tray should leave sufficient room or space for impression material 4-5mm).
- 4- Size of the arch.
- 5- Form of the arch. (Round, square and taper).

Preliminary impression:

It is an impression made in a stock tray for making a study cast on which a custom tray is constructed.



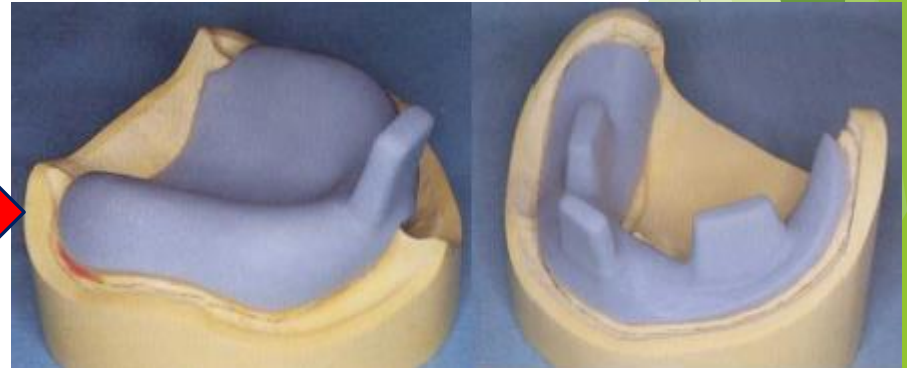
Primary impression



Primary cast

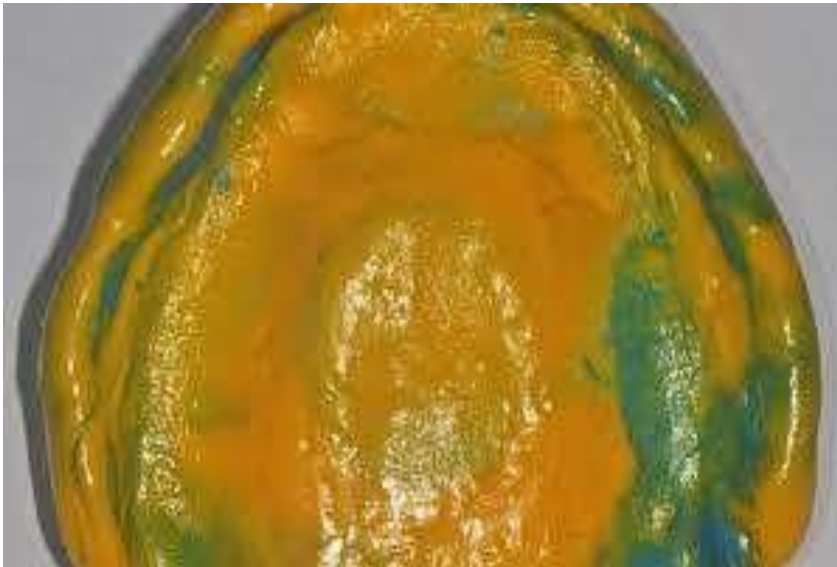


Special tray

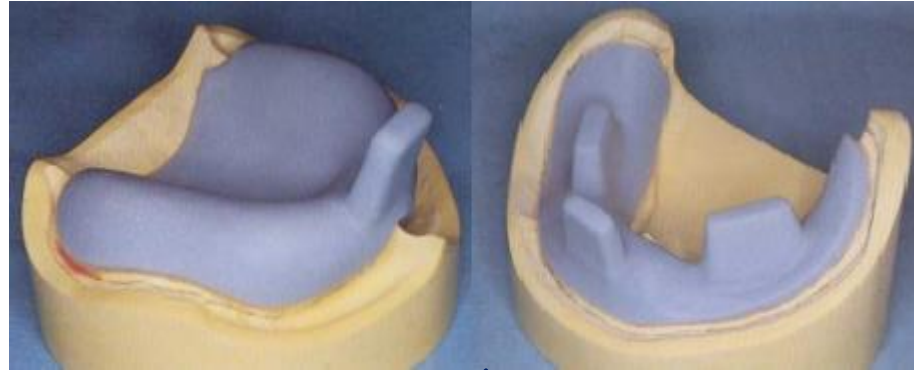


Final impression:

It is an impression made in a custom tray and it is used for the purpose of making the master cast on which the denture is constructed.



Special Trays



Secondary/Final impression



Secondary/Master casts



WHY DO WE NEED A SECONDARY IMPRESSION



REASONS FOR SECONDARY IMPRESSION IN A CUSTOM TRAY

› MECHANICAL REASONS:

Better fit of Custom tray and a uniform thickness of impression helps to record an accurate impression and minimize dimensional inaccuracies

› ANATOMICAL FACTORS :

Limiting structures need to be recorded in their functional state.

› BIOLOGICAL REASONS:

Not all supporting structures have the same stress bearing capacity.

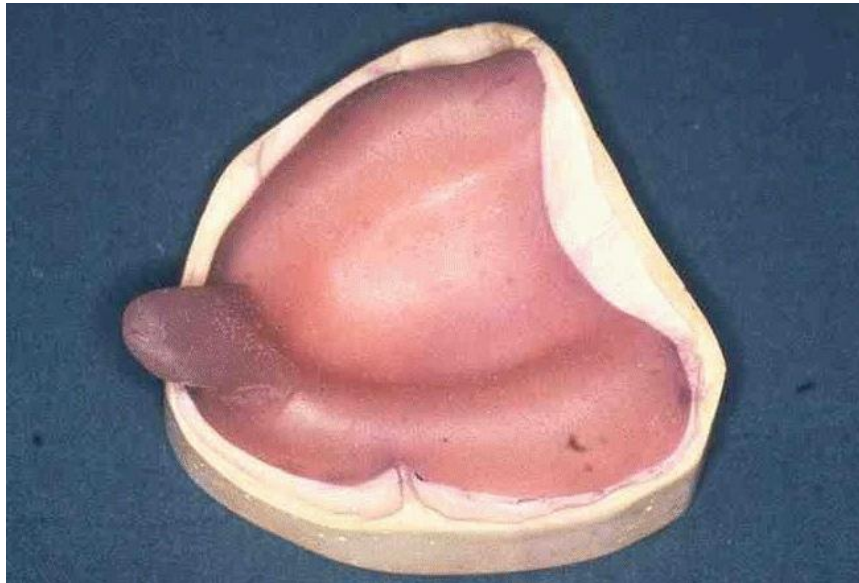
- Stress bearing areas can be recorded in a compressed state so that the denture fits closely in those areas
- Relief Areas should be recorded in a relaxed state so that the denture does not exert excessive pressure on these areas

Custom Trays (Special tray)



Custom Trays (Special tray)

It is made on the preliminary cast and used for making the final impression, it is **specially designed** for one patient and discarded after use.



Advantages

- 1. Fits the arches accurately.
- 2. The bulk of the impression reduced → less dimensional changes.
- 3. Allow homogeneous thickness of impression material.
- 4. More comfortable to the patient.
- 5. Provide optimum accuracy and stability.
- 6. Provide anatomically correct extension of denture impressions.

Advantages of special trays

- ▶ Economy in impression material (used less impression material required in special tray).
- ▶ More accurate impression.
- ▶ Special tray provides even thickness of impression material. This minimizes tissue displacement and dimensional changes of impression material and produce impression with correct extension.
- ▶ The work with special tray is easier and quicker than modifying stock tray to provide accurate impression.
- ▶ Special tray is more accurately adapted to the oral vestibules, this helps in better retention of denture.
- ▶ Special tray is less bulky than stock tray which is more comfortable for the patient.

General Requirements:

1. Follow specific anatomical landmarks.
2. Approximately 2 mm short of the vestibular depth.
3. Uniform thickness of 2mm.
4. Its contour should resemble those of the finished denture.
5. The handle should not interfere with the lips.
6. Borders should be smooth and rounded.
7. Accept Modification.

Criteria for special tray construction:

1. The impression tray must not impinge upon movable structures.
2. The borders must be under extended (2mm).
3. The posterior limits of the impression tray should be slightly overextended to ensure inclusion of the posterior detail for development of the post-dam area in upper tray.
4. The tray must have a handle for manipulation and the handle must not interfere with functional movement of the oral structures.
5. The tray should be rigid and of sufficient thickness that it will not fracture during its use.
6. The tray must be smooth on its exposed surfaces, and should have no sharp corner or edges which would injury the patient.

Types of special tray

We have two types of special tray:

- ▶ Spaced special tray (with or without stoppers).
- ▶ Closed fitted special tray.

TYPES OF SPECIAL TRAYS

› SPECIAL TRAY WITH SPACER



with stoppers

TYPES OF SPECIAL TRAYS

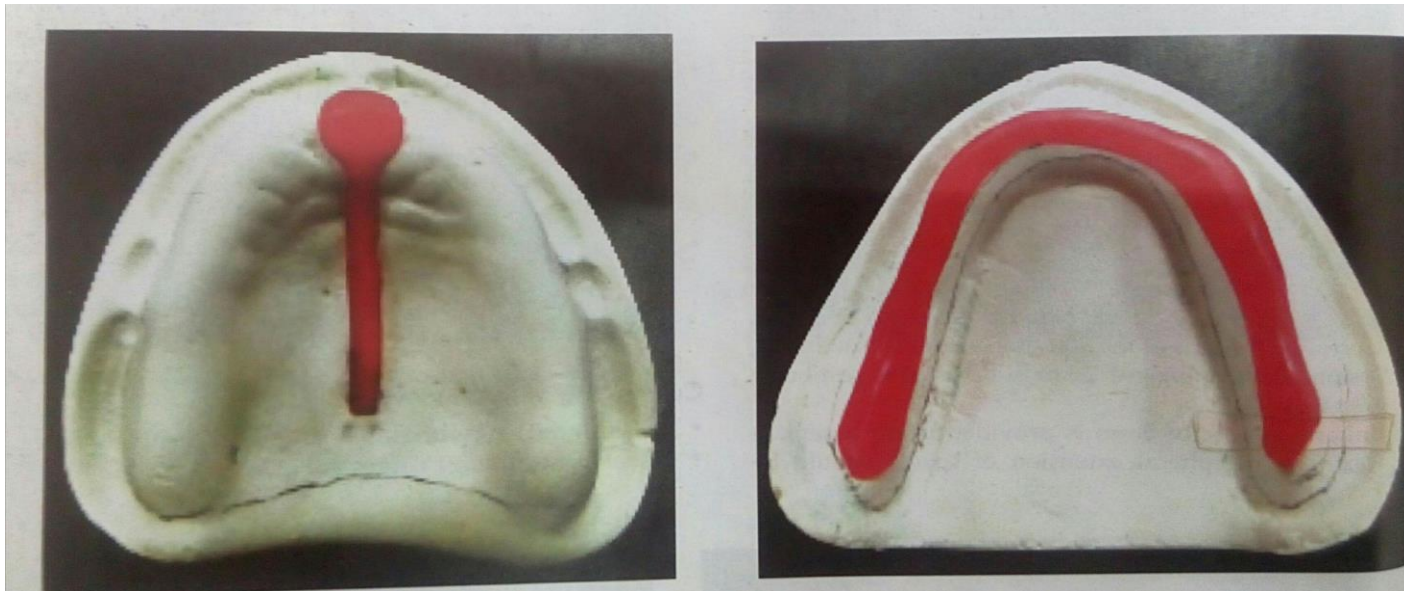
› SPECIAL TRAY WITH SPACER



Without stoppers

TYPES OF SPECIAL TRAYS

› CLOSE FITTING SPECIAL TRAY



* In **close fit special tray** we used only separating medium on study cast and a self-curing acrylic resin tray material is mixed and uniformly adapted over the cast, so that the tray will be about 2-3 mm in thickness.

CUSTOM TRAY WITH SPACER (General Considerations):

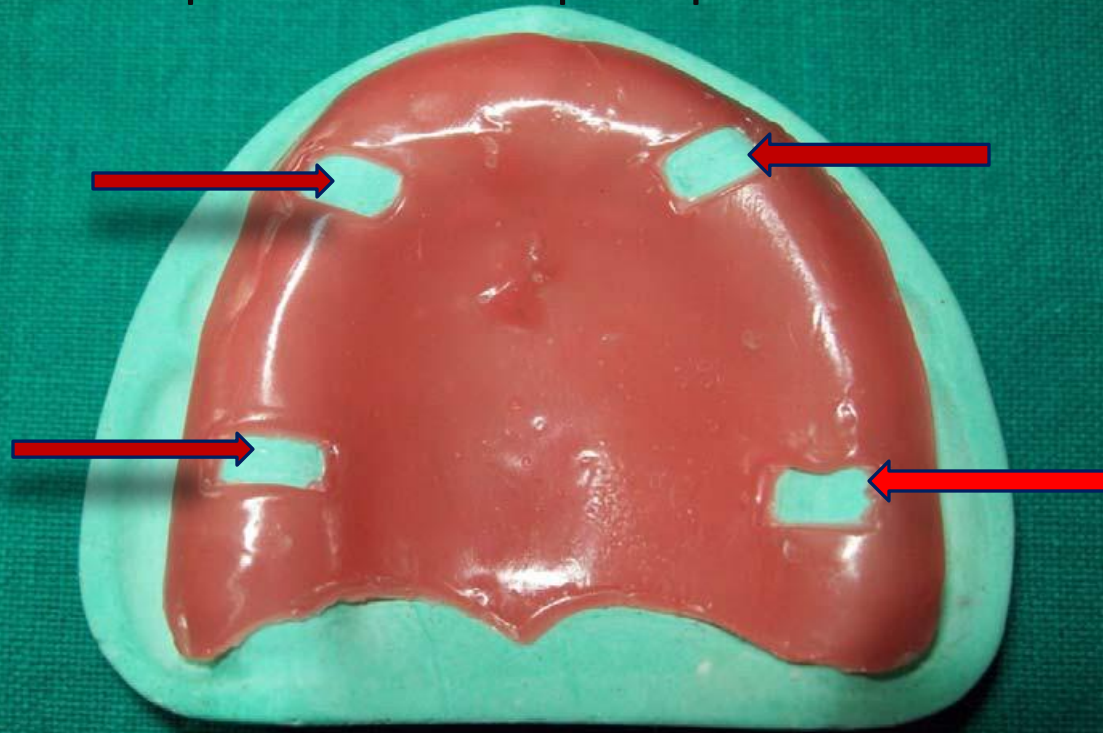
- It provides an even thickness for the impression material.
- (Its thickness depends on the type of impression material)
- Custom tray should extend $\sim 2\text{mm}$ short of the denture border and Spacer should be $\sim 2\text{mm}$ short of the Custom tray boundary.
- Stops (3 or 4) may be essential.



Boundaries of the Spacer & the Tray

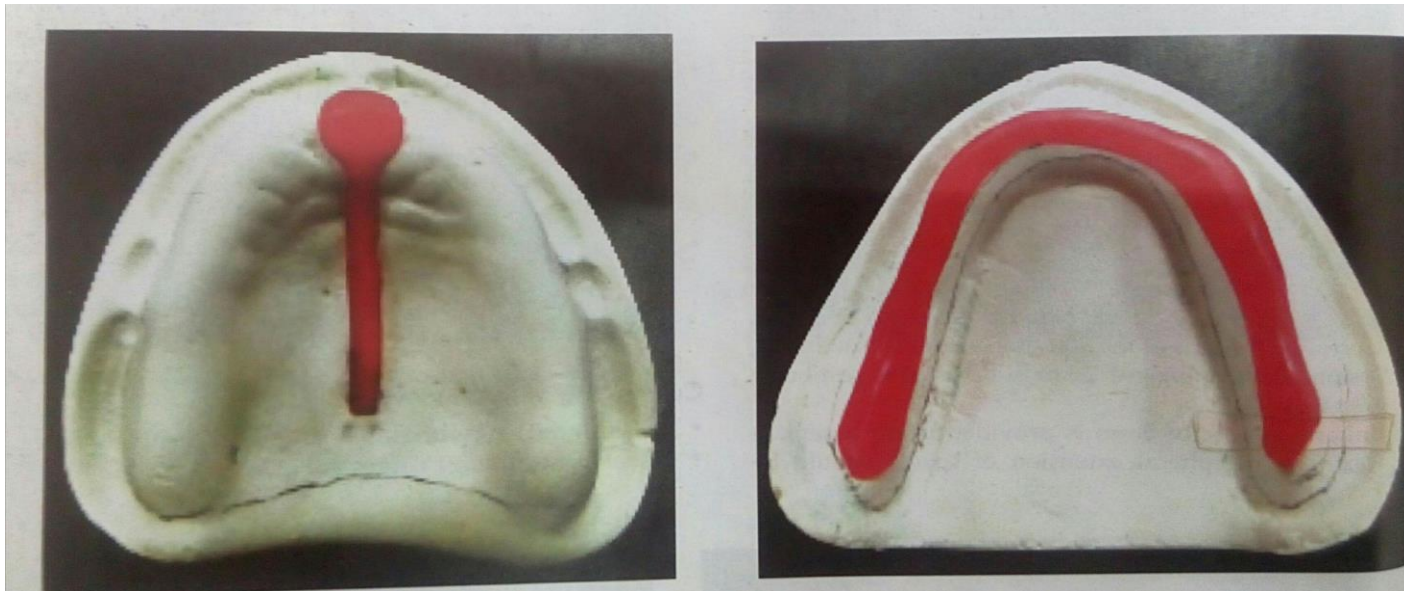


Spacer with Stops in place



TYPES OF SPECIAL TRAYS

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Materials used for construction of special tray

The special tray can be constructed by the use of different materials; this is depending on the type or technique of impression taking. It can be constructed from:

1. Cold cure acrylic resin or self-cure acrylic resin or auto-polymerizing acrylic resin (more common).
2. Visible light cured acrylic resin (VLC).
3. Shellac base plate.
4. Impression compound (some time).
5. Heat cure acrylic resin (rarely).

Materials of construction:

A. Thermoplastic materials:

- ↯ Shellac base plate.
- ↯ Modeling compound.

B. Resins:

- ↯ Self cured.
- ↯ Heat cured.
- ↯ Light cured.



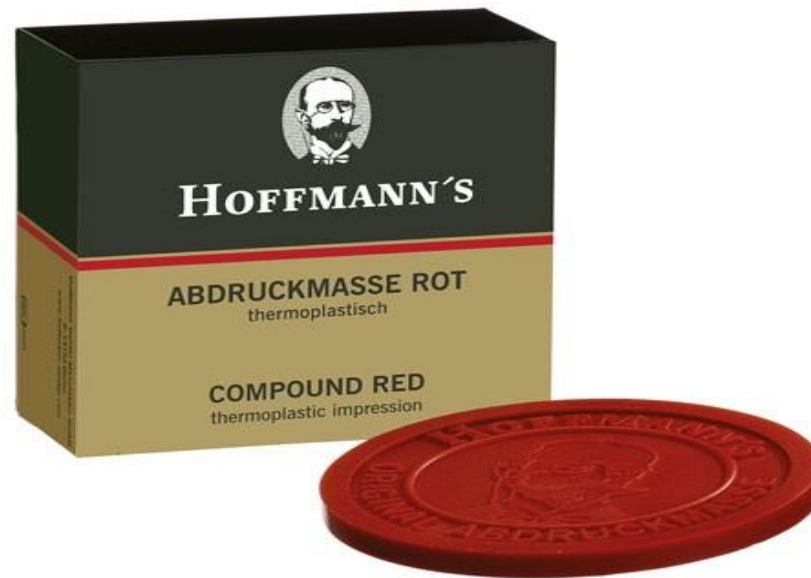
Shellac base plate:

In the form of sheets → application of heat → primary adaptation on the cast
→ Trimming of the excess → Final adaptation & rolling of the edges.



Modeling compound:

In the form of cakes → Hot water → adaptation & shaping → trimming of the excess & smoothness.



Resins:

1. Light Cured / Photo-activated acrylic resin



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Resins:

2. Self curing acrylic resin:

- **Advantages:**

1. Readily available and cheap material
2. More rigid than shellac base plate trays.

- **Disadvantages:**

1. More time consuming and difficult manipulation compared to VLC resin.
2. Monomer can be toxic and allergic to the patient and operator.



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Resins:

3- heat cured acrylic resin:

Techniques or methods for construction of special trays

- ▶ Finger adapted dough method.
- ▶ Sprinkle-on acrylic method

Finger adapted dough method

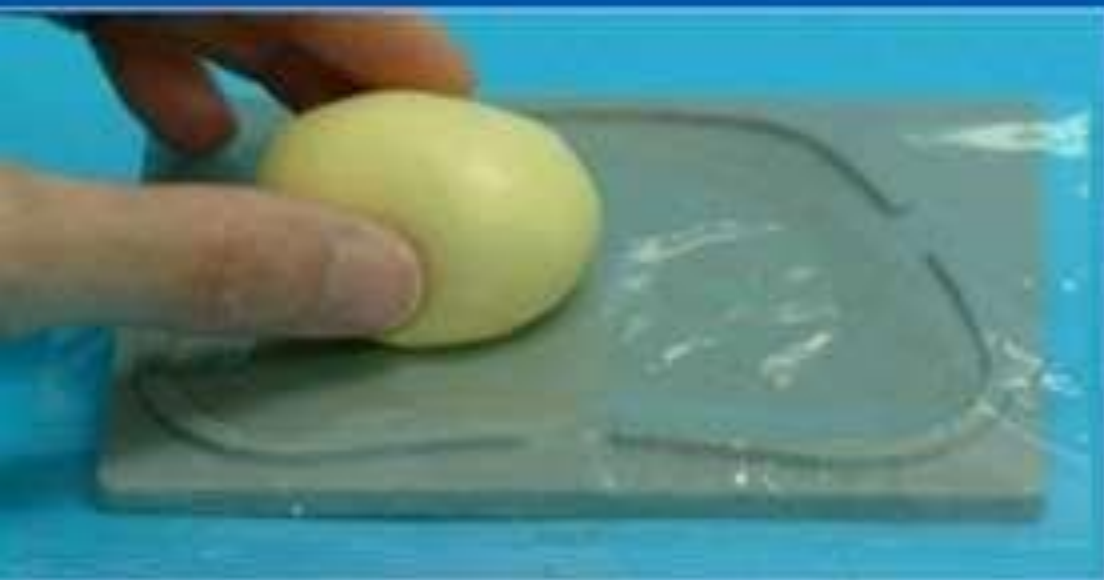
- ▶ In **special tray with stoppers** we should have 4 stoppers, 2 at anterior area (canine area) and 2 at posterior area (first molar area) in both sides.
- ▶ A baseplate wax sheet 1mm in thickness is adapted on the cast (after heating the wax) and a window open on the wax sheet in area of stoppers by removing the wax to make the stoppers and then put a uniform layer of self- cure acrylic resin upon it.
- ▶ When we remove the wax, there is a space with 4 stoppers which will stop the special tray in the mouth of the patient and stop the pressure on the material during make the impression.

Mix approximately $\frac{1}{4}$ cup of tray resin for each tray.

Apply a thin layer of vaseline to your fingers.



Wait for the material to get to a doughy consistency before you apply it to the template. Press material with a glass slab to obtain the proper thickness.

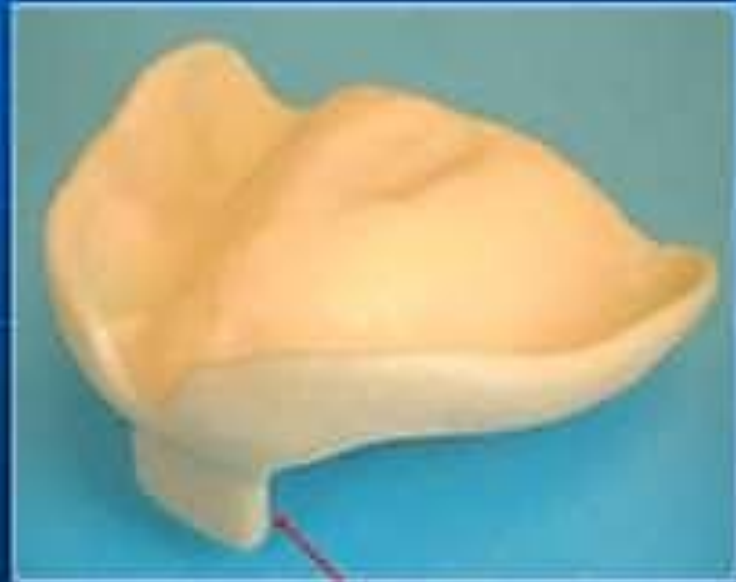
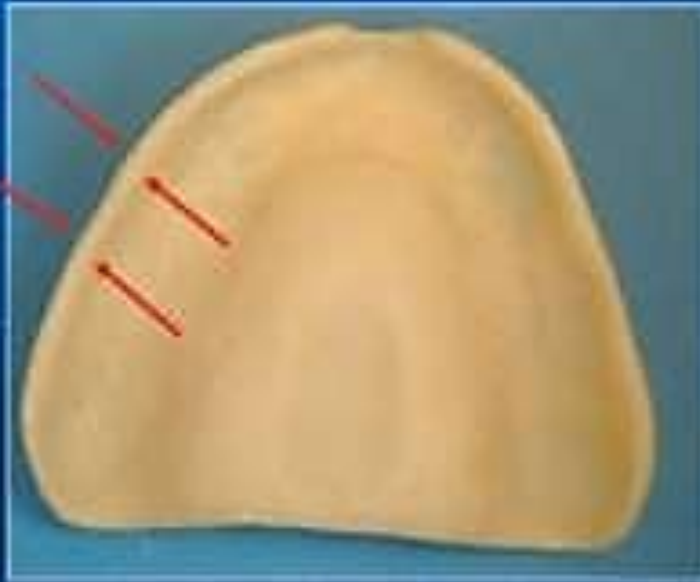


- Adapt the resin material to the cast as shown
- Trim excess with knife
- Place additional resin to create handles
- Allow resin to polymerize



Maxillary tray check list

Tray periphery should be 2-3 mm thick. The edges should be rounded. The rest of the tray should be about 1-2 mm in thickness.



Tray handle - 10mm high

While for spaced one without stopper, a baseplate wax 1mm in thickness is adapted on the cast (after heating the wax) then put the acrylic resin on it, when the wax is removed there is space without stoppers





Sprinkle- on acrylic technique

- ▶ This technique used for construction of individualized impression tray.
- ▶ Eliminate undercuts on the cast with a thin coat of wax.
- ▶ Paint cast with separating medium (cold mold seal).
- ▶ Place acrylic resin powder (polymer) in a container with a perforated top (like a salt shaker). Place the (liquid) monomer in a dappen dish.
- ▶ Shake the polymer on the border area. With a glass medicine dropper, add monomer to the saturation point. Continue to build this over the entire denture - bearing area to thickness that will yield a rigid tray (a minimum of 2.5 mm).
- ▶ Just before the final polymerization, remove the tray, reseal on the cast and allow complete polymerization.
- ▶ Reduce the borders to coincide with the outline on the cast (2 mm under extended).
- ▶ Roughen the ridge area on the top of the tray anteriorly at the midline, then make a handle from acrylic resin and attach to the tray at this area.

Sprinkle- on acrylic technique



Sprinkle-on technique of resin addition.



Sprinkle- on acrylic technique

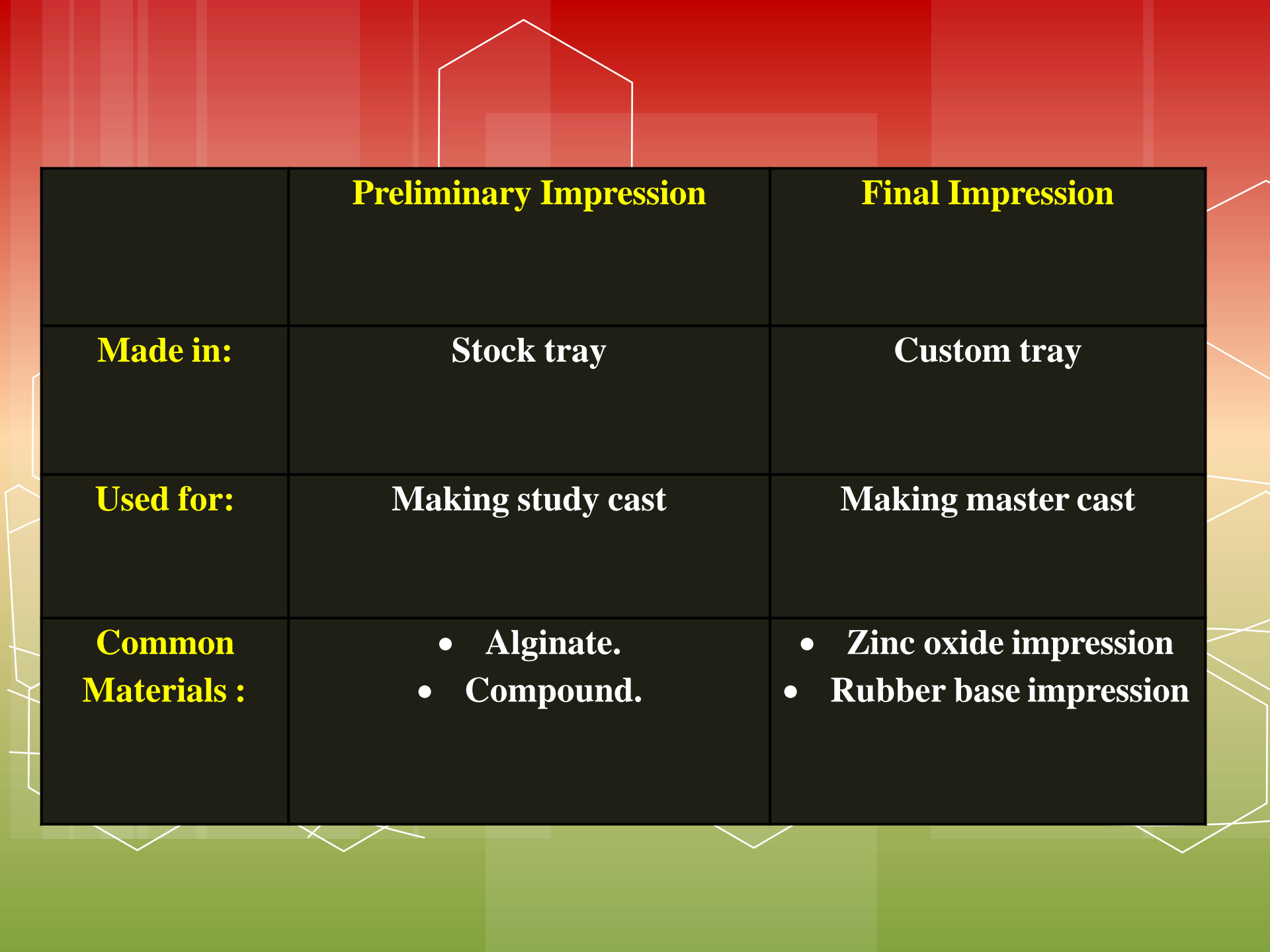
Sprinkle-on technique of resin addition.



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	Study Cast	Master Cast
Other names:	Primary cast Diagnostic cast	Secondary cast Definitive cast
Formed from:	Preliminary impression	Final impression
Used for:	Diagnosis and construction of custom tray	Fabrication of the denture
Common Materials :	Plaster of Paris	Dental stone



	Preliminary Impression	Final Impression
Made in:	Stock tray	Custom tray
Used for:	Making study cast	Making master cast
Common Materials :	<ul style="list-style-type: none">• Alginate.• Compound.	<ul style="list-style-type: none">• Zinc oxide impression• Rubber base impression



References

- Rangarajan.V,Padmanabhan TV, Textbook of Prosthodontics 2013 Elsevier Publishing.
- Zarb G.A, Bolender C.L,Carlsson G.E. Boucher's Prosthodontic Treatment for Edentulous Patients. Mosby Co. St.Louis, 11th edition, 1997