RECORD BASE AND OCCLUSAL RIMS

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1st year MDS

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Record base

Definition

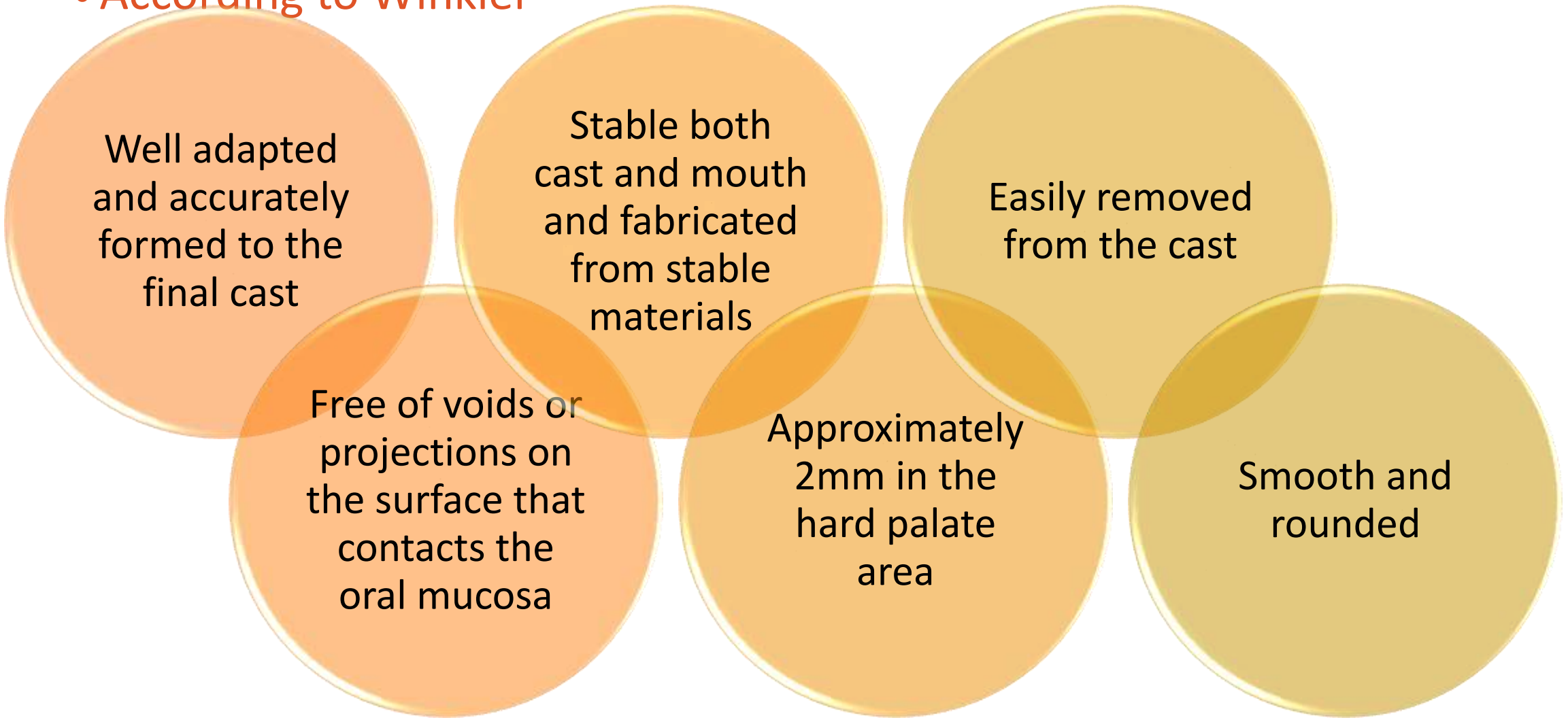
- A rigid, relatively thin layer of wax, shellac, or thermoplastic (heat-, chemically-, or light-activated) polymer adapted over edentulous surfaces of a definitive cast to form a base which, together with an attached occlusion rim made of wax or similar material, serves as the record base

(GPT 9)

- A record base or base plate is a temporary form representing the base of a denture. It is used in recording maxillomandibular relations and in the arrangement of the teeth

Criteria for record base

- According to Winkler



- Elder (1985)

It should adapt to the tissues like a finished denture.

The extent and the shape of the borders should resemble a finished denture.

It should be strong enough to withstand occlusal loads.

It should be dimensionally stable, should be suitable to allow teeth arrangement.

- It should have a pleasant color, which should be contrasting enough to be clearly demark the borders in the oral cavity.
- It should not be very thick. And should be rigid even in thin sections.
- Not react with the tissues.

Materials used for making the Base Plates

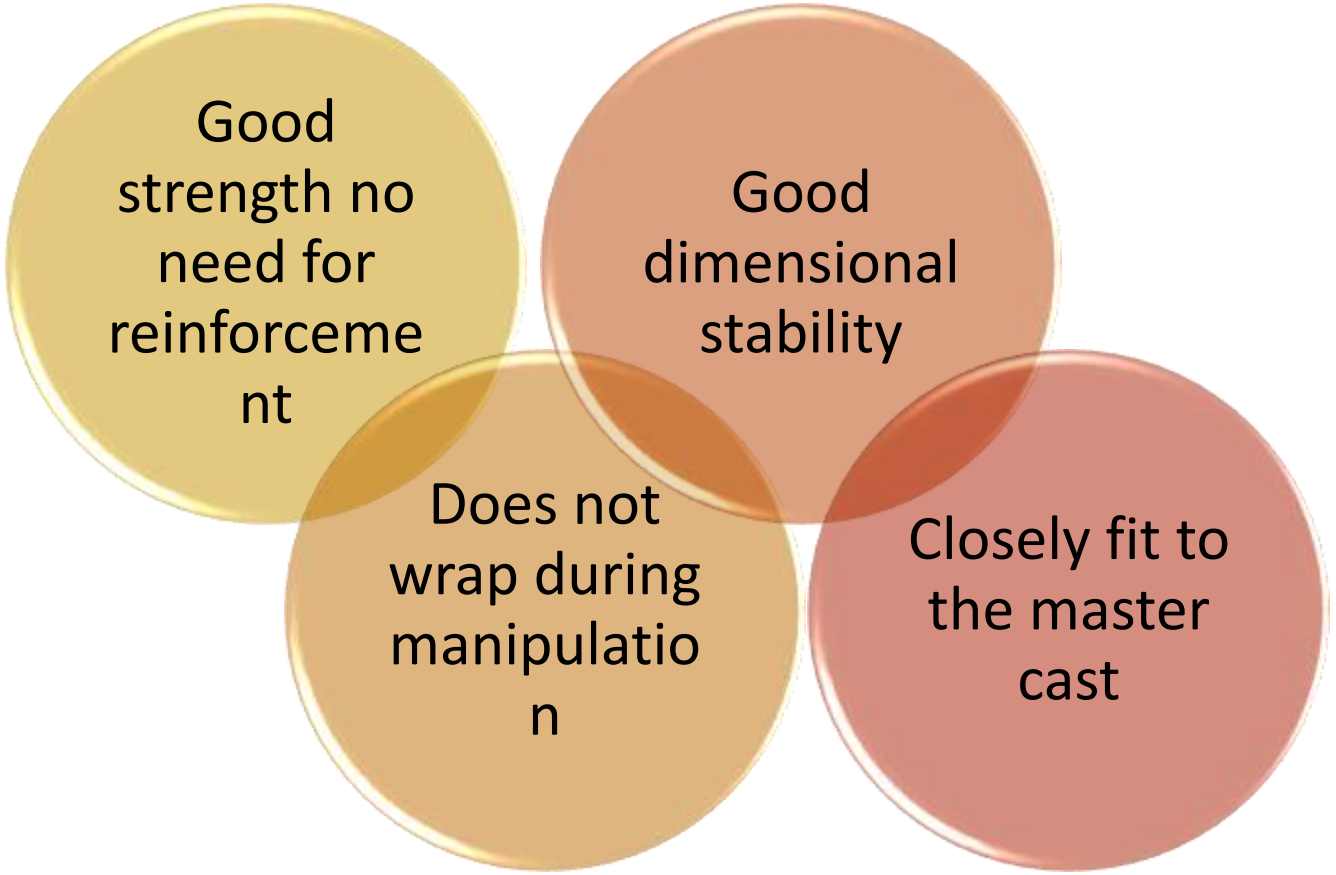
Temporary	Perment
Auto polymerizing resins	Heat cure acrylic resin
Shellac	Gold
Vacuum formed vinyl or polystyrene	Cr – Co alloy
Baseplate wax	Cr – Ni alloy

Auto cure acrylic resin

Composition

Powder	Liquid
Poly methyl methacrylate	Methyl methacrylate
Benzoyl peroxide	Dimethyl – p toluidine
Compounds of mercuric sulfide, cadmium sulfide	Dibutyl phthalate
Zinc or Ti Oxide	Glycol dimethacrylate
Dibutyl phthalate	Hydroquinone
Dyed organic fillers and inorganic materials like glass fibers or beads	

Advantages


Good strength no need for reinforcement
Good dimensional stability
Does not wrap during manipulation
Closely fit to the master cast

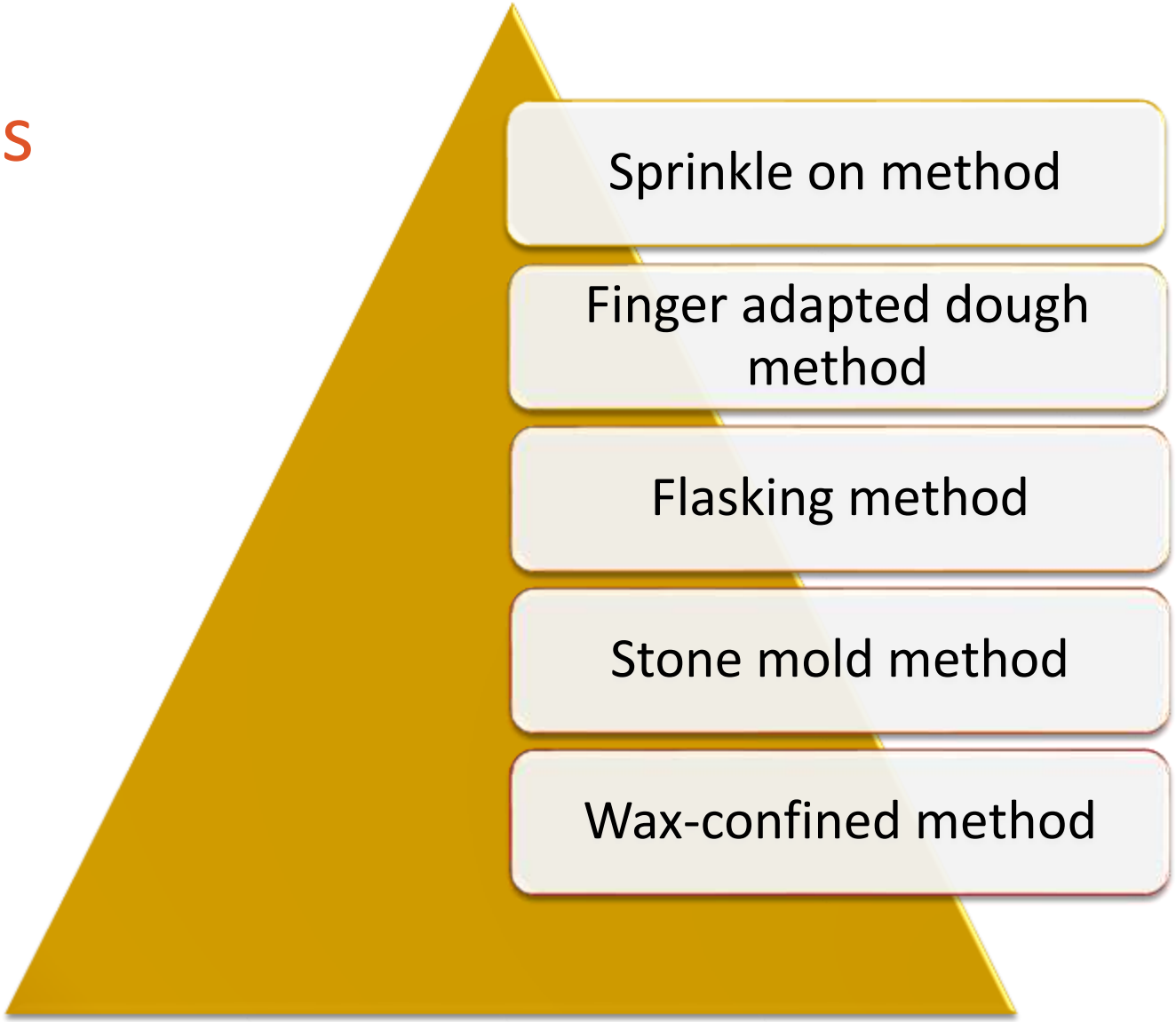
- Disadvantages

Require more time in fabrication

Difficult to control the thickness

Residual monomer can cause irritation to oral tissues

- Methods

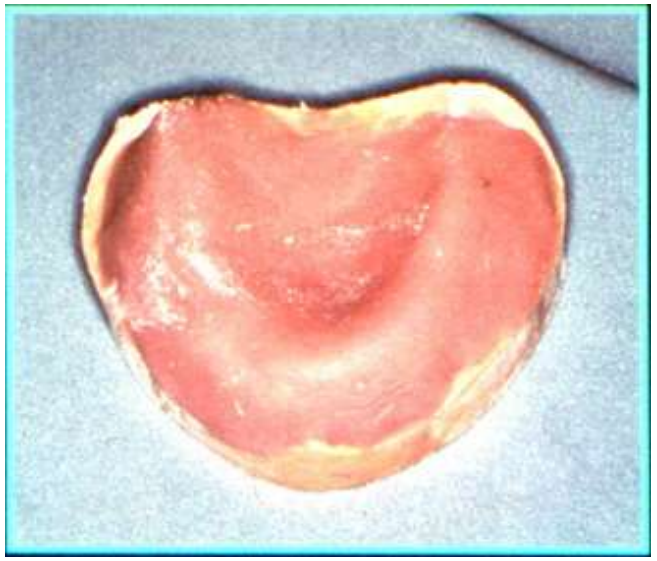

Sprinkle on method
Finger adapted dough method
Flasking method
Stone mold method
Wax-confined method

Sprinkle - on method

- Any undercuts are relieved, and separating medium is applied to the cast.

- Using an eye dropper apply the monomer to the cast, carefully add the polymer (salt and pepper technique) until a sufficient thickness is gained over the entire surface of the cast.

- The processed base is removed from the cast, smoothed, and polished at the borders.



Problem areas

Problem	Probable cause	Solution
Baseplate unable to be removed from cast	Undercuts not properly blocked out	Block out extensive undercuts with wax
Baseplate broken during removal	Cast not coated with un contaminated tinfoil substitute	Coat cast with uncontaminated tinfoil substitute before adding resin
Cast chipped or broken during removal	See above	Make soft – curing resin thick enough , prevent displacement by hard setting resin

Baseplate too thick in some areas and thin in others	Resin flow not controlled by tilting cast during application	• Control resin flow by tilting cast while sprinkle on powder. • Extensive care in shifting powder on prominent cast area. • Use enough powder to prevent flow of mixture
Baseplate porous	Some areas allowed to dry when resin is applied to cast	• Keep all areas moist with monomer to prevent drying when applying resin • Cure baseplate in pressure pot or under inverted plaster bowl

Completed baseplate too flexible	Ratio of soft cure resin in undercut areas to hard setting resin too high	Use only enough soft curing resin to fill undercuts , apply adequate layer of hard setting resin over it
	Wrong liquid or powder used	Use correct powder liquid ratio
	Baseplate removed from cast too soon , polymerization not completed	Allow adequate time for baseplates to set before removing from cast
	Baseplate too thin / ridge flat	Reinforce baseplates for flat ridges by wire embedded in resin

Failure of baseplate to fit cast	Baseplate heated by grinding / polishing	Do not over polish, use slow speed and ample flour of pumice and water while polishing
	Baseplate stored in dry environment	Store completed baseplate in water
	Baseplate removed from cast too soon , polymerization not completed	Allow baseplate to cure completely
	Baseplate warped from prying when removed from cast	Block out undercuts on cast to avoid need for prying baseplate from cast with resultant warping

Finger adapted dough method

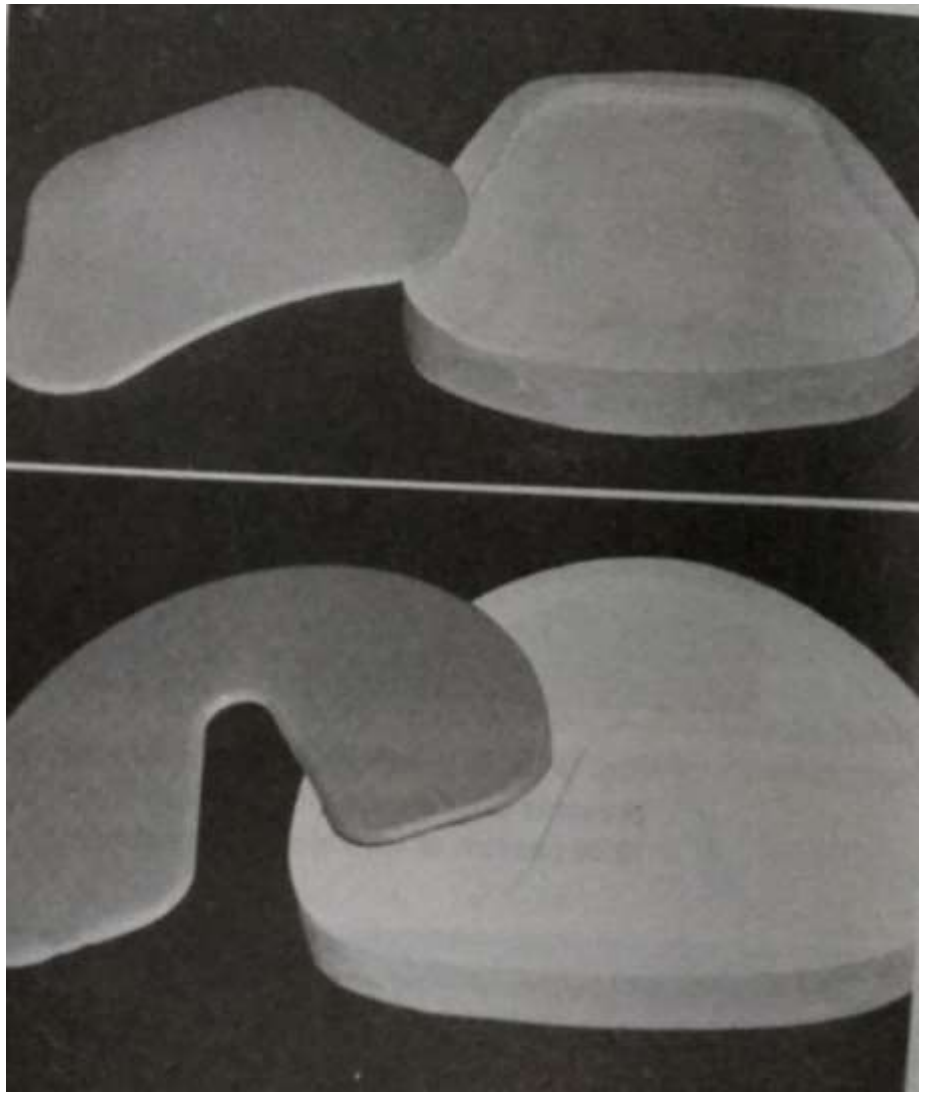
- Any undercuts are relieved, and separating medium is applied to the cast
- The self curing resin is mixed according to manufacturer instructions
- Resin baseplate should be approximately 2mm thickness
- Make a convenient mold by impressing a double thickness shellac baseplate into a mix of artifical stone

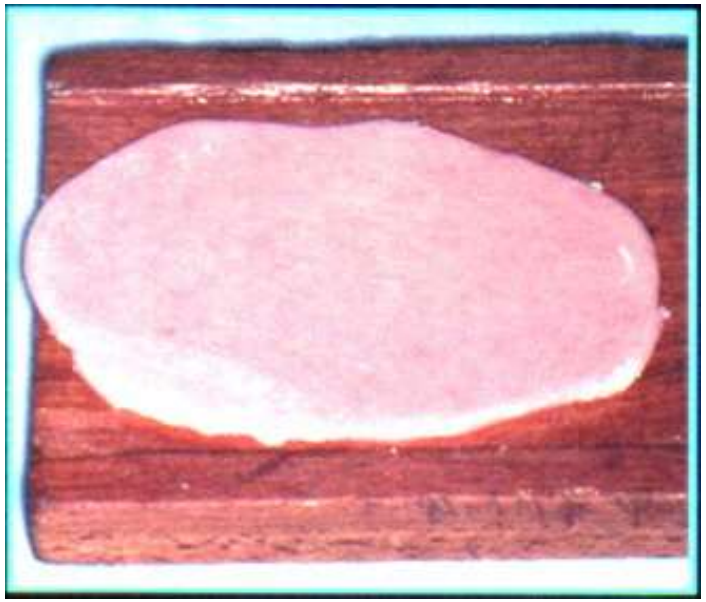
After the stone has set remove the baseplate and use the resultant mold to shape a resin sheet of uniform thickness into a baseplate

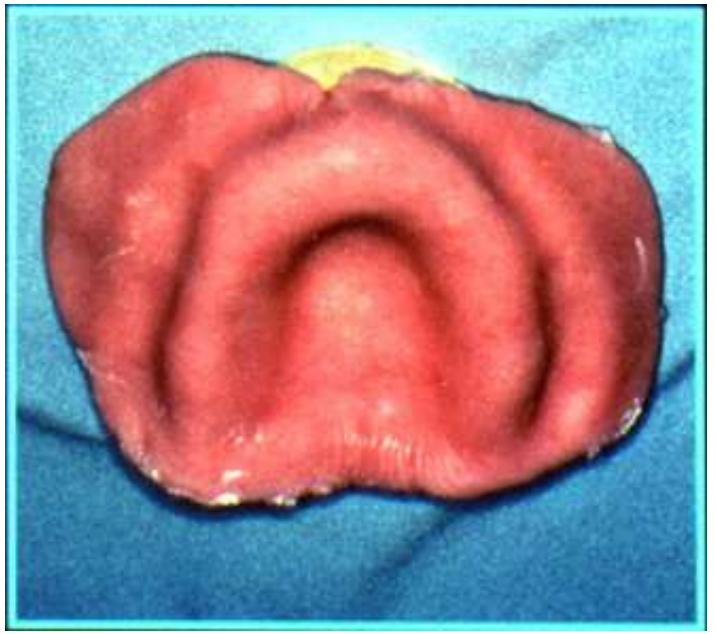
Another procedure is to roll the dough into a sheet of the desired thickness, trim it to the shape of a baseplate, and adapt it into cast

It is allowed to polymerized completely

The processed base is removed from the cast, smoothed, and polished at the borders







Problem	Cause	Solution
Failure of baseplate to fit cast	Resin beyond dough stage before finger adaptation started	Adapt resin when dough stage
	Finger adaptation of resin discontinued too early	Continue finger adaptation of resin until it no longer springs away from cast
Baseplate too thin in some areas and too thick in others	Convex areas too thin as result of finger pressure	Do not place too much pressure over convex ridge areas when adapting resin
	Resin not rolled to desired thickness before applying to cast	Roll resin into sheets of proper thickness before adapting o cast

Stone mold method

One layer of baseplate wax is adapted to cast and trimmed to size

Index indentations are placed at 4 widely separated points on the land area of the cast

Separating medium is applied on the land area of stone cast

Cast and wax pattern are boxed with boxing wax before pouring stone

Boxing wax should extend approximately 15mm above wax pattern to allow stone to be thick enough to prevent breakage

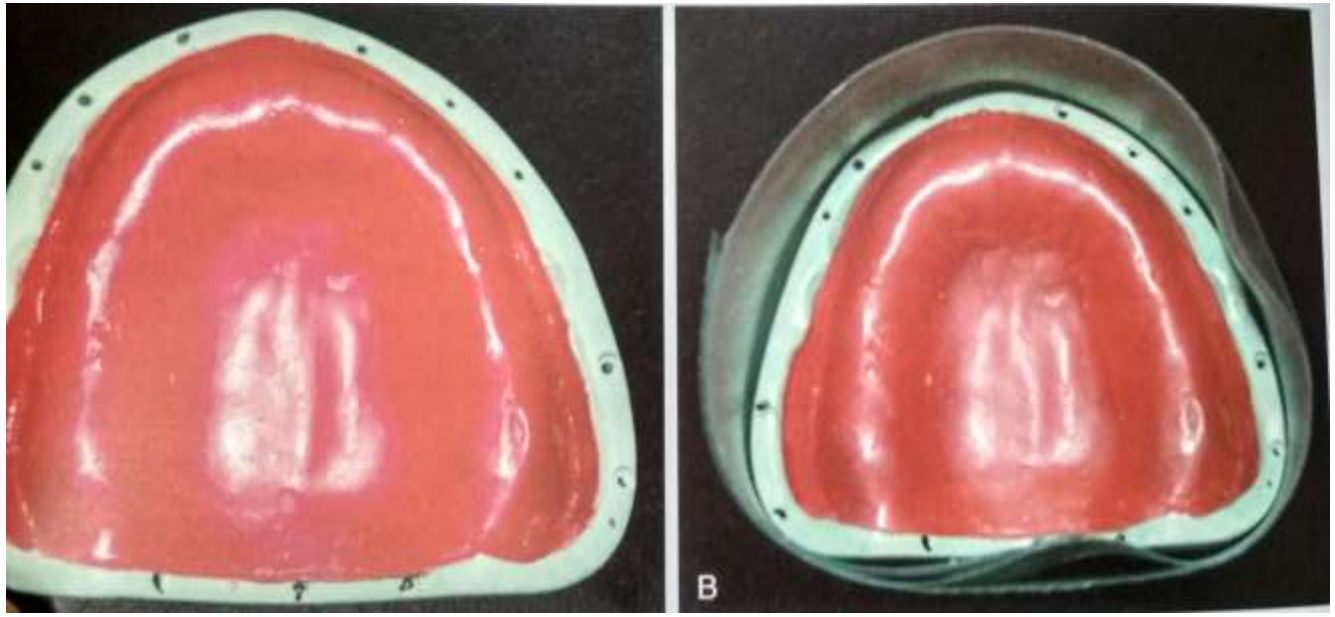
After setting stone index is separated from cast

Wax pattern removed from cast

Tinfoil substitute is painted onto cast and stone index

Cast undercuts are blocked out with wax

Auto polymerizing resin is mixed and applied with spatula, place resin into peripheral roll to prevent voids


B


Index
Cast
C

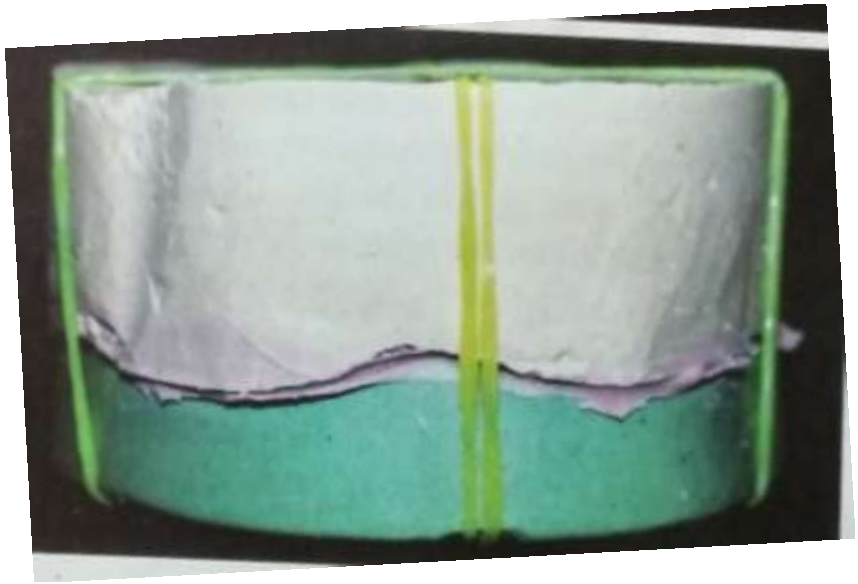

D

Cast and index is assembled and finger pressure is used to express excess resin

Heavy rubber bands placed around assembled index and cast assure maintenance of pressure while curing

Curing can be accomplished in pressure pot at 20 psi for 20 min / enclosed resin can be benched cured

After curing cast and index are separated baseplate are removed trimed and polished

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Problem	Cause	Solution
Breaking of stone index when pressure applied to close mold	Stone index too thin	Make stone index at least 13 – 15mm thick
	Stone not completely set before pressure applied	Let stone set before resin packing
	Improper W/P ratio used when mixing stone for index	Use proper W/P ratio
	Resin too stiff before attempting to close mold	Pack resin at dough stage

Problem	Cause	Solution
Voids in completed baseplate	Insufficient resin for filling mold	Mix sufficient resin for overfill mold slightly
Baseplate too thick	Mold not completely closed	Pack mold with resin at proper stage to assure closing of mold

Wax confined method

- Introduced by LaVere and Freda (1974)
- Block out all undercut and Apply separating medium
- Adapt one layer of baseplate wax over the cast to make a wax form/ tray. Trim the wax 2mm short of the borders of the cast

- Resin is mixed and placed onto cast with small spatula and rest of resin mix is placed into wax tray
- Wax tray and resin are placed over cast and settled into place gently to produce baseplate thickness of approximately 2mm
- Cured under pressure pot, finished and polished
- Completed baseplate have wax exterior surface that facilitates addition of wax occlusal rim and later setting of teeth


A


B

Problem	Cause	Solution
Resultant baseplate too thin	Wax ray with resin seated too firmly on cast	Seat wax tray with resin so as to form layer of resin approximately 1 – 2 mm thick
Baseplate too thick	Wax tray improperly seated on cast	Same as above
Resin on exterior wax surface of baseplate	Resin inadvertently placed on exterior wax when adapting borders	Carefully adapt and smooth resin borders to keep exterior wax free of resin

Shellac base plate

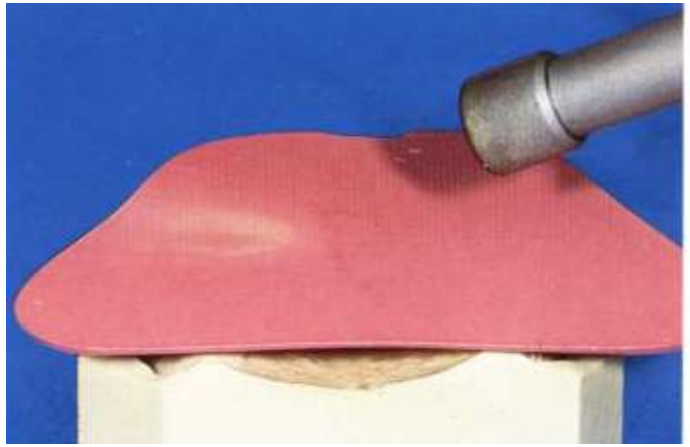
Advantages:

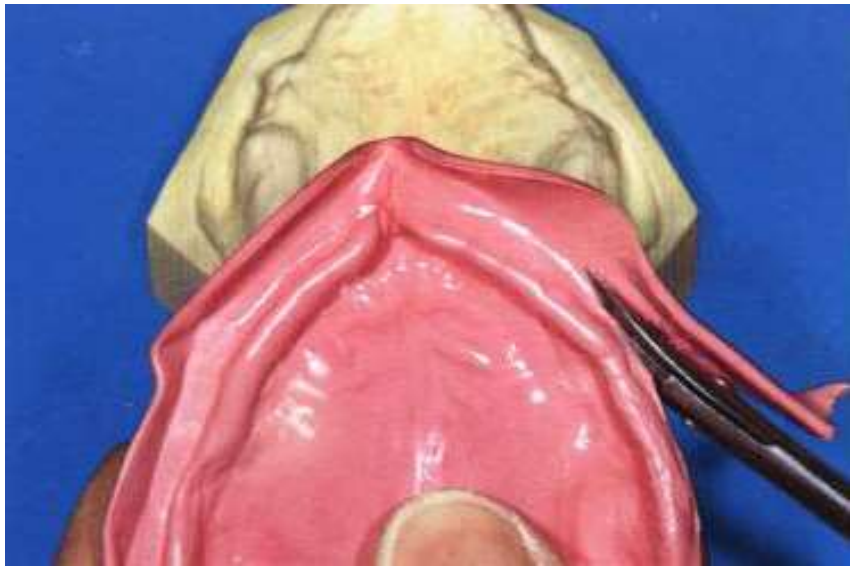
- They will adapt to intimate contact with the master cast.
- Require short time for construction.
- Inexpensive.
- Can be corrected easily by reheating and readapting to the master cast.
- Uniform thickness.

Disadvantages :

- They warp, do not fit accurately, distort easily, lack rigidity, become brittle and break, and will not permit polishing of the borders

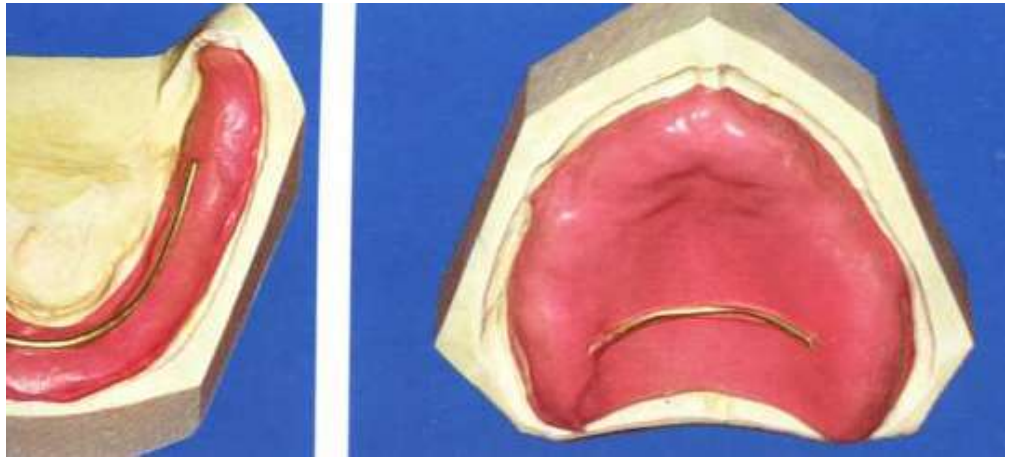
- Any undercuts are relieved.
- The shellac record base forms are manufactured in the shapes of the maxillary and mandibular arches.
- The forms are softened with an open flame and molded to the cast with an instrument or the fingers.
- While the material is in a softened state, the excess is removed with scissors.
- After hardening, the borders are smoothed but as a rule will not take a polish.





Stabilized shellac baseplates

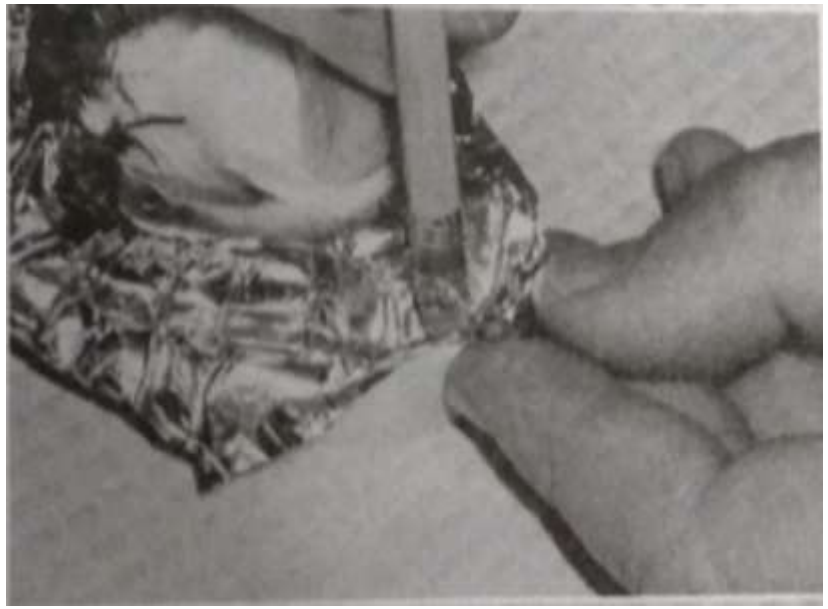
- Paperclip wire is adapted to cast
- Mandibular reinforcing wire – lingual to crest of alveolar ridge
- Maxilla – anterior to posterior border



Zinc oxide eugenol impression paste

- Undercut blocked before adapting tinfoil
- Tinfoil adapted cast with cotton burnisher or pencil rubber
- Zinc oxide impression paste mixed according to manufactures instructions

- Impression material is placed in shellac baseplate
- Vent hole is placed on the palatal aspect of maxillary baseplate to vent excess material
- Baseplate with impression material carefully placed over tinfoil adapted cast
- Before setting material excess tinfoil reflected back onto baseplate to make borders of proper thickness




B


C


D

Problem	Cause	Solution
Baseplate unable to removed from cast	Cast not wet or treated with talc before baseplate adapted	Wet cast in slurry water or coat with talc before adapting baseplate
	Shellac baseplate stuck to cast	Do not overheat shellac baseplate
	Undercuts not blocked out adequately on cast before adapting baseplate	Do not adapt baseplate into undercuts or soften before removing from undercuts
Completed baseplate too flexible	Wire reinforcement for stabilization not used	Reinforce shellac baseplate with wire or stabilize it with more material

Completed baseplate too thick	Layer of stabilizing material too thick	Apply finger pressure when adapting baseplate and stabilize material to achieve correct thickness of stabilizer
Void in stabilizing materials	Insufficient impression material or inadequate pressure when forming stabilizing liner	Use enough impression material to preclude formation of voids
Completed baseplate unable to fit cast	Baseplate warped by heat	Readapt baseplate by warming
	Baseplate warped by stabilizing material	Remake baseplate

Thermoplastic resin baseplates and vacuum – adapted resin baseplates

- Any undercuts are relieved, and separating medium is applied to the cast.
- A sheet of base plate material placed over the cast and inserted in the vaccum chamber.
- Electric heater switched to heat the sheet.
- Turn on the vacuum. The sheet will adapt closely to the cast.
- Switch of the heater and allow the record base to cool.
- Remove the record base and cut the excess material.

Advantages

- Simple technique
- Minimal amount of time required
- Excellent control of thickness
- Choice for variety of materials for baseplate, splints, trays, coping, and mouth guards
- Satisfactory rigidity
- Well adapted to cast

Disadvantages

- Expensive
- Difficult to form smooth rounded borders

Problem	Cause	Solution
Baseplate unable to removed from cast	Deep undercuts not blocked out	Block out deep undercuts
Cast chipped on removal of baseplate	Delicate cast undercuts are not blocked out	Block out small folds and creases in cast to preclude bridging

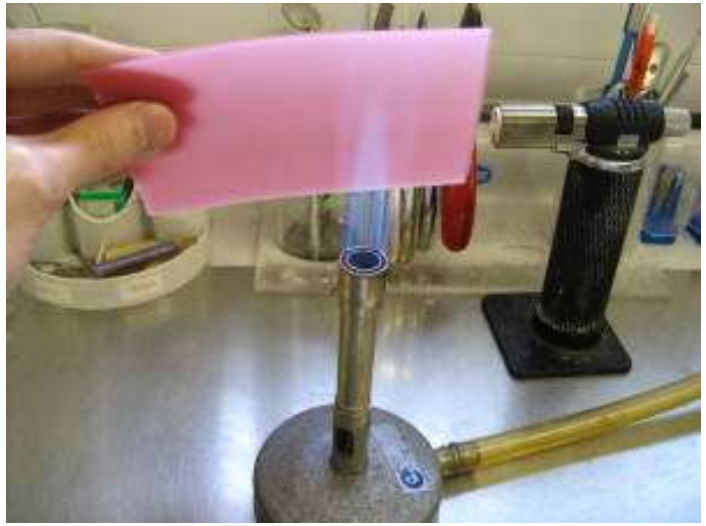
Baseplate borders not adapted into vestibular reflections of cast	Vestibular reflections of cast bridged by baseplate material	Fill in borders with wax or autopolymerizing resin for correct thickness and adaption
Baseplate not intimately adapted to cast	Resin not hot enough when adaption begun	Allow resin to develop adequate sag before startling adaption
	Vacuum molding period too short	Continue vacuum adaption for 30 s after discontinuing heating

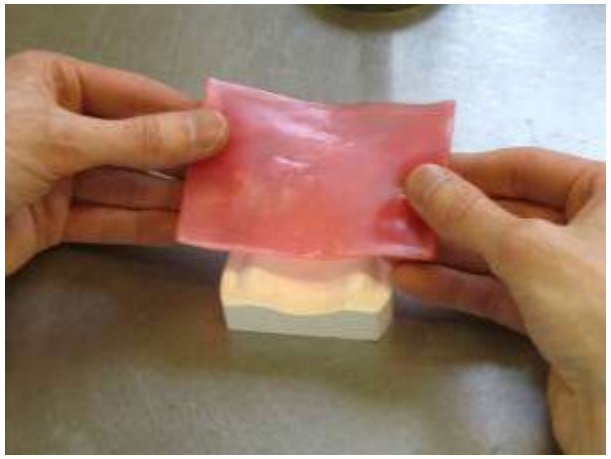
Wax baseplate

- Composition

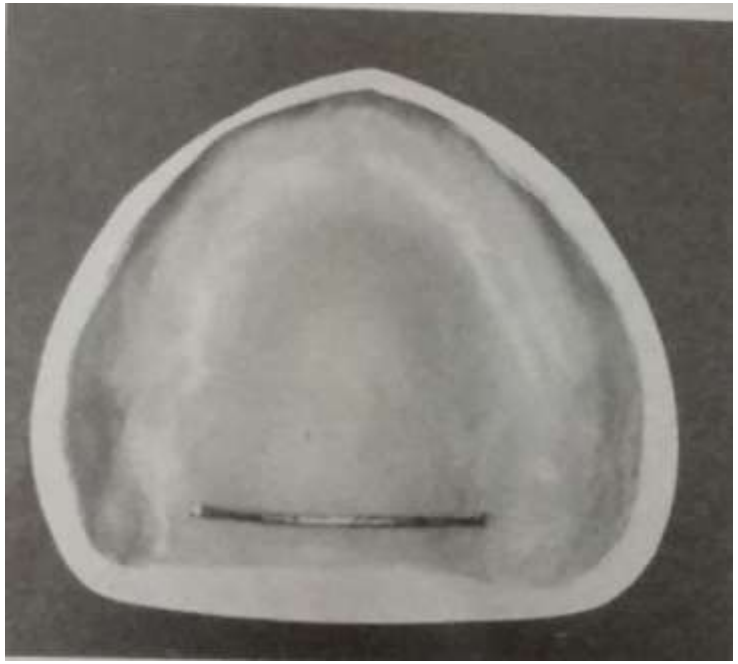
Component	Percentage
Paraffin/ ceresin	80.0%
Beeswax	12.0%
Carnauba	2.5%
Natural/ synthetic resins	3.0%
Microcrystalline	2.5%

- Wet the cast
- Soften the base plate wax over the flame and adapt it to master cast
- Remove the excess wax and make the borders round and smooth.





- Reinforce wire can placed approximately 3mm anterior to posterior extension of baseplate
- It is embedded in wax to improve rigidity



Problem	Cause	Solution
Failure of wax baseplate to fit cast	Wax not adapted properly	Adapt wax to achieve intimate contact
	Wire reinforcement not used	Use wire reinforcement to improve dimensional stability and rigidity
	Baseplate warped after completion	Readapt warped baseplate manually

Fluid resin baseplate

Described by Browning in 1973

Using a fluid resin system to make processed bases in a reversible hydrocolloid mold.

Advantages

Rapid retrieval

Disadvantage

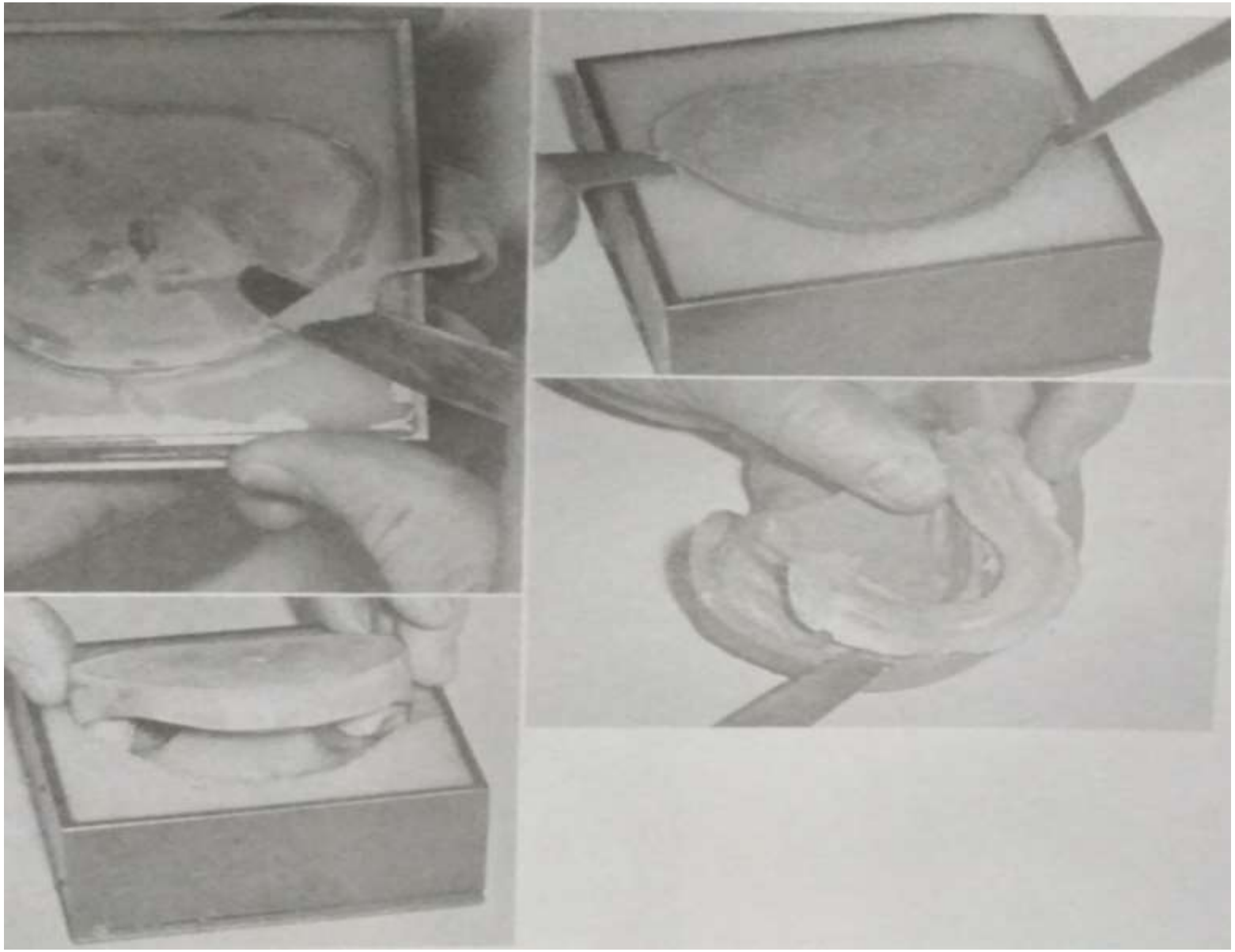
Time consuming

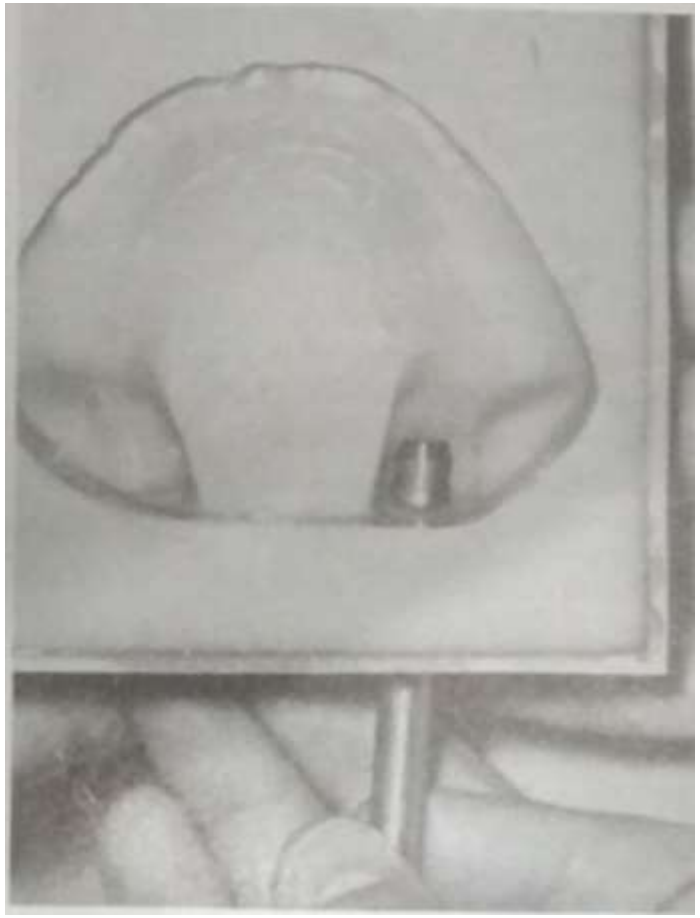
Additional material required

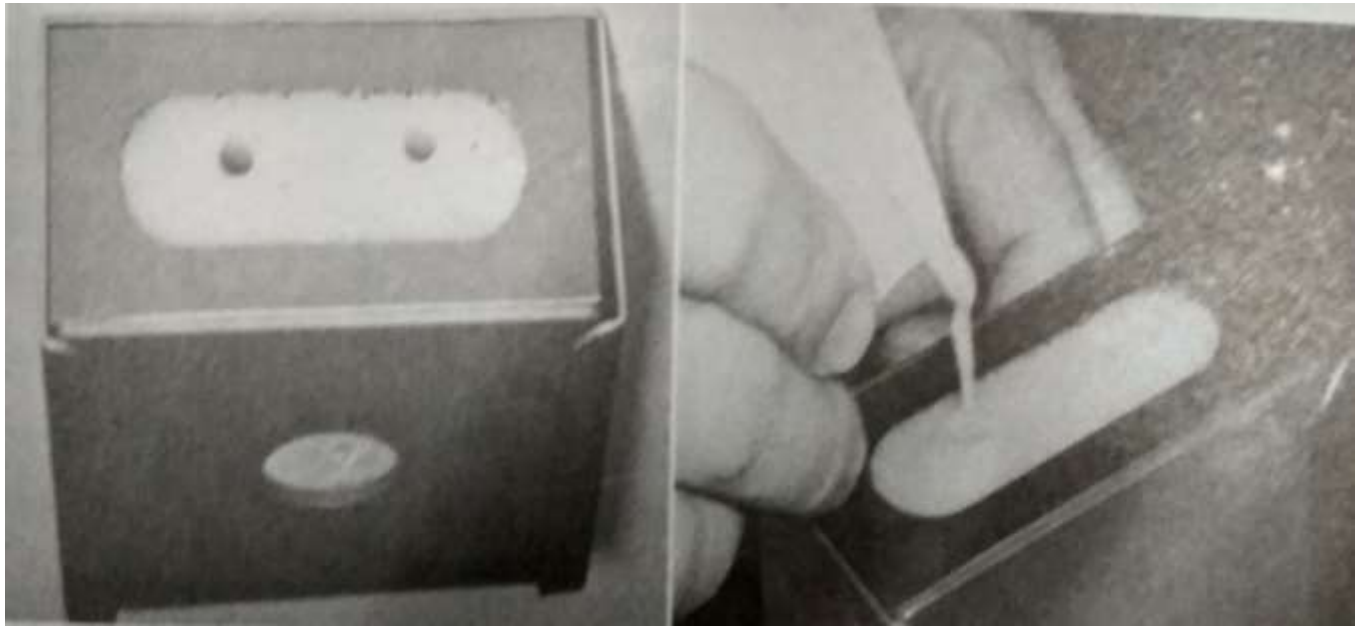
Wax the pattern on the master cast. place a finish line llel to and 3 – 4mm away from the border extension when making a permanent base instead of a baseplate

Invest the waxed up master cast in hydrocolloid material . After the material set remove the cast and place the sprue holes.

Mix the fluid resin and fill it through the sprue. Recover the baseplate after curing







Problem	Cause	Solution
Baseplate incomplete or voids present	Insufficient resin mixed	Mix enough resin
	Sprue too small	Use large diameter sprues
	Sprues improperly placed	Place sprues to prevent entrapment of air in upper recesses of mold
	Resin pored into both sprues	Pour resin into one sprue only
	Pouring delayed and resin set	Pour resin immediately
	Flask not rocked during pouring	Rock flask gently during pouring to express air

Heat cured compression molded resin baseplate

- Do not block out cast undercuts
- A wax pattern is constructed over the cast with a thickness and contour desired for complete denture.
- The cast and pattern are flasked, the wax is eliminated, acrylic resin is packed and heat processed.
- The processed base is removed from the cast, smoothed, and polished at the borders.

Problem	Cause	Solution
Baseplate broken on removal from cast	Improper prying to remove baseplate from cast	Section cast with saw to remove baseplate
	Cast not painted with tinfoil substitute/ tinfoil substitute contaminated	Paint cast with uncontaminated tinfoil substitute before packing
Baseplate too flexible	Wax pattern too thin	Make wax pattern thick enough to provide adequately quite rigidity

Metal bases

The metallic portion of a denture base, forming a part of all the basal surface of the denture. It serves as a base for the attachment of the plastic (resin) part of the denture and teeth

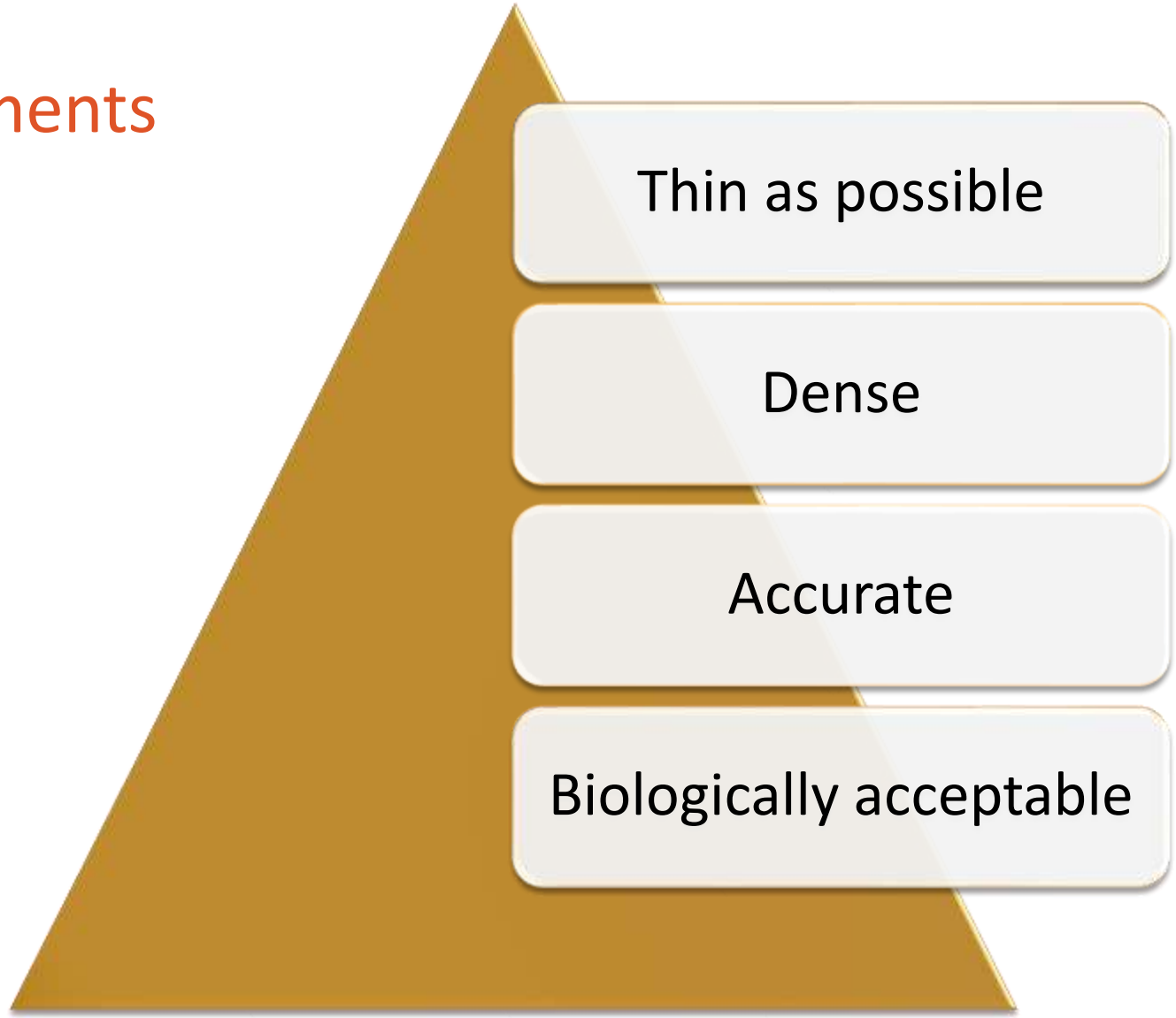
Advantages

- Prevention of acrylic warpage
- More strength
- Increased accuracy
- Less tissue changes under the base
- Less porosity
- Thermal conductivity
- Less deformation in function

Disadvantages

- Cost
- Difficulty during relining
- Time consuming construction

- Requirements



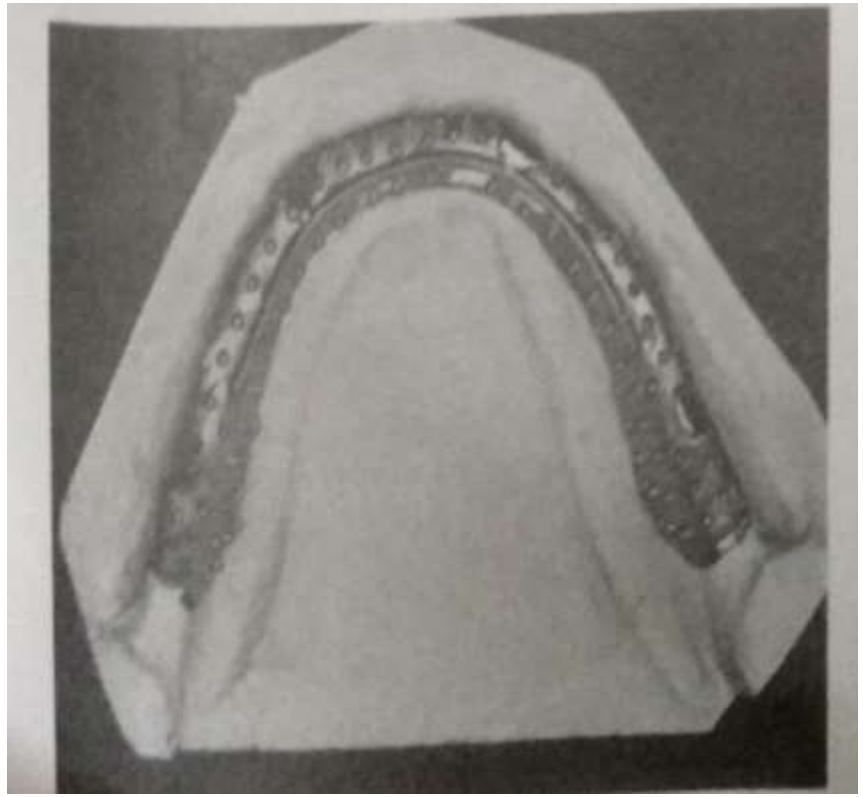
Design principles

Maxilla

palate
Palate and ridge crest
Entire denture bearing area

Mandible

Crest of the ridge coverage
Complete coverage



- Design principles

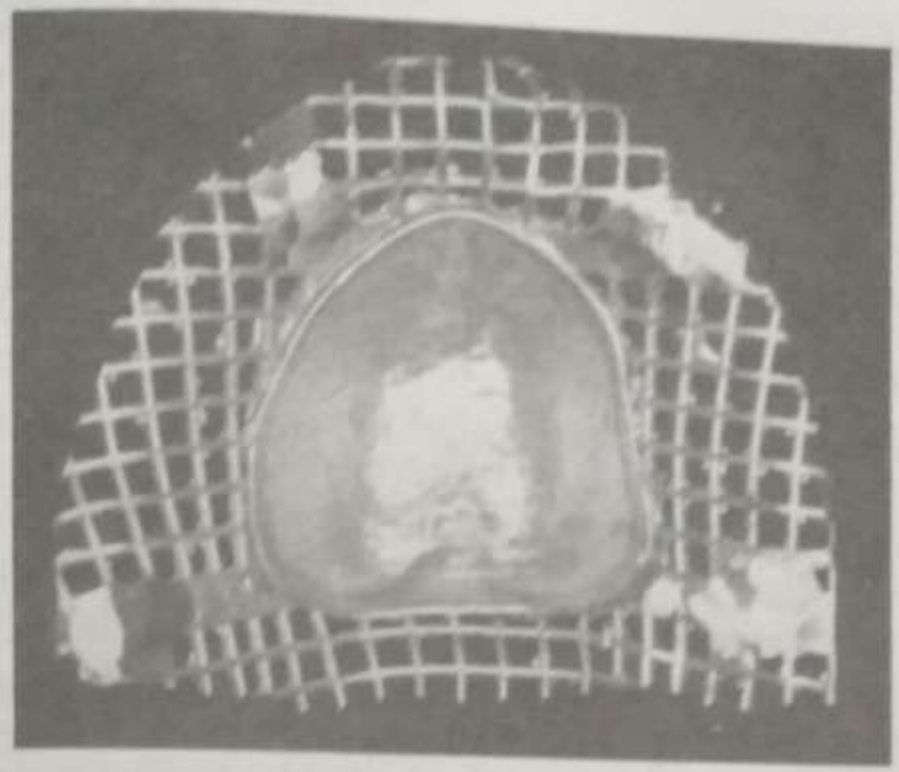


Fig. 17-1. Maxillary base covering only center palate area with relieved retention mesh. This design has been used to aid patient with history of repeated midline fractures of maxillary denture. It is inferior design because it places thin, porous resin over ridge crest.

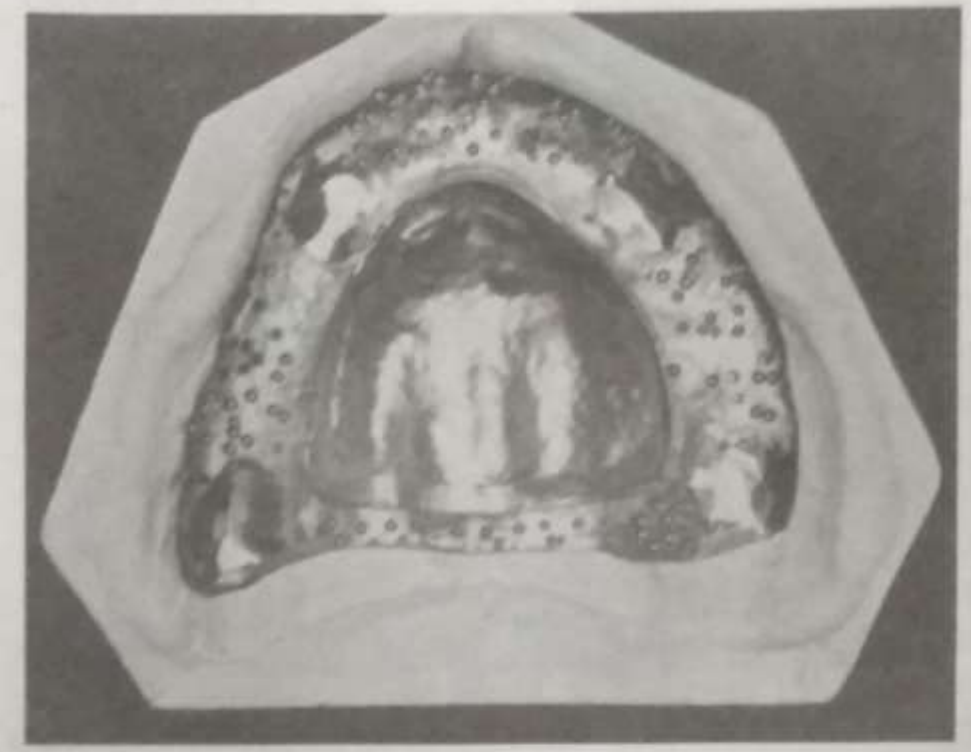


Fig. 17-2. Maxillary coverage of palate and ridge crest. Posterior palatal seal area will be in resin to facilitate adjustments.

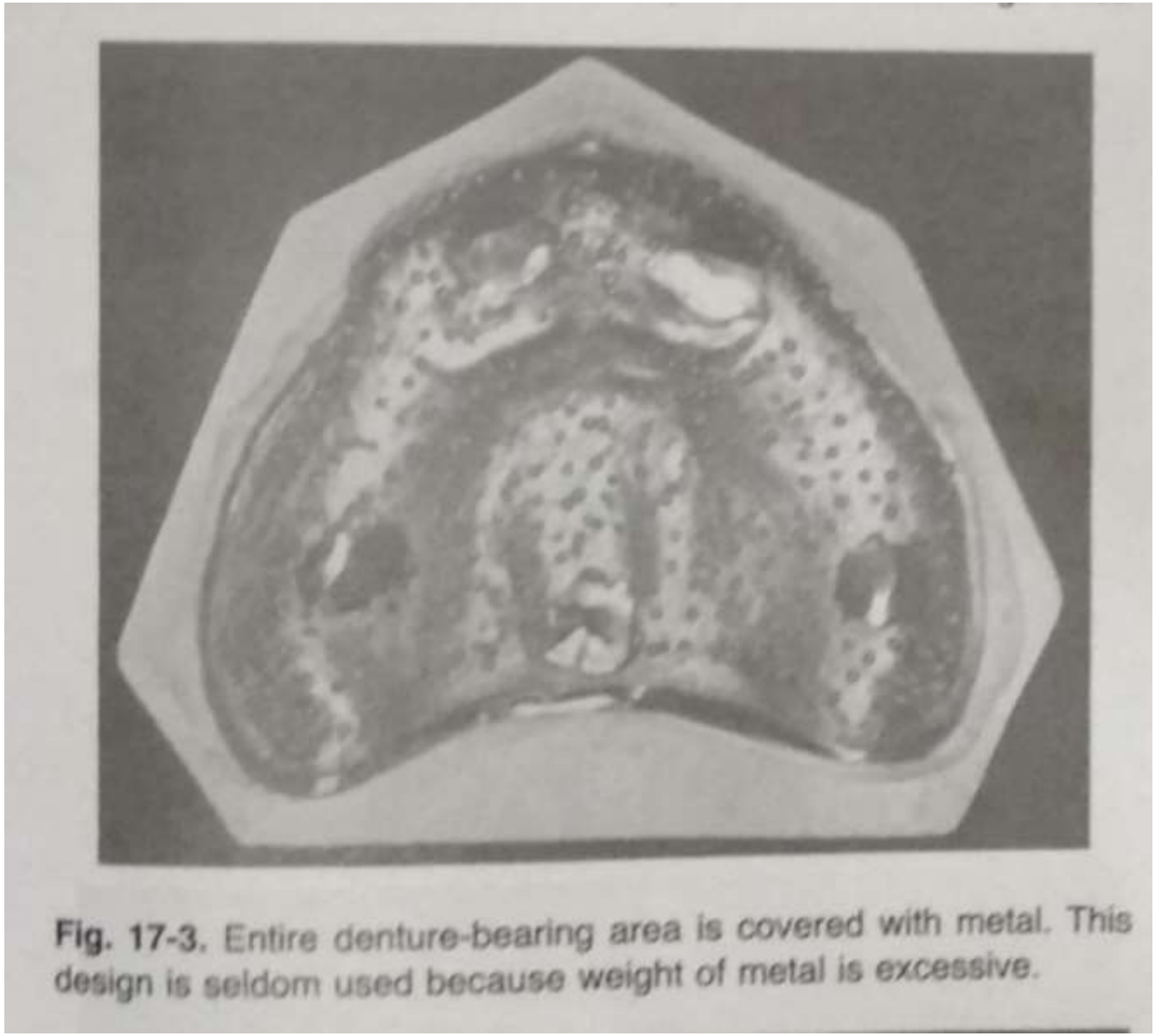


Fig. 17-3. Entire denture-bearing area is covered with metal. This design is seldom used because weight of metal is excessive.

Retentive features

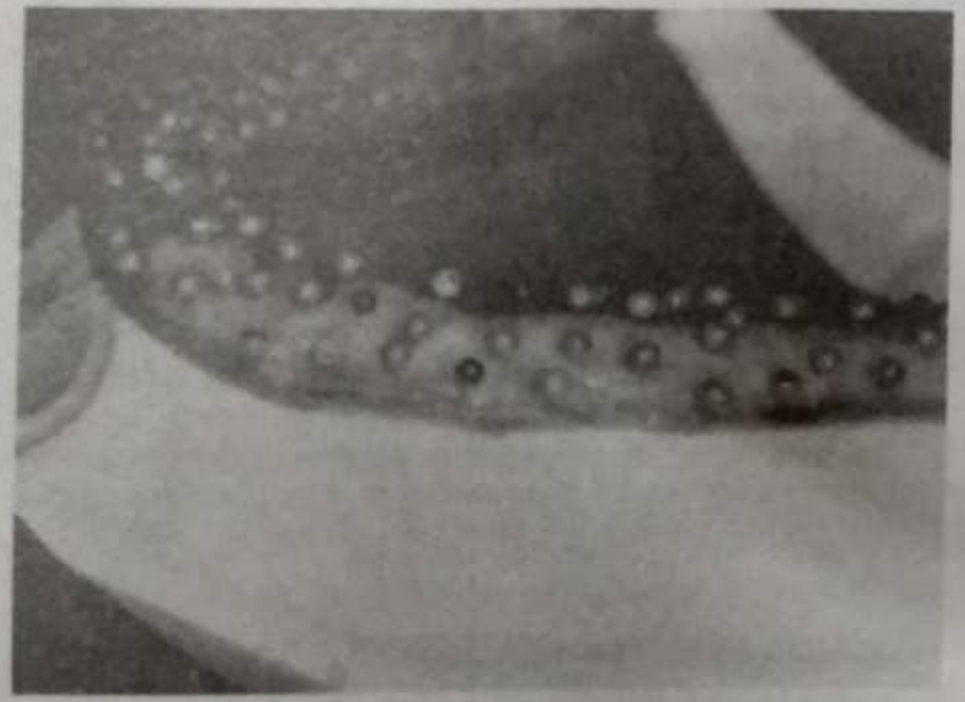


Fig. 17-8. Retentive beads provide excellent resin retention if they are No. 14 or larger and space between them is twice their diameter.

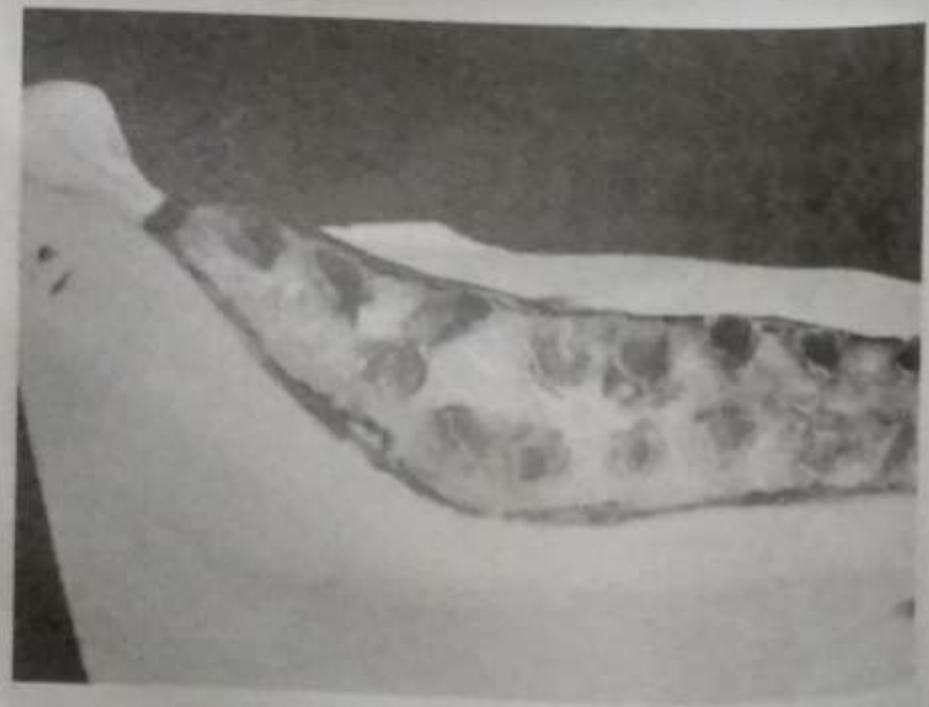


Fig. 17-9. Nailhead retention is made by blunting piece of 18-gauge wax and attaching it to stipple sheet with tacky liquid.

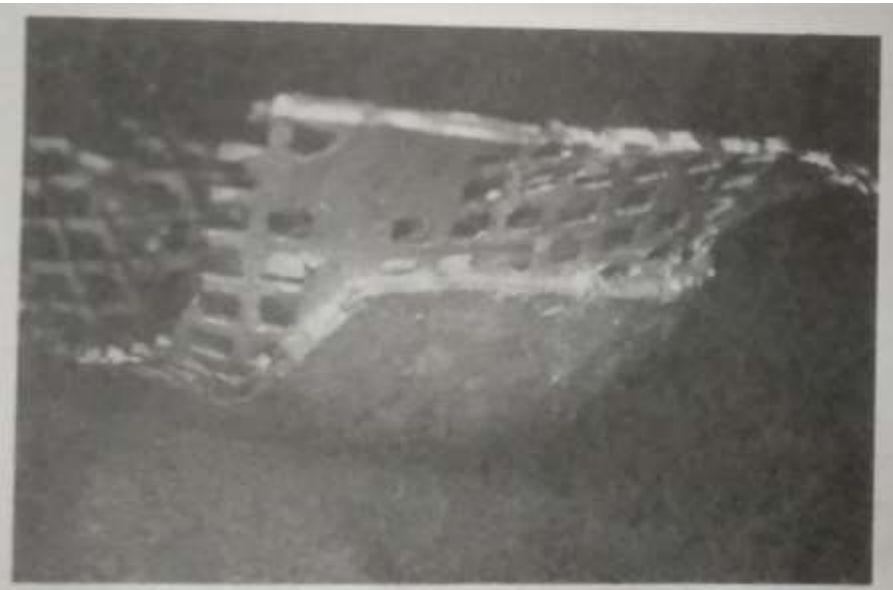
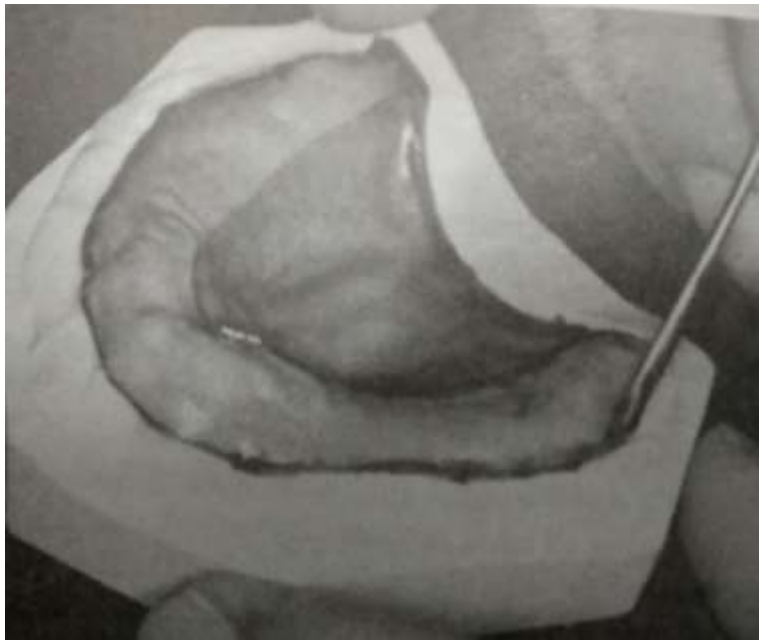
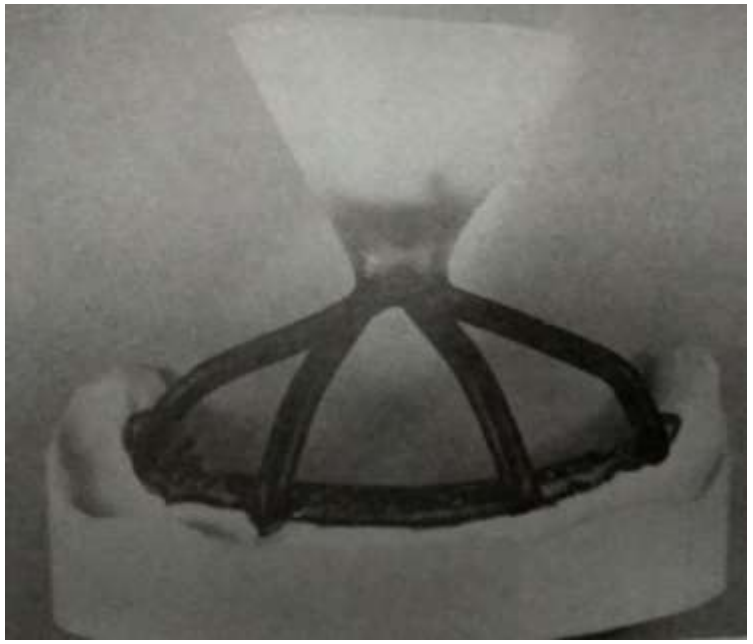


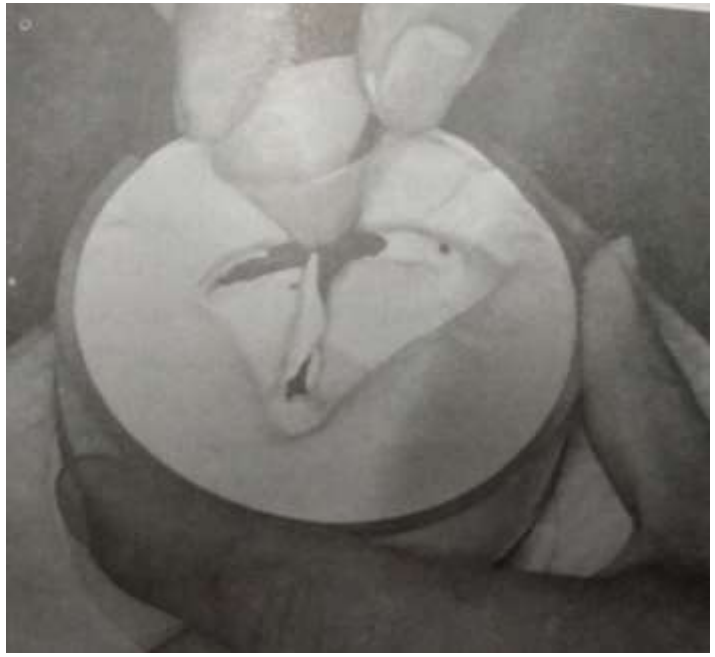
Fig. 17-7. Relieved retention mesh should allow at least 1 mm for resin beneath it.

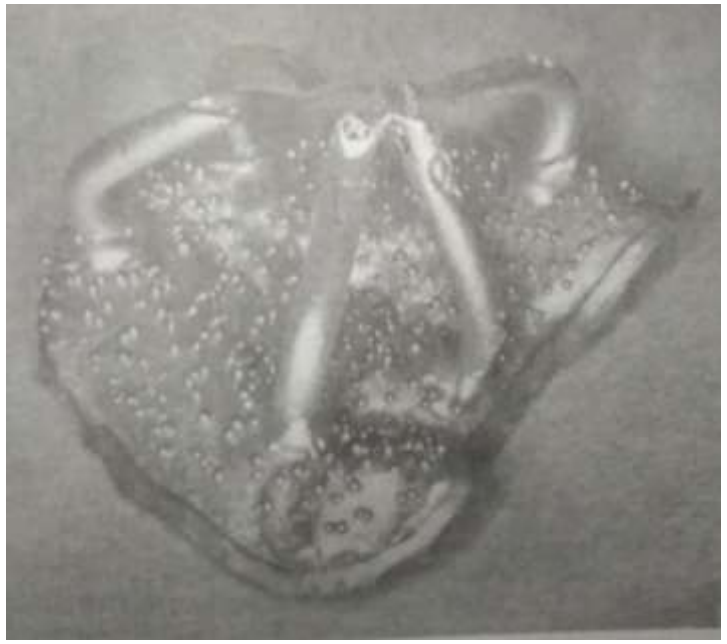
Fig. 17-10. Retentive loops made of 18- or 20-gauge round wax can be adapted to base wax-up for effective retention. They have disadvantage of intruding into denture space more than bead or nailhead retention.

Fabrication procedure

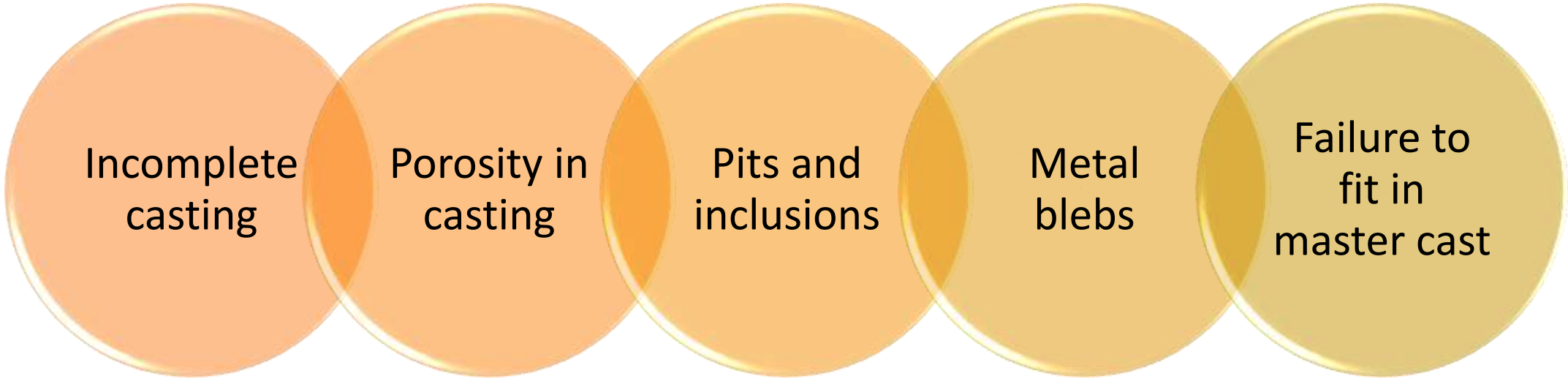








Problems


Incomplete casting
Porosity in casting
Pits and inclusions
Metal blebs
Failure to fit in master cast

Occlusal rims

Definition :

- Occluding surfaces fabricated on interim or final denture bases for the purpose of making maxillomandibular relation records and arranging teeth; RECORD RIM, OCCLUSION RIM

(GPT 9)

- It contains maxillomandibular relationship, midline, high and low lip line, cuspid line, amount of horizontal and vertical overlap, support for lips and cheeks

Requirements :

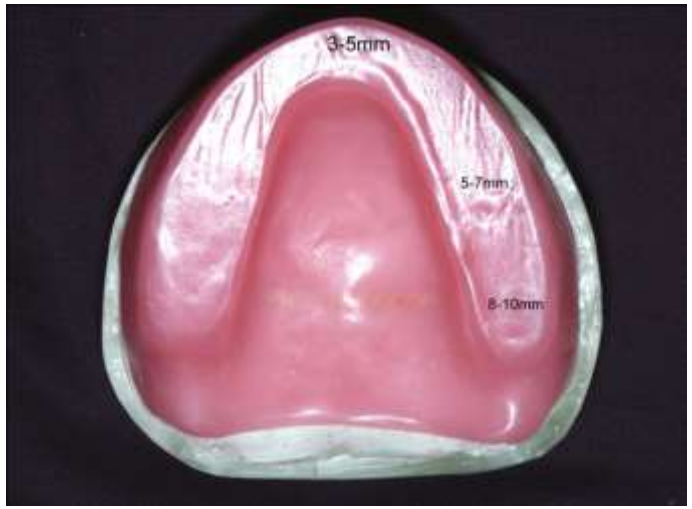
- The position should be in the anticipated position of the artificial teeth.
- It must be securely attached to the base.
- The occlusal surface must be smooth and flat.
- It should be contoured to support the lip and cheeks accurately.
- All the surfaces should be smooth

Wax Rim

- Wax rims are smooth and have a flat occlusal surface. They are about as wide buccolingually as denture teeth – wider in the posterior, narrower in the anterior
- The occlusal rim must be centered buccallingually over and parallel to the residual ridge crest.
- The anterior portion of the maxillary occlusal rim is labially oriented

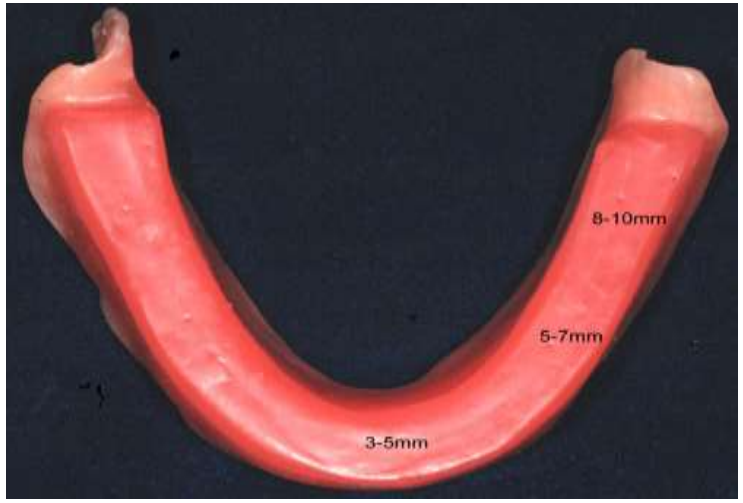
Maxillary arch

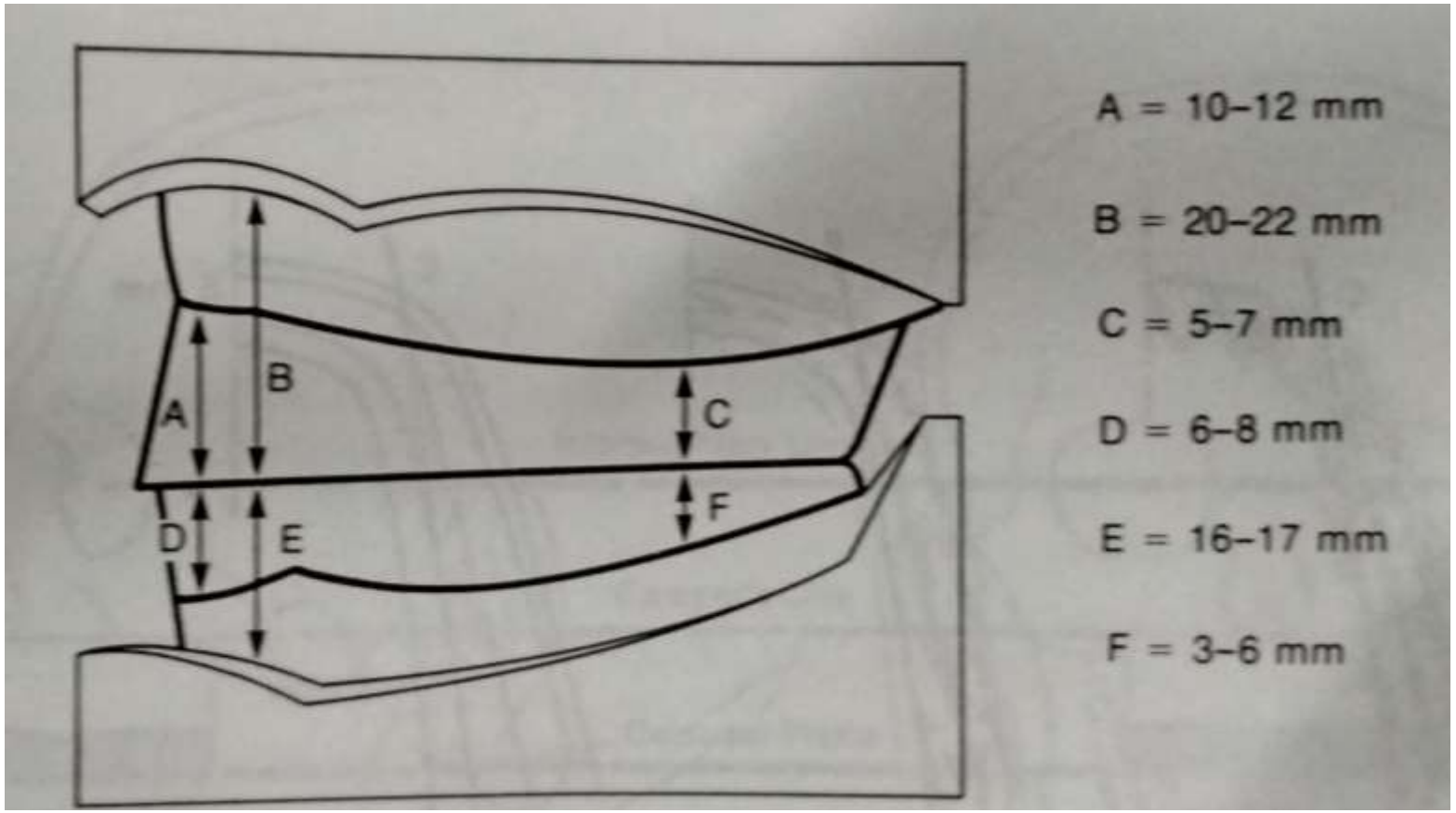
- The anterior wax rim height is 20-22mm
- The posterior wax rim height is 16-18mm.
- The width of the anterior rim is approximately 3- 5mm.
- The width of the occlusal rim in the posterior region is approximately 8-10mm.
- The occlusal rim is properly sealed to the baseplate without any voids.



Mandibular arch

- The anterior wax rim height is 16-17mm
- The posterior wax rim height covers 2/3 of the retromolar pad.
- The width of the anterior rim is approximately 3- 5mm.
- The width of the occlusal rim in the posterior region is approximately 8-10mm.
- The occlusal rim is properly sealed to the baseplate without any voids.




A
B
C
D
E
F
A = 10–12 mm
B = 20–22 mm
C = 5–7 mm
D = 6–8 mm
E = 16–17 mm
F = 3–6 mm

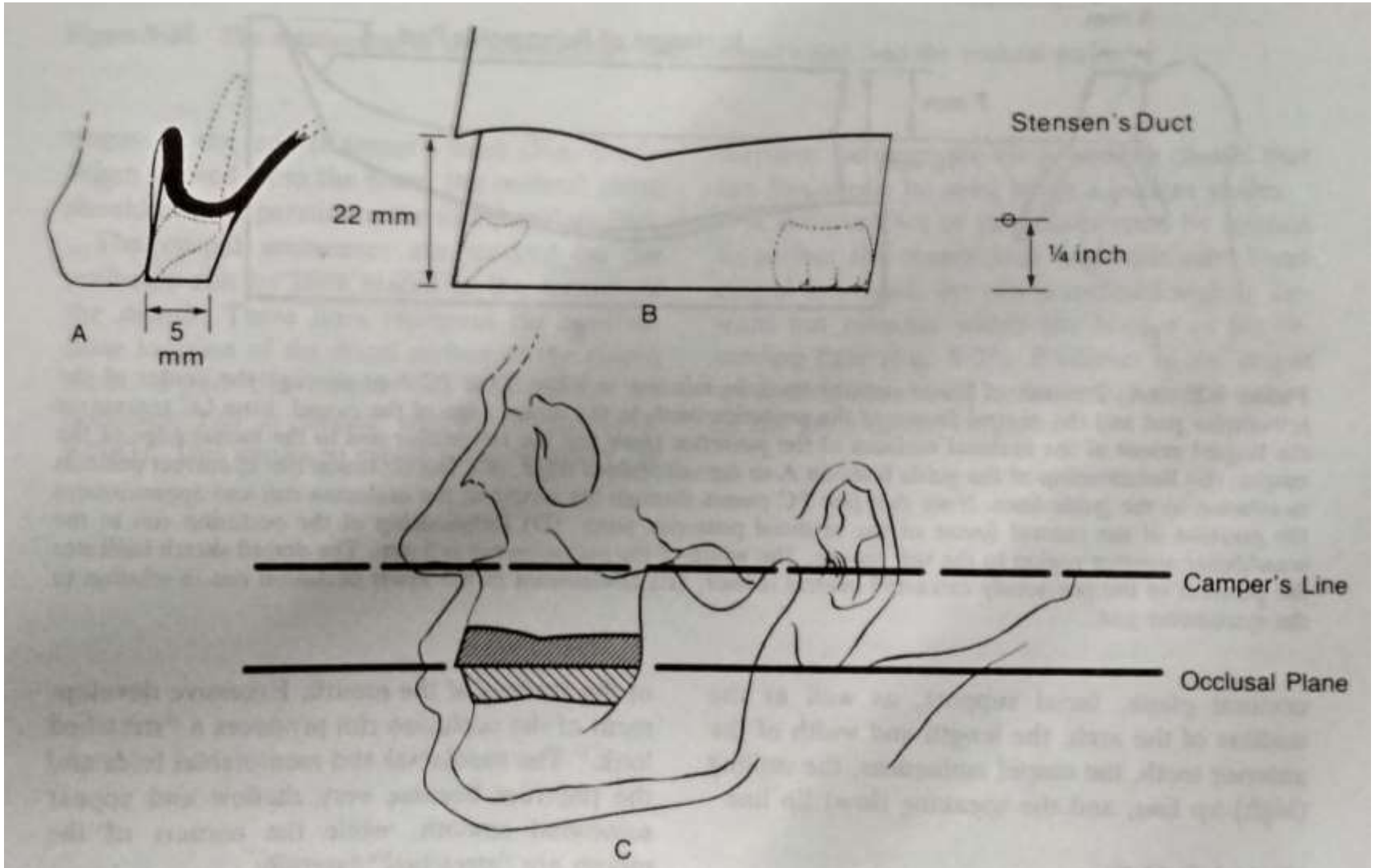
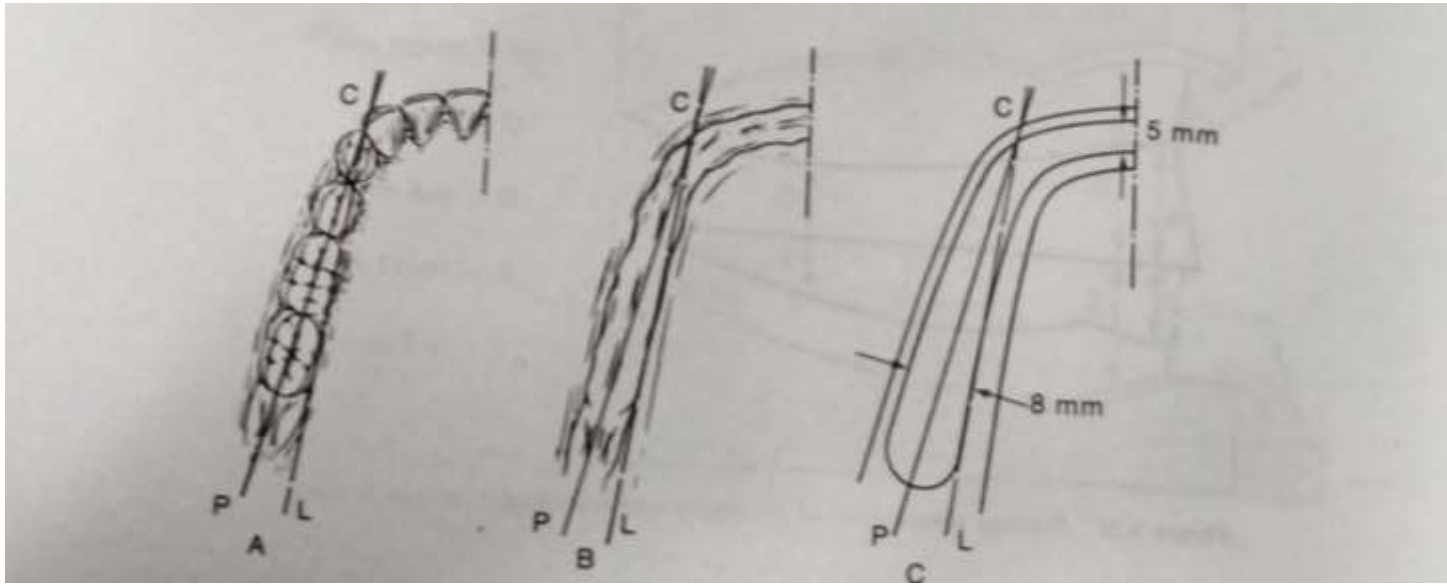
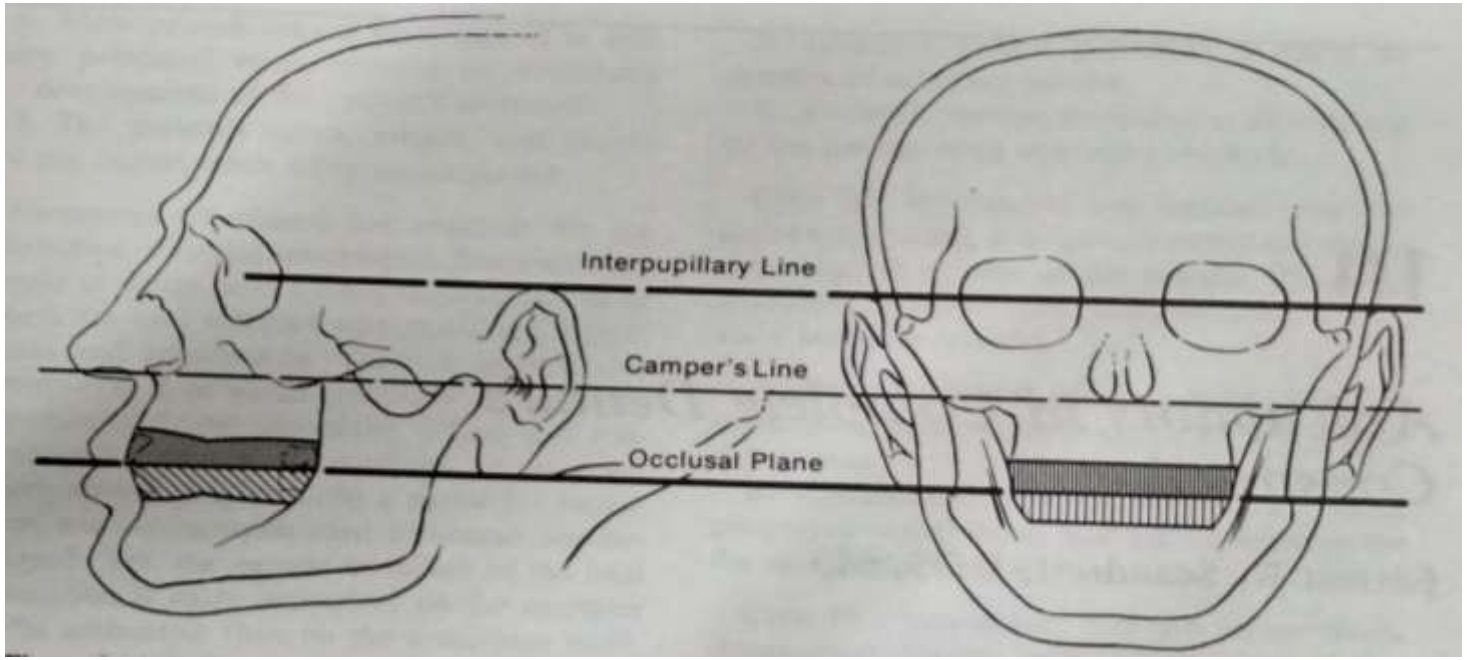


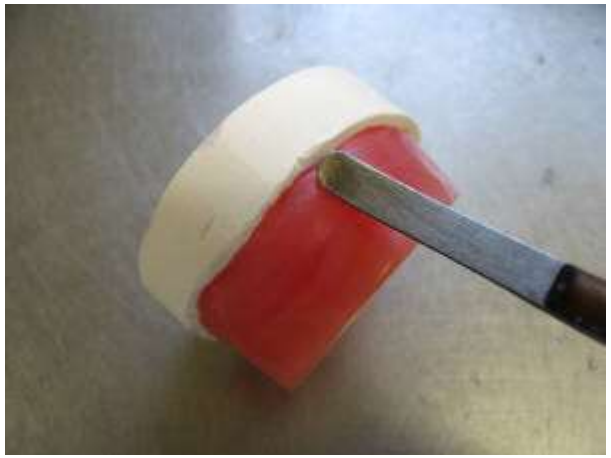
Figure 9-22 (A) Relationship of maxillary occlusion rim in anterior region to soft tissues. The width is 5 mm. The dotted sketch indicates the position of the previously extracted central incisor. (B) Anteroposterior view of maxillary occlusion rim with previously extracted central incisor and first molar superimposed. Note the position of Stensen's duct in relationship to the occlusal plane. (C) Relationship of Camper's line to the plane of occlusion.

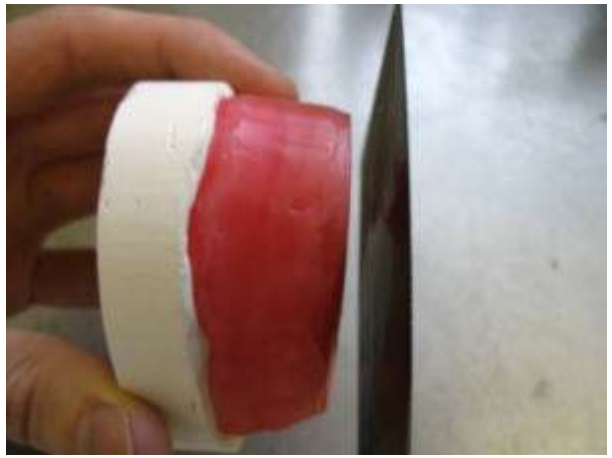

C
P
L
A
C
P
L
B
C
5 mm
8 mm
P
L
C


Interpupillary Line
Camper's Line
Occlusal Plane

Ready made occlusion rim

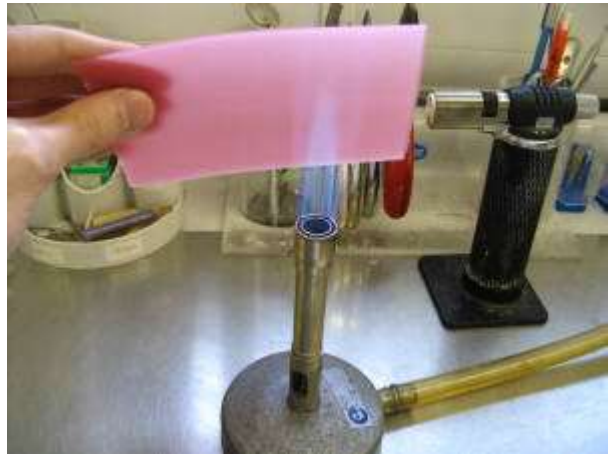
- Its supplied as a horse shoe shaped rim, adapt it in the proper position on the record base.
- Softened it slightly, sealed it with the record base by the aid of a wax knife.
- Smooth all the surfaces

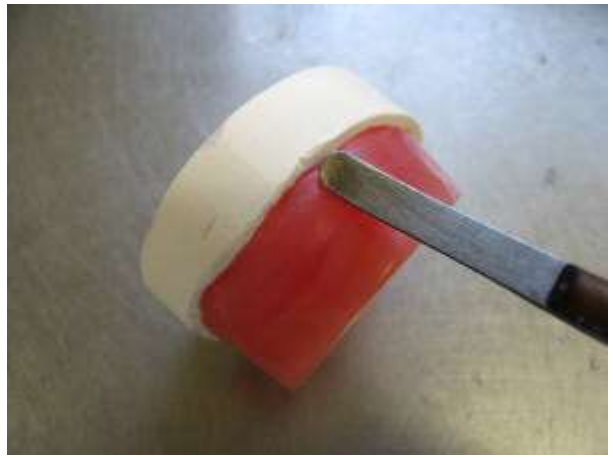


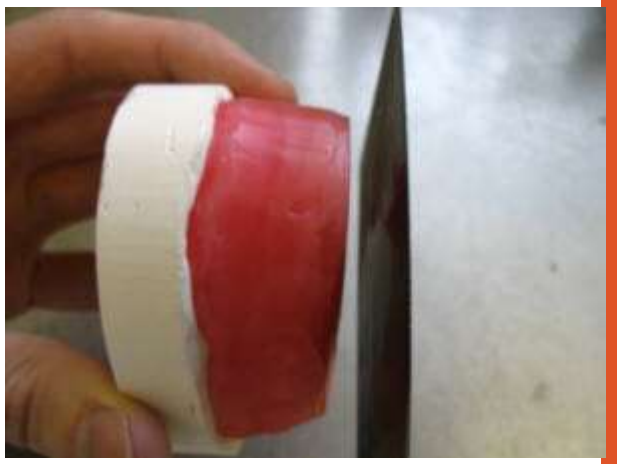


Hand made occlusion rim

- Half a sheet of paraffin wax is softened and folded upon itself to produce a rectangular rim, approximately the length of the alveolar ridge.
- Softened it slightly, sealed it with the record base by the aid of a wax knife.
- Smooth all the surfaces







Modeling plastic occlusal rims

- Occasionally a dentist makes occlusal rims of impression compound to record jaw movements as in functionally generated path procedures

- These are formed from softened modeling plastic and are adapted to the baseplate similar to baseplate wax method

Conclusion

Reference

- Anusavice. Phillip's science of dental materials. 11th ed
- Boucher's prosthodontic treatment for edentulous patients- 10th ed
- Sheldon Winkler – Essentials of complete denture prosthodontic
- Morrow & Rudd – dental laboratory procedures .volume -1


Thank You