



Lecture 5

Fabrication of removable orthodontic appliances Post insertion instruction and guidelines

Soldering and welding

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Fabrication of the removable Orthodontic appliances

1- First appointment: An accurate alginate impression should be taken of the maxillary arch including the tuberosity,



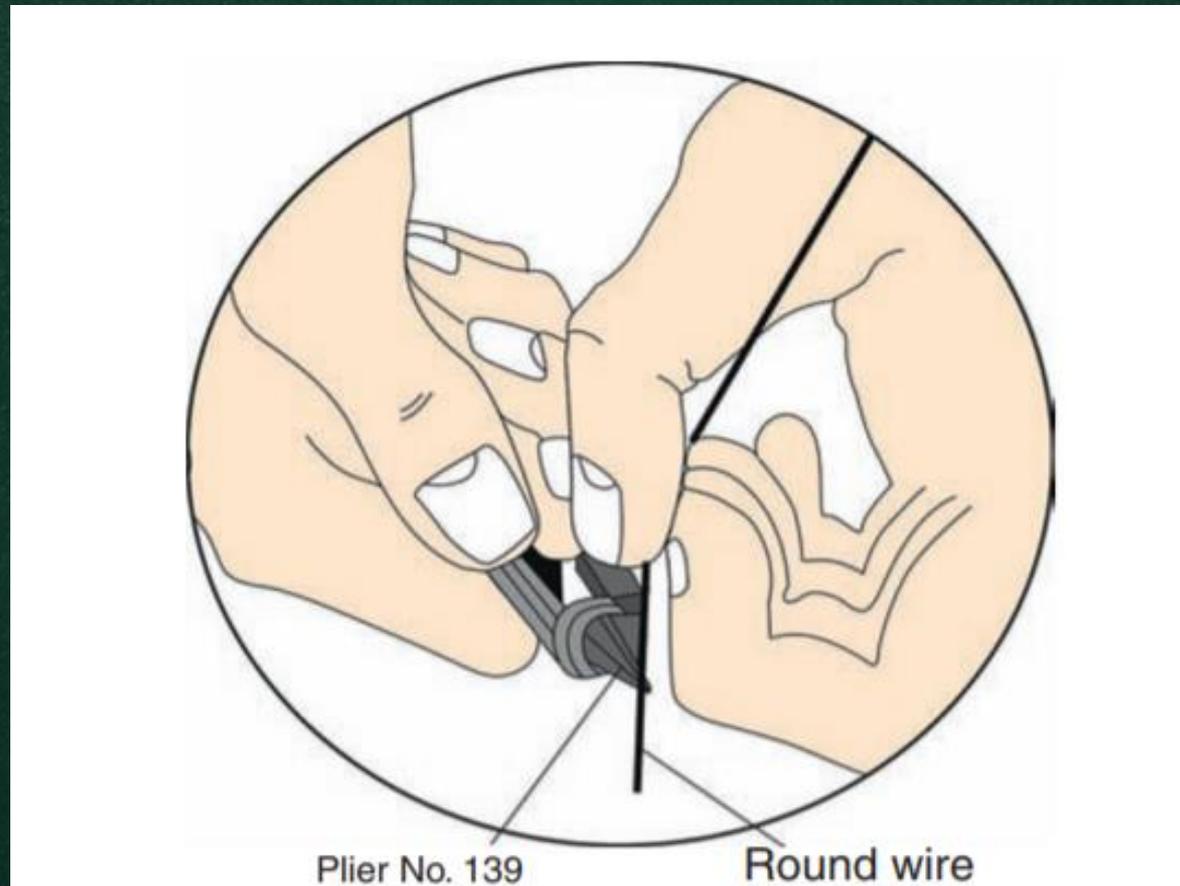
Fabrication of the removable Orthodontic appliances

2- The impression should then be poured up
in stone.



Fabrication of the removable Orthodontic appliances

3- the wire framework is fabricated by wire bending
pliers. (springs, labial bow and clasps).



Fabrication of the removable Orthodontic appliances

Fix the springs and clasps to the cast by wax on the occlusal and labial surfaces of the teeth, so that they do not move during fabrication of the acrylic



Fabrication of the removable Orthodontic appliances

Wax is applied on the coils and arms of Z-, recurved, T- and finger springs not to be embedded in the acrylic baseplate



Processing of Appliances

After it has been determined that both the clasps and labial wire/active components are properly adapted and passive, they may be affixed to the casts by **the generous use of sticky wax on the labial and buccal surfaces.**



Processing of Appliances

the acrylic portion may be fabricated by

- waxing,
- flasking,
- boiling out and curing under pressure,

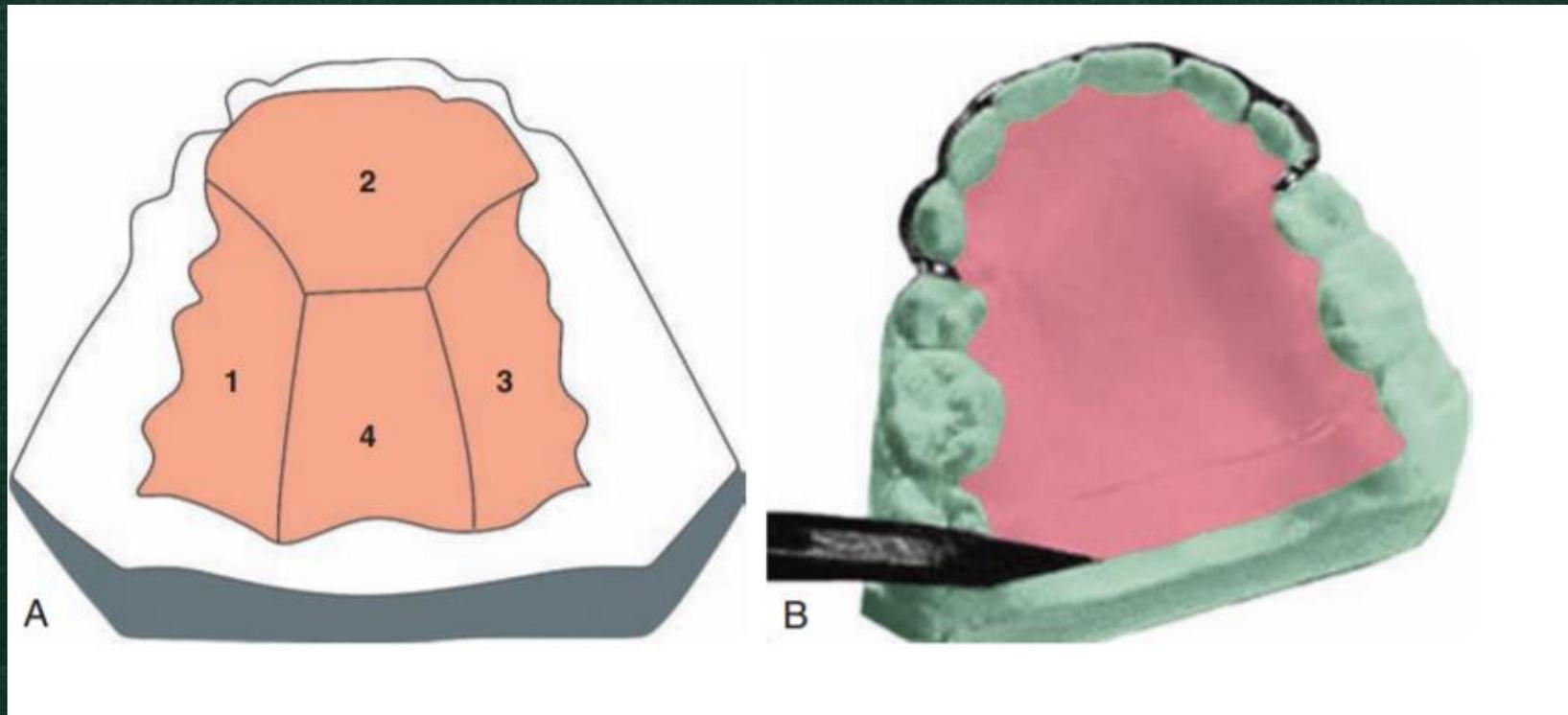
or it may be made directly by the use of **self-cure acrylics**/ endothermic techniques that permit the application of powder and monomer directly to the model surface after it has been painted with a separating medium.

Processing of Appliances

The flasking and pressure-cure procedure (heat cure) is more desirable with better properties because there is less **distortion and porosity and probably less likelihood of breakage.**

It is common practice to make the majority of appliances **in self-cure acrylic** because it is easy to use and faster to fabricate retaining heat-cure acrylic for those situations where additional strength is desirable, for example some **functional appliances.**

Processing of Appliances



Processing of removable appliance with chemical cure resins.
(A) Shows the division of maxillary cast into four parts for processing with **sprinkle-on technique**.
(B) Appliance processed with bulk technique.

Processing of Appliances

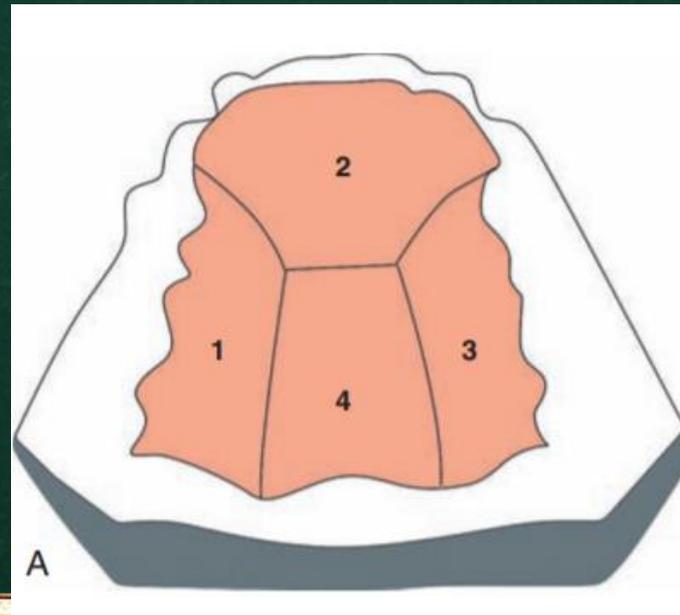
Sprinkle-on Technique/Pepper Salt Technique

the working model in water Soak the cast in water for about 5 minutes until no more air bubbles come out of the cast. fusing the acrylic with the stone of the cast. This prevents the absorption of liquid monomer by dry cast and fusing the acrylic with the cast material.

Processing of Appliances

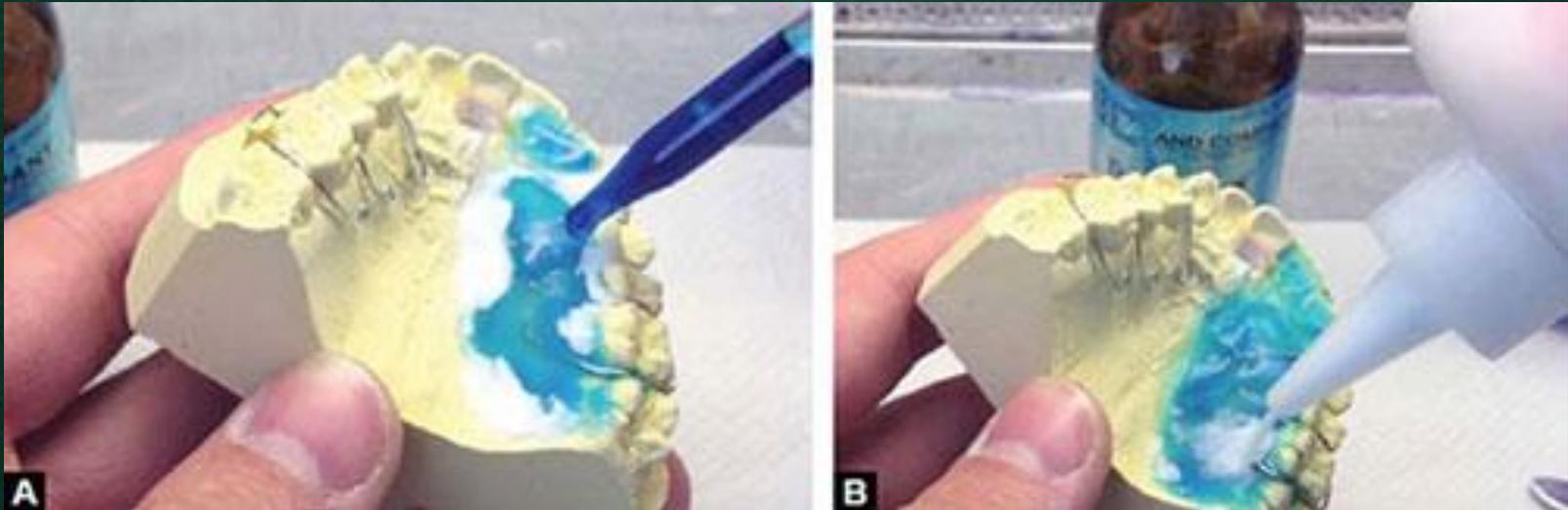
Sprinkle-on Technique/Pepper Salt Technique

Divide the palatal portion of the upper model into four parts. The lower model also can be divided into three segments. Coat the palatal surface with a thin layer of separating media using a brush.



Processing of Appliances

With a plastic applicator bottle, liquid monomer is added to the polymer powder in the first section of the palate. Polymer powder is added to a thickness of **1.5–2 mm**. This procedure is done in all the segments. If anterior bite plane is required, a flat area is built in segment 2. Curing is done in a bowl of warm water or pressure pot for approximately **20 min**. Appliance **is removed after 30 min** trimmed and polished.



Processing of Appliances



Processing of Appliances

6. The wax is cleaned and the acrylic base plate is finished with a carbide bur and polished with pumice..



Processing of Appliances

Great care must be exercised in the polishing of the acrylic. It is quite easy to catch the labial wire clasps on the polishing brush or wheel and distort them.



Processing of Appliances

Bulk Technique

Bulk technique involves mixing powder and liquid monomer separately in a mixing jar. The prepared mix is placed over the wet model and contoured or adapted to the required level after applying separating media.



Processing of Appliances

Cure in a hydroflask under 2 bar pressure to eliminate porosity. The hydroflask contains water at 40°C to accelerate the curing reaction

Fitting a removable appliance

It is always useful to explain again to the patient (and their parent/guardian) the overall treatment plan and the role of the appliance that is to be fitted.

Fitting as soon as possible after the impression has been taken to avoid forward movement of posterior teeth.

Fitting an appliance can be approached in the following way **a)** Before inserting the appliance:

(1) Check that you have the correct appliance for the patient in the chair and that your prescription has been followed.

(2) Show the appliance to the patient and explain how it works.

(3) Check the fitting surface for any roughness.



Try in the appliance. If it does not fit check the following:

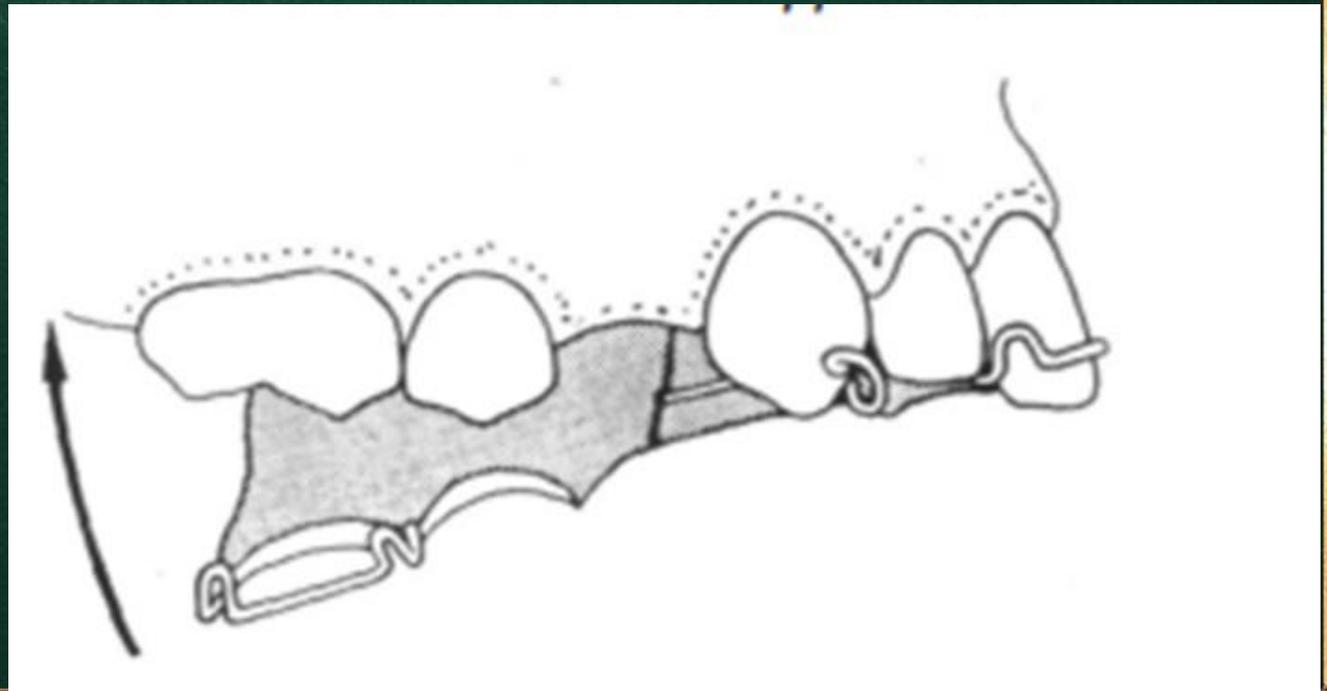
- Have any teeth erupted since the impression was taken?

If necessary, adjust the acrylic.

- Have any teeth moved since the impression was recorded? This usually occurs if any extractions have been recently carried out.
- Has there been a significant delay between taking the impression and fitting the appliance?

b) Inserting the appliance

1. The appliance should be inserted into the mouth with the anterior part lightly into position and then press the acrylic base upwards until the molar clasps engage.



2. Removal of the appliance: Should be carried out in the reverse order. The finger tips are used to pull down on the bridges of the molar clasps until they disengage readily, make sure the patient can insert and remove the appliance.

3- Adjust the retention until the appliance just clicks into place.

4- If the appliance has a bite-plane or buccal capping, this will need to be trimmed so that it is active but not too bulky.

5- The active element(s) should be gently activated and check the teeth to move freely.

6- Give the patient a mirror and demonstrate how to insert and remove the appliance. Then let the patient practice.

Go through the instructions with the patient (and parent or guardian), stressing the importance of full-time wear. A sheet outlining the important points and containing details of what to do in the event of problems is advisable.

c) Instruction to the patient and to the parents:

1- The patient should be shown in a mirror the insertion and removal of the appliance.

The correct method of insertion is to engage the anterior wire on the incisors and then press the acrylic palate upwards until the molar clasps engage. Removal is accomplished by pulling down on the molar clasps before disengaging the anterior teeth

2- You might face some discomfort during eating and speech in the first few days and in case of appliance damage

3- You should wear the appliance during day and night (24 hrs).

4- You should clean your teeth and the appliance regularly without distorting any component.

5- Avoid all sticky or hard foods such as; boiled sweets, chewing gum etc. These precautions will minimize the chances of a breakage

Arrange the next appointment.

If a working model is available, it is wise to store this with the patient's study models as it may prove helpful if the appliance has to be repaired.



Post insertion instructions

Patient Instructions

- Demonstrate appliance insertion and removal to the patient.
- Instruct the patient to remove and insert the appliance without help.

Post insertion instructions

- Instruction about duration of wear is to be given.
- Most of the appliances are worn full time.
- Inform patient of the initial difficulties in getting used to the appliance, e.g. difficulty in eating and speaking.

Post insertion instructions

- Cleaning of the appliances should be taught.
- Importance of maintenance of oral hygiene should be stressed upon.
- Careful storage of appliance should be stressed to prevent distortion.
- Give subsequent appointment. Usually subsequent appointment will be after 3-4 weeks.
- Patient is instructed to report immediately, if there are any problems because of the appliance or if there is any damage to the appliance

Follow-up Visit & Monitoring progress

Ideally, patients wearing active removable appliances should be seen around every 4 weeks.

Passive appliances can be seen less frequently, but it is advisable to check, and if necessary adjust, the retention of the clasps **every 3 months**.

Ask for any difficulties encountered.

Follow-up Visit & Monitoring progress

- Repeat the measurement to assess treatment progress.
- Adjustment of the retentive components.
- Activation of the active components.

Follow-up Visit & Monitoring progress

During active treatment it is important to establish that the patient is wearing the appliance as instructed.

Follow-up Visit & Monitoring progress

Indications of a lack of compliance include the following:

- the appliance shows little evidence of wear and tear;
- the patient lisps (ask the patient to count from 65 to 70 with, and without, their appliance);
- no marks in the patient's mouth around the gingival margins palatally or across the palate;
- frequent breakages.

If wear is satisfactory the following should be considered:

- Check the treatment plan (& progress onto the next step if indicated).
- The patient's oral hygiene.
- Record the molar relationship, overjet and overbite.
- Re-assess anchorage.
- Tooth movement since the last visit.

- Whether the active elements of the appliance need adjustment.
- Whether the bite-plane or buccal capping need to be increased and/ or adjusted.
- Record what action needs to be undertaken at the next visit.

Repairing a fractured Adam's clasp:

- The Adam's clasp is commonly fractured from the U-loop because it has an acute bend. The procedure of soldering is as follows:

- 1. Flux is added on the wire to prevent its oxidation under the flame.

- 2. Direct flame is used to heat the wires until they become red. Care must be taken not to overheat the neighboring acrylic.

- 3. Silver solder is added to unite the two fractured parts.

- 4. The soldering joint is immediately quenched in water to give the solder hardness.

- 5. Excess solder is removed by a bur and the joint is polished.

Soldering and welding

Soldering

It is defined as a process of joining metals by the use of a filler metal (solder), which has substantially lower fusion temperature than that of the metals being joined.

If fusion temperature of filler metal is:

<450°C—the procedure is known as soldering.

>450°C—the procedure is known as brazing.

Examples of Soldering in orthodontics

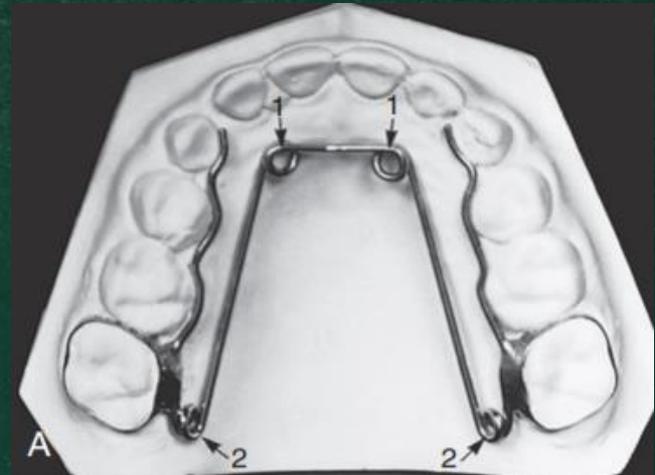
Applications of soldering in orthodontics

- Used to join parts of orthodontic appliances.
- Used to fasten attachments to bands.
- Soldering labial bow to the bridge of Adams clasp

Soldering



A quad helix : The appliance is fabricated from 38-mil wire and soldered to the bands



The W-arch (A) The appliance is fabricated from 36-mil wire and soldered to the bands.





FIGURE 1- Round joints. Wire material: Forestanit in spring hard quality (diameter 0.9 mm)

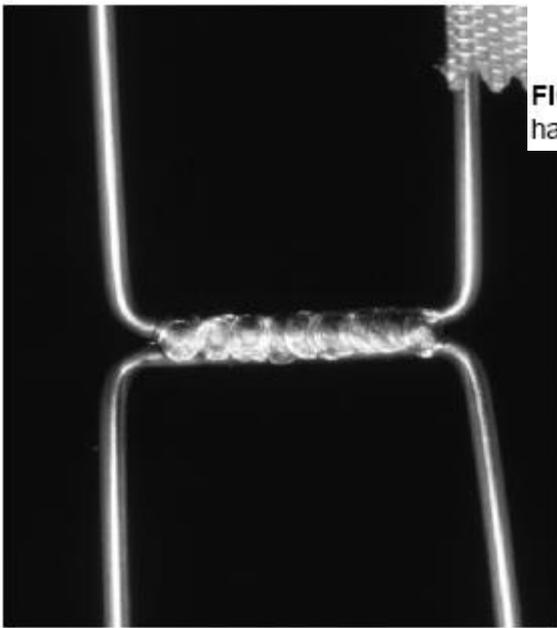


Figure 4- 9-mm long joints. Wire material: Forestanit in spring hard quality (diameter 0.9 mm)

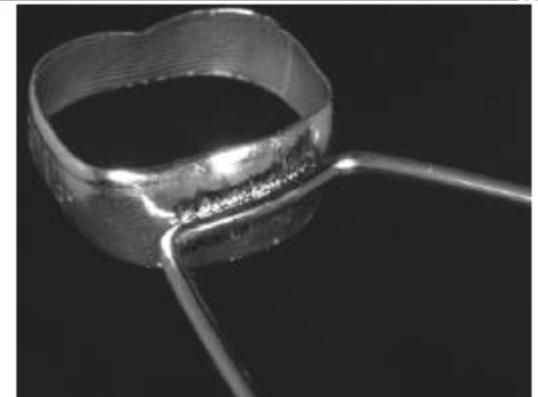


FIGURE 5- Band-to-wire joints. Wire material: Forestanit spring hard quality (diameter 0.9 mm; length 7 mm). Band material: Dura-Fit (Forestadent, Germany)

Welding

Welding is **joining of two similar metals** or alloys without addition of a filler material. The two alloys are heated to higher temperature by passing an electrical current through them so that the alloys are fused together by melting and flowing.

In clinical orthodontics, spot welding is the most commonly used method of welding for the construction of orthodontic appliances.

Welding

This is accomplished by a welder machine. The two wires are put in firm contact under pressure of the jaws of the welder and then a low voltage high amperage electrical current is passed through the wires to melt the surfaces of the wires and make them fuse.

Welding

Note: the wires should be welded at right angle to each other (not parallel) to have a small contact surface area that concentrates the electrical current and make the wire melt more making a stronger joint.

Welding and soldering is generally used in orthodontics to:

1. Repair fractured clasps.
2. Solder Hawley arch or buccal canine retractor to the bridge of the Adams clasp.
3. Solder a variety of modifications to the bridge of the Adams clasp (e.g. hooks for elastics and face bow tubes).

Welding



bracket welded to
a premolar band



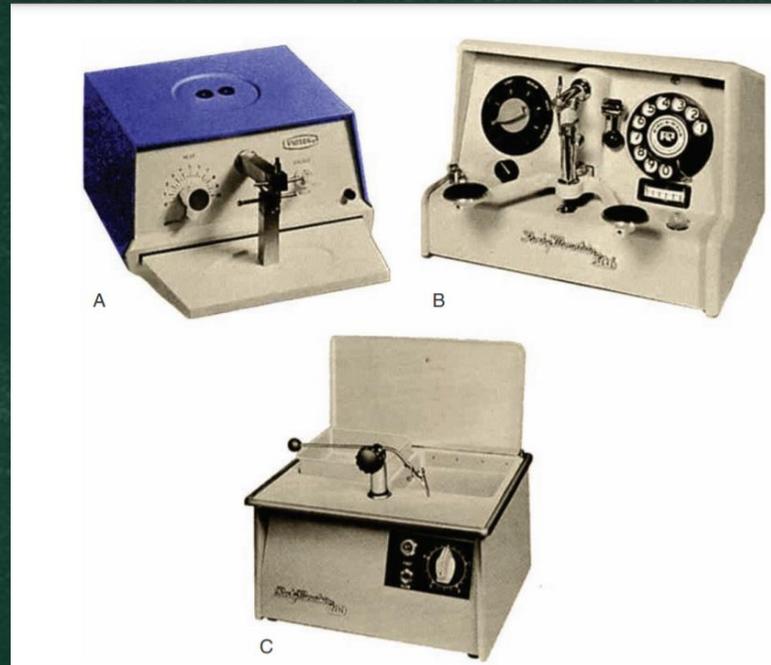
18-mil beta-titanium
(beta-Ti) wire (the loop)
welded to 17 × 25 beta-Ti.

Welding



A short and relatively heavy cross-elastic is placed between the buttons welded on the bands

Welders



Welding, heat treating and passivating equipment. Welders (A, B) are combined resistance and capacitor type. Passivator (C) is a combined heat treating passivator and electric soldering unit.



ANY QUESTION?

