

Learning to position brackets on models

Thursday 11th June 2026

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Dental mouth mirror

- Access for both direct and indirect vision
- Checking bracket position and placement
- Soft tissue retraction



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Short dental probe

- Examination of tooth surfaces and restorations
- Positioning of orthodontic attachments
- Removal of composite flash
- Removal of elastomeric ties



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College tweezers

- Retrieval of small fragments from within oral cavity
- May facilitate aseptic transfer of small instruments and placement of bonded retainers



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Ruler

Used in the assessment of overjet, level of crowding and treatment progress



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Ligature director

- Tucking ends of wire auxiliary (facebacks, short and long ligatures and Kobayashi ligatures)
- Engagement of Nickel-Titanium archwires into the bracket slot of rotated or displaced teeth



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Weingart pliers



- Directing larger dimension round and rectangular archwires through molar bands and tubes
- Squeezing crimpable stops

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Light wire pliers

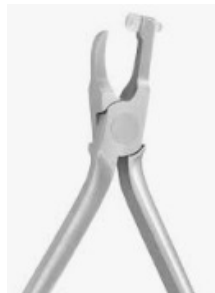


- Directing larger dimension round and rectangular archwires through distal molar attachments
- Wire bending including closing loops, first and second order finishing bends

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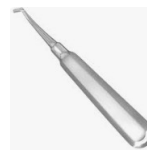
Posterior band remover

- Removal of molar and premolar bands



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Mershon band pusher



- Seating molar and premolar bands through the contact points of adjacent teeth
- Burnishing the edges of bands against tooth surface to improve adaptation and fit

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Direct metal bracket debonding pliers



- Removal of orthodontic brackets and tubes from the surface of teeth through application of shearing force resulting in failure between the adhesive layer and bracket base

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Direct bond bracket tweezers



- Positioning of orthodontic brackets and attachments directly onto the buccal surfaces of the teeth

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Buccal tube tweezers

- Positioning of buccal molar tubes on upper and lower permanent molar teeth



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Mosquito forceps



- Placement of elastomerics around the bracket tie-wings to secure the archwire into the bracket slot
- Placement of separator elastics
- Securing stainless steel short, long and Kobayashi ligatures
- Placement of stainless steel short, long and Kobayashi ligatures

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Ligature cutter

Cutting ends of stainless steel short, long and Kobayashi ligatures



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Tweed rectangular arch forming pliers

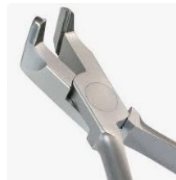


- Wire bending such as first, second and third order bends in rectangular stainless steel and Beta-Titanium archwires

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Distal end cutter

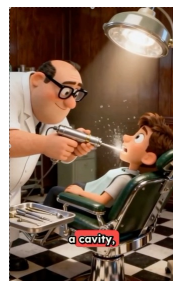
Cutting distal end of round and rectangular NiTi and SS archwires passed through molar attachment



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Bonding to enamel

- Michael Buonocore
- 1955
- Discovered that treating enamel with **phosphoric acid** enables restorative resins to bond directly to the tooth



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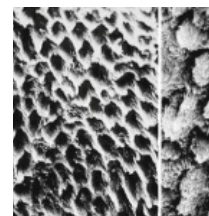
Bonding to enamel

- **Enamel**
- Direct bonding to enamel utilizes three principal agents:
 - an enamel surface conditioner
 - a primer solution
 - an adhesive resin

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Surface conditioner

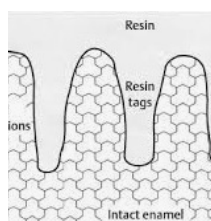
- This creates micro-porosity and a high-energy enamel surface.
- Scanning electron micrographs of enamel that has been etched with 37% phosphoric acid for 15 seconds.



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Primer

- This flows into the etched surface to create resin tags
- Mechanical bond is created between the adhesive resin and the tooth surface.



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Adhesive resin

- This is the 'cement' which permits the bonding of materials to the tooth surface.
- Buonocore originally introduced the enamel acid etch technique in 1955 and proposed conditioning with 85% phosphoric acid for 30 seconds.
- Later it was found that 37% phosphoric acid utilized for 15 seconds was sufficient to develop a strong, durable bond to anterior teeth.
- For molars it has been suggested that an etching time of at least 30 seconds be utilized when bonding to the buccal surfaces of first molars, as it produces a more consistent bond strength compared to etching for 15 seconds.
- Optimal bond strength estimates at 5.9-7.8Mpa



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Self-etch primers

- Self-etching primers (SEPs) provide a one stage alternative to conventional etching followed by primer application.
- Advantages include:
 - ease of use
 - decreased technique sensitivity
 - reduction in chairside time



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SEP

- Research suggests there is weak evidence demonstrating higher odds of failure with SEPs over a 12-month period, but strong evidence for a time saving of approximately 8 minutes for full arch bonding.
- However, a more recent review concluded that there was no useable evidence to enable conclusions about failure rates for SEPs in comparison to acid etch and which is the most appropriate concentration or etching time.

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GIC

- Glass ionomer cement (GIC) is an alternative adhesive.
- Glass ionomer cements can:
 - Release fluoride and thus may prevent enamel decalcification
 - Reduce severity of white spot lesions
- However, has a weaker bond strength



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Composite veneers

- Bonding to composite labial veneers may result in increased bracket retention in cases affected by severe defects of enamel when compared to bonding to the defective enamel alone



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Bonding to fluorosed enamel

- For bonding to mildly fluorosed teeth, there is no significant difference in shear bond strengths compared to that of normal enamel.



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Composite resin

- Bonding to composite resin requires :
 - superficial roughening, either through sandblasting with aluminium oxide or with diamond burs.



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Porcelain

- Bonding orthodontic brackets to porcelain/ ceramic surfaces has a greater failure rate compared to enamel bonding.
- Sandblasting with 50 μ m aluminium oxide (2–4 seconds);
- Etch – 9.6% hydrofluoric acid gel (2 minutes), rinse and dry;
- Application of silane porcelain primer and air dry (2–3 coats);
- Application of adhesive resin bonding agent.

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Hydrofluoric acid

- Hydrofluoric acid is highly corrosive, and should be used under rubber dam isolation and with high volume suction to prevent injury to the patient.



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Gold

- Conventional acid etching is ineffective in the preparation of gold surfaces for mechanical retention of orthodontic attachments.
- Intra-oral sandblasting can be used followed by bonding with a methacryloyloxyethyl trimellitate anhydride, (4-META) metal-bonding adhesive resin.



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Amalgam

- Successful bonding of orthodontic attachments to an amalgam surface requires conditioning of the amalgam (for example sandblasting), and use of a 4-META resin.
- Subsequent bonding of brackets to sandblasted and alloy primer-coated amalgam surfaces can be achieved by traditional primers and orthodontic composites.
- Banding

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Acrylic

- Acrylic teeth incorporated onto orthodontic appliances as pontics.
- Orthodontic brackets can be bonded to acrylic teeth using both mechanical and chemical methods.
- Mechanical retention includes sandblasting with aluminium oxide particles, the creation of undercut holes to facilitate a micro-mechanical 'lock' or roughening the surface with diamond or tungsten carbide burs.
- Chemical retention can be achieved using adhesive materials, such as cyanoacrylate.



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Technique

- Following etching of enamel surface with 37% phosphoric acid and application of primer (hydroxyethylmethacrylate), an adhesive layer promotes micromechanical bonding between the enamel surface and the base of the bracket onto the tooth surface.

- Two techniques are commonly used:
- One stage: self etching primers
- Two stage: Acid-etch and primer

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- The enamel surface can be cleaned with pumice prior to application of self etch primer
- Remove any potential contaminants and salivary pedicle that could affect the achievement of adequate bond strength.

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Practical steps

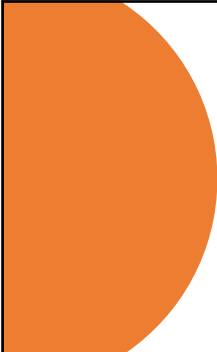
- Enamel surface cleaned with pumice
- Before preparing the tooth surface, adequate isolation of the teeth and a dry field essential
- Orthodontic retractors are used to move lips and cheeks to improve visualization and access to teeth
- Saliva ejectors are used to ensure a dry field and prop open the occlusion
- Ejector placed in molar region when teeth have been dried

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- Two stage
- 37% phosphoric acid is placed on teeth for 15 seconds
- 30 seconds is advised for molar teeth
- Etch is washed from teeth and dried using a 3 in 1
- Enamel surface should appear frosty
- A thin layer of primer (hydroxyethylmethacrylate, Transbond) is then applied to the surface of teeth

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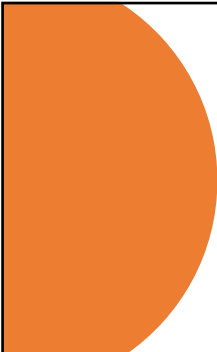
- One stage:
- The surface of enamel do not need to be prepare with 37% phosphoric acid as the etching and bonding agent are combined
- The SEP is sequentially activated leaving a yellowish fluid on the micro brush
- The surface of the tooth should be agitated with the brush for 3-5 seconds and then lightly air dried

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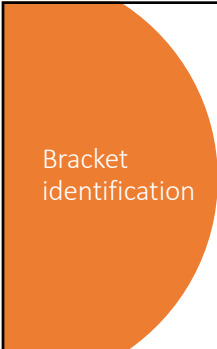
- Using bracket tweezers, the bracket or molar tube with composite adhesive on the base is seated onto the tooth surface
- The position adjusted with the short probe
- Bracket positioning can then be assessed from the labial aspect for vertical and horizontal position
- Directly for anterior teeth and using a dental mirror for posterior teeth and viewed occlusally to evaluate the position in relation to the long axis of the tooth.
- Once optimal bracket position is achieved, full seating can be ensured either with bracket tweezer or short probe.
- This creates an even layer of adhesive beneath base and any residual flash should be remove to avoid plaque harbouring areas.

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- Composite beneath the bracket base is light cured with either:
- Light emitting diode
- Halogen
- Plasma arc laser light cure
- This initiates the polymerization process for the time recommended by the manufacturer

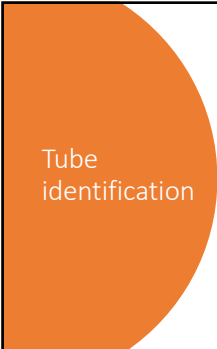
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Bracket identification

- Shape
- Size
- Thickness
- Contour of base
- Torque in slot
- Disto-lingual ID

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Tube identification

- Gingival hook
- Offset of tube
- Torque in tube

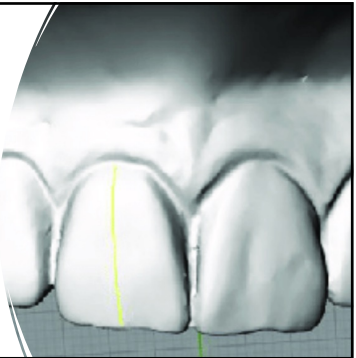
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- Considerations when positioning brackets onto teeth:
- Base adaptation
- Slot angulation
- Mesio-distal and vertical position
- Failure to seat fully can result in rotational effects
- Tooth size, shape, morphology should be considered
- Use of bracket gauges which use the incisal edge and occlusal places as a reference

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Bracket positioning approaches

- Middle middle approach
- Andrews SWA
- Facial Axis (FA): the centre of the FA of the clinical crown (FACC)



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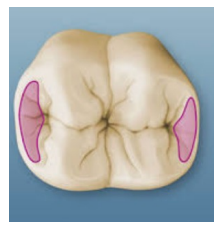
Andrews 6 keys

KEY 1		Key 1 Molar relationship - the distal surface of the distal marginal ridge of the upper first permanent molar occludes with the mesial surface of the mesial marginal ridge of the lower second molar. The mesio-distal axis of the upper first permanent molar falls within the groove between the mesial and middle cusps of the lower first permanent molar.
KEY 2		Key 2 Crown angulation or mesio-distal tip - the gingival portion of the long axis of each tooth crown is distal to the occlusal portion of the axis. The degree of tip varies with each tooth type.
KEY 3		Key 3 Crown inclination or labio-lingual/face-distal taper - for the lower incisors the occlusal portion of the crown axial surface is lateral to the gingival portion. In all other crowns, the occlusal portion of the labial or buccal surface is lingual to the gingival portion.
KEY 4		Key 4 Rotation - there should be an absence of any tooth rotations within the dental arches.
KEY 5		Key 5 Spacing - there should be an absence of any spacing within the dental arches.
KEY 6		Key 6 Occlusal plane - the occlusal plane should be flat.

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Marginal ridge approach

- Ricketts proposed the marginal ridge as a reference for vertical bracket positioning
- Disregards the buccal height of the tooth
- Specific to the posterior segment



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Bracket positioning

- Brackets should be positioned in the centre of the clinical crown (Long axis or LA point)
- Disto gingival tie wing is highlighted to orientate the bracket correctly
- Both tie wings can be marked which can be changed between both the right and left
- Centre of the clinical crown is considered the most reproducible point
- Incisal wear and gingival can make positioning challenging

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Bracket positioning



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Banding of molar teeth

- Two types of attachment:
 - Bands
 - Buccal tubes

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Buccal tubes

- Easier to position
- Few appointment required
- More comfortable for patients
- Molar bands versatile
- Used in conjunction with auxiliary appliances: TPA, Quadhelix, Nance

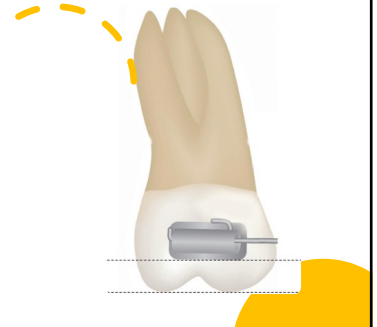
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Buccal tubes

- Maxillary and mandibular first molar tubes should be bonded:
 - adjacent to the buccal groove and mesio buccal groove
 - parallel to the buccal cusps with even amount of mesial and buccal cusp visible

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Buccal tube positioning



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Common bracket positioning errors

- Maxillary central incisor: Bracket not positioned parallel to long axis of the tooth
- Maxillary lateral incisor: Bracket placed too incisally
- Maxillary canine: Horizontal positioning
- Maxillary premolar: Bracket placed too occlusally
- Maxillary first molar: Molar tube placed too gingival
- Mandibular canine: Horizontal positioning
- Mandibular premolar: Bracket placed too occlusal
- Mandibular first molar: Molar tube placed too gingival

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Torque values

	Maximum central	Maximum lateral	Maximum canine	Maximum first premolar	Maximum second premolar	Maximum first molar	Maximum second molar
Andrews	7	3	-7	-7	-7	-9	-9
Roth	12	8	-2	-7	-7	-14	-14
MBT	17	10	0	-7	-7	-14	-14
	Mandibular Central	Mandibular Lateral	Mandibular Canine	Mandibular first premolar	Mandibular second premolar	Mandibular first molar	Mandibular second molar
Andrews	-1	-1	-11	-17	-22	-30	-30
Roth	-1	-1	-11	-17	-22	-30	-30
MBT	-6	-6	-6	-12	-17	-20	-10

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Angulation values

	Max central	Max lateral	Max canine	Max first premolar	Max second premolar	Max first molar	Max second molar
Andrews	5	9	11	2	2	5	5
Roth	5	9	13	0	0	0	0
MBT	4	8	8	0	0	0	0

	Mandibular central	Mandibular lateral	Mandibular canine	Mandibular first premolar	Mandibular second premolar	Mandibular first molar	Mandibular second molar
Andrews	2	2	5	2	2	2	2
Roth	2	2	7	-1	-1	-1	-1
MBT	0	0	3	2	2	0	0

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Local variations

- Palatal positioned maxillary lateral incisor
- **Solution**
- Invert lateral incisor bracket (MBT 10°)
- Class III incisor relationship
- **Solution**
- Transpose lower canine brackets (MBT 3°)



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Questions?

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