Clinical Technique Guide

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IRREVERSIBLE HYDROCOLLOID IMPRESSION TECHNIQUE

1) Armamentarium: Follow manufacturer’s instructions for W/P ratio

2) Perforated stock trays: Alginate impression material needs thickness of > 3 mm in all areas

3) Tray adhesive and application technique: Care should be taken not to spray tray adhesive on the handle of impression tray

4) Completed impression: Impression should be poured within 10 minutes after removal from the mouth
IRREVERSIBLE HYDROCOLLOID IMPRESSION TECHNIQUE

Material
Alginate impression material is an irreversible, hydrocolloid designed to create accurate dental impressions for study casts, orthodontic casts, occlusal guards, custom trays, casts for fabricating provisional restorations, removable partial denture frameworks, removable appliances and deprogrammers. Alginate impression material is most accurate when there is at least 3 mm of space between the impression tray and the hard and soft tissues to be captured. It is also critical to use an alginate tray adhesive at all times.

Armamentarium
- Impression tray
- Alginate tray spray adhesive
- Mixing bowl and spatula
- Green stick compound and flame
- Dispenser and measuring jar supplied by the manufacturer

Ideal Guidelines
- For every one (1) scoop (7 g) of powder, add 1/3 measure of water (19 ml).
- For every two (2) scoops of powder, add 2/3 measure of water (38 ml).
- For every three (3) scoops of powder, or one (1) single-use pouch, add one (1) measure of water (57 ml).
- For best results, use distilled water at approximately 73°F (23°C).

Commentary
- A completed alginate impression should not be left in water, as it will cause expansive dimensional changes through the intake of liquid (Imbibition). In addition, avoid exposing alginate to air, as this will lead to water loss and shrinkage (Syneresis). Therefore, the alginate impression must be poured within 10 minutes of removal from the mouth. When immediate pouring is not possible, place the impression into a sealed plastic bag wrapped in a moist paper towel. Removing the impression tray should be done in one quick motion to prevent permanent deformation.
- At first, add water to the bowl followed by powder, until all the powder is dissolved. Next, continue to mix with the spatula in a vigorous fashion. Stir against the sides of the bowl to reduce air intake. Do not whip or stir the material. Cold water delays setting while warm water hastens it.
- To prevent a gag reflex, first reassure the patient that you will not prevent them from breathing. Next, either 1) seat the rear of the impression tray in the mouth while taking the impression, followed by the front, or, 2) with the patient in the prone position, seat the front of the impression tray in the mouth first in order to visualize excess material exuding from the rear of the tray. This helps to control the flow of alginate and prevents gagging.
- Accurate alginate impressions require that all of the material in the tray be fully supported by a rigid base. When the tray is inadequate in length, extending the tray with a custom-applied greenstick compound ensures the most accurate impressions.

References
- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
POLYVINYL SILOXANE (PVS) IMPRESSION TECHNIQUE

Auto Mix-50 dispensing gun
Heavy body impression tips
BFC syringe (Ho Dental)

Placement technique (“Flood the prep”)

EMERY (Double bite) impression tray
Completed PVS impression
POLYVINYL SILOXANE (PVS) IMPRESSION TECHNIQUE

Material
Aquasil Ultra is a quadrafunctional polyvinyl siloxane (PVS) addition-reaction silicone available at UCLA in both heavy and extra-light body viscosities. When used properly, it has excellent hydrophilic properties, dimensional accuracy, high-tear strength, and resistance to permanent deformation.

Armamentarium
- Dispenser (1:1, 50 ml)
- Cartridge (base and accelerator)
- Mixing tip for dispenser
- Free Flo (Kerr) syringe with disposable tip
- BFC syringe (Ho Dental)
- Impression trays, including a double bite tray available for cases where MIP is stable. Full arch trays are indicated for multiple units, terminal crowns, fixed dental prostheses (FDP’s), removable dental prostheses (RDP’s), implants, survey crowns, cases where centric relations (CR) will be used and vertical dimension of occlusion (VDO) changes
- PVS tray adhesive and a disposable tray painting brush

Ideal Guidelines
- Select and prepare a firm tray. Use rigid trays of sufficient size to provide a thickness of at least 2-3 mm of impression material.
- If there is any debris or blood, clean the field with air-water spray. Remove excess water using suction and air, taking care not to desiccate the tooth.
- Dispense heavy body impression material directly into the impression tray. Do not layer the material or place it into rows to prevent air from entering. Start at one end and fill the tray without any voids. The heavy body tray material should be loaded first.
- Inject the loaded syringe material into gingival sulcus, finish line areas and any existing anatomy and continue syringing around the prepared tooth structure until all the walls, including those of the unprepared tooth structure, are covered with the material. Flood the tooth!
- Set the loaded tray containing heavy body material into the mouth. Hold the impression tray in position until firmly set. With Aquasil, this process takes 6 minutes. For quadrant cases, stabilize the chin.

Commentary
- Block out the fixed dental prostheses and large gingival embrasures with wax or small cotton pellets to avoid locking of the set material in the mouth.
- Moisture contamination is the most frequent reason for a failed impression. Always maintain a dry field when attempting final impressions.
- Sulfur, present in latex gloves along with ferric and aluminum sulfate present in retraction solution will delay the setting of addition silicone.
- Impressions made with the use of Aquasil exhibit great dimensional stability and can be poured up to 6 days after removal from mouth.
- Apart from the “putty-wash” technique, Aquasil Ultra (light body and heavy body) can be used in duplication of models and Aquasil heavy body can be used for edentulous/overdenture impressions.

References
- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
WAXES AND COMPOUNDS

Green Cake Compound

Occlusal Indicator Wax

Green Stick Compound

Orange Sticky Wax
WAXES AND COMPOUNDS

Materials

- Impression “cake” compound
- Green stick compound
- Sticky wax
- Occlusal indicator wax
- Torch
- Bowl containing water at room temperature

Indications for use

- **Impression “cake” compound** is used on the bite fork of the face bow at the time of face bow transfer. Form softened material on both the upper and lower sides of the bite fork. The Patient bites into the cake, thereby stabilizing the bite fork.
- **Green Stick Compound** is used to stabilize custom matrices, # 212 retractors, unstable clamps and for extending impression trays.
- **Sticky Wax** is used for stabilizing casts at the time of mounting on the articulator.
- **Occlusal Indicator Wax** is an effective indicator of occlusal pre-maturities with a positive wax perforation reading of contacting surfaces.

Commentary

- **Impression Compound/Green Stick Compound** - Place the compound over the flame until it starts to become soft, which occurs at approximately 150°F (66°C). Continue heating and tempering in lukewarm water until a soft, dough-like consistency is achieved. Alternatively, a water bath at 150 degree F may also be used to soften the material.

- **Occlusal Indicator Wax** –
  A) For contact evaluation: Place the wax over the prepared tooth surface, asking the patient to bite normally.
  B) As a guide to determine occlusal clearance: The thickness of each strip of wax is 0.5 mm, and an appropriate number of strips can be used depending on the occlusal clearance needed. Four layers works well for all-ceramic and PFM clearance.

References

- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
GC CAVITY CONDITIONER
GC CAVITY CONDITIONER

Material Properties

GC cavity conditioner is an appropriate component product used to condition the bonding surface of the tooth prior to using glass ionomer restorative material like Fuji II LC and GC Fuji IX.

Main Constituents and Uses

- 20% Polyacrylic Acid removes smear layer and debris for improved bonding.
- 3% Aluminum Chloride Hexahydrate component seals the dentinal tubules and reduces sensitivity.
- When used without a liner, it enhances the marginal seal of GI restorations.

Procedure

- 10 second application.
- Rinse away with copious water and HVS.
- Blot dry before using glass ionomer.

Commentary

- This product should not be used with GC Fuji I and GC Fuji Plus cements.
- This product may cause sensitivity in some people. If any such reactions are experienced, discontinue the use of product.
- When using a liner, like Fuji Lining LC, prior to placing a base or restorative glass ionomer material, it is unnecessary to use GC cavity conditioner.

References

- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
- GC cavity Conditioner Instruction Sheet
GLASS IONOMEER LC LINER/BASE

Placement technique
GLASS IONOMEER LC LINER/BASE

Material Properties
Fuji Lining LC is a light cured Resin-Modified Glass-ionomer lining cement.

Indications for use
- As a base or liner in prepared cavities.
- To “tack down” therapeutic liners (MTA or calcium hydroxide)

Procedure
- Prepare tooth under rubber dam. Wash and dry, but do not desiccate the tooth.
- Depress the lever to dispense the required amounts of pastes onto the mixing pad (one “click” dispenses ample material for most applications). After dispensing, incorporate and spread the material out in a thin layer on the mixing pad using a Birtle’s applicator. Mix thoroughly, with lapping strokes, for 10 seconds, taking care not to incorporate air bubbles.
- Transfer to the preparation using Birtle’s applicator, covering the dentin (or pulp capping material) up-to the dentino-enamel junction. [NOTE: do not cover enamel.]

Commentary
- Contraindications: Placing directly on the pulp is not warranted.

References
- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
PULP CAPPING WITH CALCIUM HYDROXIDE LINER

Dycal Liner - Densply

Pinpoint pulp exposure

Calcium hydroxide pulp cap
PULP CAPPING WITH CALCIUM HYDROXIDE LINER

Material Properties
Dycal liner is a two-component, rigid-setting, self-curing material with calcium hydroxide designed for use in Direct and Indirect Pulp capping procedures and as a protective liner under Dental Adhesives, Varnishes, Cements, and other Base Materials. It will not inhibit the polymerization of acrylic and composite restorations.

Indications for use
• Application to exposed, vital pulp tissue (Direct Pulp Capping).
• Application to dentin as a protective barrier between restorative materials and deep vital dentin (Indirect Pulp Capping) or where dentin to restorative material contact is not desired.

Procedure
• Under rubber dam isolation, complete cavity preparation.
• Rinse the cavity and exposure site(s) with 2.6%-5% NaOCl (Diluted Endodontics Bleach). Bleeding is controlled with a cotton pellet moistened with water. [NOTE: if bleeding cannot be controlled within 10 minutes, a pulpectomy is indicated.]
• Gently dry preparation with a cotton pellet. Avoid desiccation.
• Dispense equal volumes of base and catalyst pastes on the parchment paper pad provided. Replace container caps. Using a Birtle’s applicator, stir immediately to mix thoroughly until a uniform color is achieved. Do not over-spatulate. Complete mixing within 10 seconds.
• Place the mix directly on the exposed pulp and cavity dentin judged to be less than 1.0 mm in thickness forming a thin layer. Avoid placing liner on enamel or the margins of the cavity. Material thickness should be approximately 0.8 -1 mm. Avoid placing a large bulk of the material.
• Allow the liner to completely set.
• Remove any set excess from retention areas, enamel, and/or margins with a sharp spoon excavator or a bur.
• Place Fuji Lining LC over the Dycal to “tack it down” securely and proceed with the restoration.

Commentary
• Pulp capping may only be attempted with vital pulps, with no spontaneous pain, and no radiographic evidence of pulpal disease.
• Pulp vitality and status should be assessed radiographically at the time of next appointment and every three to six months or as needed.
• Ideal thickness of a base is approximately 2 mm (maximum), liner (0.5 mm) and a luting agent (15-25 microns).
• The goal is to have 2 mm or more of dentin/insulating base from the dental pulp.

References
• Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
• Craig’s Restorative Dental Materials 12th edition pp.503-504, 2011
RESIN MODIFIED CALCIUM SILICATE LC LINER/BASE (THERACAL, BISCO)

Theracal LC

Fuji II LC (Powder+ liquid system)
RESIN MODIFIED CALCIUM SILICATE LC LINER/BASE (THERACAL, BISCO)
[OPTIONAL PULP CAPPING TECHNIQUE]

Material Properties
- Light-cured, Resin-Modified Calcium Silicate filled liner designed for use in Direct and Indirect Pulp Capping, consists of tricalcium silicate particles in a hydrophilic monomer that provides significant calcium release making it a uniquely stable and durable material as a liner or base
- Improved seal and bond to deep moist dentin
- Strong physical properties
- No solubility
- High radiopacity
- Significant calcium release

Indications for use
- Application to exposed, vital pulp tissue (Direct Pulp Capping).
- Application to dentin as a protective barrier between restorative materials and deep vital dentin (Indirect Pulp Capping) or where dentin to restorative material contact is not desired.

Procedure
- Under rubber dam isolation, complete cavity preparation.
- Hemostasis should be achieved prior to TheraCal LC direct pulp capping placement.
- Apply TheraCal in increments of 1 mm and light cure.

Commentary
- Pulp capping may only be attempted with vital pulps, with no spontaneous pain, and no radiographic evidence of pulpal disease.
- Pulp vitality and status should be assessed radiographically at the time of next appointment and every three to six months or as needed.
- A “tack down” layer of Fuji Lining LC is unnecessary.

References
- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
## DENTAL CEMENTS

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<th>Dental Cement</th>
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| 1 Fuji Plus (GC America)| - Resin modified Glass Ionomer cement  
- Working time = 1 minute  
- Setting time = 4 minutes  
- Mixed with special GC mixer for 10 seconds and delivered with a GC dispensing gun | - For single unit mechanically retained indirect restorations  
- For crown (E-max, Lava, PFM or Gold) cementations |
| 2 Fuji I (GC America)  | - Traditional Glass Ionomer cement  
- Working time = 2 minutes  
- Setting time = 5 minutes  
- Mixed with special GC mixer for 10 seconds and delivered with a GC dispensing gun | - For fixed partial dentures and posts cementations  
- For cast gold inlay and onlay cementations |
| 3 Durelon (3M ESPE)    | - Traditional powder/liquid (zinc phosphate/polycarboxylic acid) cement  
- Very difficult to remove from the tooth | - For ceramic onlay cementations  
- For long term provisional cementations |
| 4 IRM (Caulk)          | - Traditional powder/liquid zinc oxide eugenol cement  
- “Thick and quick” is the key to IRM mixing | - For provisional cementations when retention is compromised or a stronger cement is desired |
| 5 Temp Bond (Kerr)     | - Zinc oxide eugenol cement in unidose packages of base and catalyst | - For provisional cementations  
- For cementing implant restorations and in permanent restorations if retrievability is desired when mixed with Vaseline(1/3 base, 1/3 catalyst, 1/3 Vaseline) |
| 6 Temp Bond Clear (Kerr)| - Eugenol free  
- Most translucent provisional cement  
- Dual cure nature provides ease of handling and easy removal from restorations | - High esthetic demand  
- For provisional cementations |
| 7 Duo-Link Universal (Bisco) | - Available in 2 esthetic shades of Universal and Milky White  
- Compatible with most dental materials | - For cementation of all-ceramic indirect restorations which require bonding  
- For use in posteriors only |
| 8 Choice 2 (Bisco)     | - High compressive strength light cured composite resin cement  
- Available in A1, A2, A3, B1, B3, C2, D2, Milky White, Universal Opaque and Translucent shades  
- Try in pastes available in all shades | - For cementation of porcelain and indirect composite veneers  
- For cementation of translucent crowns in the esthetic zone |
DENTAL PHOTOGRAPHY

Canon EOS 50D camera and Canon 100 mm macro lens

Canon ring flash, Intra-oral photography mirrors (occlusal & buccal)

Cheek retractors
DENTAL PHOTOGRAPHY

Armamentarium
- Digital SLR body (Canon T3i)
- Compatible Macro lens (~100mm; non-zoom)
- Macro flash (Ring or Dual-point)
- Memory card (SD or CFC)
- Cheek retractors (Wire type)
- Contraster
- Occlusal and buccal mirrors

Settings for Dental Photography
- Exposure mode: M (manual)
- Flash mode: ETTL
- Focus: manual
- ISO: 100
- White balance: Flash
- Image quality: Large JPEG
- RAW for shade images
- Shutter speed: 1/250
- Aperture: f/8 for full face images
- f/22 for intra-oral images

Basic Diagnostic 6 Image Series

Full face smiling
- Use autofocus for this image.
- Patient’s head should be vertical.
- Aperture may need to be adjusted depending on the flash strength magnification 1:15 aperture f/8 magnification.

Lips in Repose (“M” position)
- Turn off auto focus; set magnification to 1:3 and aperture to f/22.
- Instruct patient to say “Emma” or ask them to open their mouth until lips part.
- Used to determine incisal display with lips in repose. (Young women = 3.5 mm; Men = 2 mm)

Maximum gingival display (“E” position)
- Instruct patient to say “Eeee” to give you their biggest smile.
- Used to determine the maximum lip mobility and the amount of gingival display.

Retracted
- Insert retractors.
- Thoroughly dry the teeth and gingiva.
- Teeth should be slightly separated.
- Retractors need to be pulled outward and forward, not backward.

Maxillary occlusal
- Place patient in fully supine position.
- Insert retractors (patient holds)
- Dry teeth, then insert mirror.
- Shoot from 12 o’clock position.
- Focus at 1st premolar.
Comprehensive Diagnostic Series

I. Full face smiling
II. “M” (Lips in repose)
III. “E” (max. gingival display)
IV. “F” (A-P relation)
V. Right smile
VI. Center smile
VII. Left smile
VIII Pre-Operative shade image
IX. Right retracted
X. Center retracted
XI. Left retracted
XII. Right close-up
XIII. Center close-up
XIV. Left close-up
XV. Maxillary occlusal
XVI. Mandibular occlusal
Mandibular occlusal

- Place patient fully supine with head tilted back.
- Insert retractors and dry teeth.
- Place mirror under tongue.
- Shoot from 12 o’clock position.
- Focus at 1st premolar.

Other useful Images

Shade Image (RAW)

- Position shade tabs as close as possible to the teeth to be matched.
- Use the appropriate shade guide for the porcelain to be used.
- Keep tabs vertical, and shade designator should be in the image.

Pre-operative Occlusal

- Use buccal mirror.
- If not using a rubber dam, use cheek retractors.
- Teeth should be clean and dry.
- Shoot from the opposite side of the patient (UL and LL for the right side and UR and LR for the left)

Post-operative Occlusal

- Use buccal mirror.
- If not using a rubber dam, use cheek retractors.
- Teeth should be clean and dry.
- Shoot from the opposite side of the patient (UL and LL for the right side and UR and LR for the left)

Commentary

- Anterior Restoration Image Series has 6 images: Full face smiling, Pre-operative, Preparation, Retracted, Shade Image (RAW) and Post-operative.
- Comprehensive Diagnostic Image Series has 16 images: Full face smiling, “M” (Lips in repose), “E” (max. gingival display), “F” (A-P relation), Center smile, Right smile, Left smile, Pre-Operative shade image, Left retracted, Right retracted, Center retracted, Center close-up, Right close-up, Left close-up, Maxillary occlusal and Mandibular occlusal.

References

- UCLA Student Photography Handbook by Dr. Richard G Stevenson III & Dr. Todd Schoenbaum, 2012
DUPLICATING STUDY CASTS

LABORATORY PROJECT

UNIFORM MIX

REMOVE IMPRESSION FROM TYPODONT

USE VACUUM MIXER TO MIX YELLOW

POUR THE ALGINATE CAST IN YELLOW STONE

TRIM AND FINISH THE CAST
DUPLICATING STUDY CASTS

Armamentarium
- Cast to be duplicated
- Appropriate size alginate impression tray
- Alginate impression material
- Mixing bowl and spatula
- Vacuum mixing bowl
- Yellow stone

Technique
- Place cast in warm tap water for 10-15 minutes. This will ensure that the alginate impression material will not stick to the cast (Alternatively, the cast may be sprayed with PAM cooking spray).
- Select an impression tray large enough to fit over the cast.
- Take an alginate impression of the cast and pour in yellow stone or plaster, depending on intended use of duplicate cast.
- Trim duplicate cast on the model trimmer.

Commentary
- Place patient’s name and date on all casts and indicate whether the cast is the original study cast or the duplicate of the diagnostic wax up cast.

References
- Power Point Presentation on Duplicating Study Casts by Dr. William Morgan, 2013
Topex HandiCaine Stix (SULTAN)  
Lidocaine local anesthesia (2%; 1:100,000)

Mepivacine local anesthesia (3%; NO EPI)  
Septocaine local anesthesia (4%; 1:100,000)
Topex HandiCaine Stix (Sultan)
- Contents 20% Benzocaine
- Premeasured dose 0.40mg

Lidocaine Local Anesthesia (Henry Schein)
- Contents 1.7ml
- Lidocaine HCL 2% (34mg)
- Epinephrine 1:100.000 (0.017mg)
- MRD 300 (mg) (4.4 mg/kg/2.0 mg/lb.)
- Duration 55-65 min for pulpal infiltration
- 80-90 min for pulpal block

Mepivacaine Local Anesthesia (Henry Schein) NO Epinephrine
- Contents 1.7ml
- Mepivacaine HCL 3% (51mg)
- MRD 300 (mg) (4.4 mg/kg, 2.0 mg/lb.)
- Duration 20-30 min for pulpal infiltration
- 34-45 min for pulpal block

Septocaine Local Anesthesia (Septodont)
- Contents 1.7ml
- Articaine HCL 4% (68mg)
- Epinephrine 1:100.000 (0.017mg)
- MRD 500 (mg) (7 mg/kg, 3.2 mg/lb.)
- Duration 60 min for pulpal infiltration
- 120 min for pulpal block

References
- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
Armamentarium:

Including Young’s frame, Rubber Dam sheet, Barbasol Lubricant, Rubber dam punch, Rubber Dam forceps, floss, scissors & retainers.

Retainers (Hygenic®) – Assortment of Rubber Dam clamps are available in the size: W2, W3, W4, W8A, 212, and 27
RUBBER DAM

Armamentarium
- Rubber dam material (2 types: Latex and Latex free) (6” x 6”)
- Frame (Young's Frame)
- Forceps
- Punch
- Retainers (0, W2, W3, 26N)
- Retractors (212, 27)
- Lubricant (brushless shave soap)
- Floss

Key Punch
- For all maxillary dams, the key punch is the central Incisor, with 3” across the midline and 1” below the top edge.
- For mandibular posterior dams, the key punch is the molar, at the 2” by 3” intersection.
- For mandibular anterior dams, the key punch is the canine/PM1, at the 2” by 2” intersection.
- Holes are ¼” apart from each other, which is approximately the width of a mirror handle.
- The largest hole is for the clamp.
- Large holes are for molar teeth.
- Medium holes are for premolars and anterior teeth.
- Class V, increase the hole size, place the hole 3 mm to facial from normal position, increase the hole spacing by 2 mm, and secure the retractor with green stick compound (Note: since the 212 is placed after the dam is placed, it’s not necessary to ligate the floss)

Ideal Guidelines

Retainers
- Anterior: 00, 0
- Premolar: 2, W2
- Molar: W3, W4, 26N
- Pediatric: W8a, W14, W14a

Retractors
- Class V: 212, 212SA, 6, 9
- Gingivally extensive class II: B4
- Distal access and buccal dam retraction: 27

Procedure
- Explain to the patient ‘why’ we are using the Rubber Dam.
- Discuss hand signals with the patient; suction required, pain and break needed.
- Using waxed floss, pre-floss the teeth, ligate the clamp with floss and apply lubricant over holes in the dam.
- The clamp is completely above dam, has four points of contact and engages apical to the height of contour of the tooth.
- Place a wedjet, or a small piece of dam, to secure the contralateral side.
- The dam is completely inverted, sealed well even on the face and does not obstruct the nose.
- The napkin is placed below the dam and the frame is positioned above the dam.
Mark the Key Punch at a point 3” from the top and 2” from the side of the Rubber Dam (6”x6”)

The largest hole punch for the anchor tooth, second largest for molars, followed by the premolars and anteriors, respectively. Smallest size is Pedo punch

Lubricate the punched area with minimal amount of lubricant

Ligate the clamp with floss and grasp it using the forceps

Seat the lingual first and then rotate to seat the buccal side

Slide the rubber dam through the contacts in a single layer

Use floss to position the dam below the contact point

Invert the Rubber Dam

Inverted rubber dam with wedge in place

Mandibular isolation using #212 retractor stabilized with greenstick compound

Specialized B4 (wingless) clamp Used for gingivally extensive preparations
Commentary

- The ideal field includes two teeth distal to the preparation tooth whenever possible, to the contralateral first premolar.
- An acceptable field includes one tooth distal to the preparation tooth and till the midline.
- When using a 27 clamp for distal access, place the W3 first and then replace with the 27.
- Reverse a W2 clamp on premolar, canine mesial abutments when isolating for a fixed dental prosthesis.
- If the patient has trouble breathing through their nose, hold the dam with cotton pliers and cut a hole (15mm in diameter) with scissors, away from the operating side.
- Never place a clamp on an implant-supported crown.
- **Latex-free rubber dams** are available. Ask patients about latex allergies and, to minimize the amount of possible exposure to latex. Schedule all latex-sensitive patients in the morning clinic session as latex is an aeroallergen and present in the air for at least an hour after the use of latex gloves.
- **Isolite** provides two-channel, hands-free vacuum suction and intraoral illumination, thereby providing acceptable, however, less than ideal isolation, in cases where rubber dam is not possible.
- Use rubber dam whenever possible, including crown removal, all direct procedures, adhesive cementations, build-ups (especially dowel cores), sealants and fixed dental prostheses.

References

- Power Point Presentation on Rubber Dam by Dr. Richard G. Stevenson III, 2014
RETRACTION CORDS

GingiBRAID with Alum (Dux Dental/Van-R®)

Ultrapak (Ultradent®) - knitted cord (sizes 000,00,0,1,2,3)
RETRACTION CORDS

Armamentarium
- Local Anesthetic
- Basic cassette
- Rubber dam cassette
- Restorative cassette
- Retraction cords
- Castro-Viejo Scissors

Cord Materials

<table>
<thead>
<tr>
<th>UniBraid with Alum</th>
<th>GingiBraid with Alum</th>
<th>UniBraid and GingiBraid with Epinephrine and Alum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sizes 0a, 1a, 2a are contained in a unidose sterile pack</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each 1-inch cord contains 0.15, 0.90 mg of aluminum-potassium sulfate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Braided cords in size 3a are contained in a glass bottle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each 1-inch cord contains 0.80, 1.50 mg of aluminum-potassium sulfate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Braided cords in sizes 0e, 1e, and 2e are contained in a unidose sterile pack</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each 1-inch cord contains 0.10 - 0.80 mg of epinephrine sulfate and 0.05, 0.50 mg of aluminum-potassium sulfate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Braided cords in size 3e are contained in a glass bottle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Each 1-inch of the cord contains 0.30 - 0.80 mg of epinephrine sulfate and 0.60 - 1.20 mg of aluminum-potassium sulfate</td>
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</table>

Placement Steps
- Use the Ultradent cord packer or a Gregg 4/5 to insert the cord.
- The length should be sufficient to extend completely around the tooth finish line.
- The cord placement should not harm the gingival tissue or connective tissue attachment.
- Use of hemostatic agent is recommended; aluminum chloride is safe and effective at slowing capillary flow.

Commentary
- **Single-Cord Technique** - Placement Steps (Indicated in shallow sulci, thin phenotypes and “high crest” patients)
  - Use the largest cord that will fit into the sulcus, and wait 5-10 minutes, then wet the cord, remove, rinse, dry and attempt the impression. [NOTE: the field must be perfectly dry and free of blood or debris.]

- **Double-Cord Technique** - Placement Steps
  - Place a size 0 (Gingibraid) cord into the sulcus, cutting the length so it fits precisely (castro-viejo scissors) with no overlap, and then refine the finish line – you may prep to the top of the cord and then place a larger cord (as large as possible). Wait 5-10 minutes, then wet the cords, remove the top most cord, leaving the original cord in position, (making sure it does NOT impinge on the finish line) rinse, dry and attempt the impression. [NOTE: the field must be perfectly dry and free of blood and debris.]

- Epinephrine impregnated cords are potentially risky due to possible systemic effects and must be used after a thorough understanding of patient’s health status and only with instructor’s approval and close supervision.

References
- Clinical Restorative Dental Materials Dr. Richard G. Stevenson III, 2014
HEMOSTATIC AGENTS

1) Hemogin-L (Van R) Hemostatic Solution

2) Viscostat (Ultradent®) - a 20% ferric sulfate liquid hemostatic agent.

3) Unidose Hemostatic Gel-Van R
HEMOSTATIC AGENTS

Material
Hemostatic agents in Restorative Dentistry are used to meet the objective of hemorrhage control in order to maintain a dry, clean working field. Locally applied hemostatic agents are called ‘Styptics’.

Indications
- Control of hemorrhage from inflamed interproximal tissues.
- During final impression, when needed.
- Direct restorations, if needed.
- As a ‘fixative’ for pulpotomy.
- Soak cords in liquid, then squeeze away excess before use.
- To prevent sulcular fluid contamination during direct bonding procedures.
- For tissue retraction, Impregnated with retraction cord.

Materials Used
Note: Available in liquid, gel and paste form.

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>• 25% aqueous solution of aluminium chloride</td>
<td>• 20% gel of (aluminium-chloride)</td>
<td>• 20% ferric sulphate solution</td>
<td>• 25% viscous gel of aluminium chloride</td>
</tr>
<tr>
<td>• Supplied in 40mL dropper top bottles</td>
<td>• Must be stirred or liquefied prior to use</td>
<td>• Supplied in syringes with brush tips</td>
<td>• Supplied in syringe with brush tips</td>
</tr>
</tbody>
</table>
Premier’s Traxodent (retraction and hemostatic paste)
Material properties
Traxodent is a retraction and hemostatic paste (Premier Dental), supplied preloaded in disposable syringes. It is a clay based hemostatic agent composed of kaolin and 15% aluminum chloride and can be used in virtually any clinical situation in which control of bleeding is required. When used with a compression cap, it also provides excellent tissue retraction, making it acceptable for most crown-and-bridge procedures when the minimal cord technique is not possible.

Instructions
- Bend tip for optimal access.
- Position tip parallel to axial plane of tooth.
- Dispense sufficient material to displace tissue.
- Place Retraction Cap (Roeko) on tooth structure.
- Have patient bite and maintain pressure on the cap for 2-5 minutes.
- Rinse away leaving sulcus open and accessible.

Commentary
- Optional cord technique: eliminates the need for a second cord; place size 0 cord and dispense sufficient material to displace tissue, wait for 2-5 minutes, followed by water rinse with HVS.

References
- Premier Traxodent Instruction Sheet
- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
RETRACTION CAPS

Comprecap (Roeko)  
Scalloped retraction caps

Bite on for 2-5 minutes  
Moisture controlled
RETRACTION CAPS

Material properties
- Cotton retraction caps in 3 different sizes (Anterior, Premolar and Molar).

Indications
- The Retraction Caps (Roeko) work in tandem with Traxodent (Premier) or with cords alone to enhance retraction.
- Assist hemeostasis.

Instructions
- Under bite compression (2-5 minutes) these hollow cotton caps gently guide Traxodent paste (Premier) or cords into the sulcus for maximum tissue deflection.

Commentary
- Anatomic form ensures even compression.

References
- Instruction sheet Retraction Caps (Premier)
Electrosurgery unit along with surgical tips

1) A narrow (Horizontal T-16) loop can be used to remove soft tissue prior to a preparation or to enlarge the sulcus around a preparation.

2) Vari-tip (Scalpel Point-T2) electrode is used to create a lateral space around the tooth without moving the attachment in an apical direction.
**ELECTROSURGERY**

**Electrosurgery**
Application of electrically generated heat energy to tissue to alter it for therapeutic purposes.

**Types of currents**
- Electrosection (Cutting)
- Electrocoagulation (Coagulating)
- Fulgeration (Sealing)
- Dessication (Destruction)

**Principles of Electrosurgery**
- Rapid, well planned movements.
- No pressure.
- Brushing strokes, like a painter.
- Keep moving the electrode.
- Use high enough current to prevent tissue dragging.

**Tips**
- Vari-tip (Used to create trough around the tooth & beyond the finish line for final impressions).
- Narrow loop (Used for lowering the gingival crest and inter-dental papilla).
- Small loop and Large loop (Used to reduce or recontour pontic areas).
- Large wire (Used for gingival retraction & to coagulate bleeders between teeth).
- Ball (Used to coagulate bleeders).

**Commentary**
- Variation in current requirements depending upon electrode selection, thickness & density of tissue, properties of the saliva, excessive moisture or excessive dryness, changes in the pH of the saliva are done.
- Contraindicated in ‘thin’ gingival tissue biotype (thin attached gingiva) and in patients with electronic medical devices (pacemakers).
- Tips should not contact metal or bone.
- **Soft Tissue Laser;** Applications overlap with electrosurgery, however, Soft Tissue Laser is more precise, produces less heat and can be used adjacent to metal/bone.
  NOTE: The Picasso (Diode) laser is only available in the Advanced Restorative Clinic under trained faculty guidance.

**References**
- Electrosurgery in Restorative Dentistry Dr. Donald W. Fisher
BISCOVER LV

**TECHNIQUE FOR PLACEMENT ON CURED COMPOSITE**

1. Etch for 15 seconds.
2. Rinse copiously.
3. Air dry thoroughly.
4. Apply BISCOVER LV (one thin coat).
5. Allow 15 seconds for evaporation. Do not air thin.
6. Light-cure 30 seconds with an LED or halogen light.  
   * See instructions for curing times when using other curing lights.
BisCover LV

BisCover LV is a low-viscosity, light-cured resin formulation used to seal the surface of restorations while leaving a smooth polished/glazed surface. Due to its unique proprietary chemistry, BisCover LV cures without any sticky oxygen-inhibited layer. The unique chemistry of BisCover LV allows for the use of LED, PAC, and halogen curing lights to achieve polymerization. BisCover LV is used to seal and polish/glaze: newly placed direct composites (cured only), previously placed direct composites, provisionals etc.

On Newly Placed Composites

- Light cure and contour the composite
- Apply acid etchant to the cured composite and adjacent tooth structure for 15 seconds
- Rinse and dry
- Continue with Section “Applying BisCover LV”

On Old/Previously-Placed Composites or for Reapplication

- Pumice the surface, or sandblast, or roughen with a fine diamond. Rinse and dry
- Apply acid etchant to the cured composite and adjacent tooth structure for 15 seconds
- Rinse and dry
- Continue with Section “Applying BisCover LV”

Provisionals (all types): NOTE: Can be used prior to or after cementation

- Contour the provisional restoration
- Rinse and dry. (Etching is not required)
- Continue with Section “Applying BisCover LV”

Applying BisCover LV

- Dispense BisCover LV into a mixing well. Dip the brush into the BisCover LV. Wipe excess from the brush onto the side of mixing well. The brush does not need to be saturated, just wet enough to apply one thin coat.
- Apply one thin coat of BisCover LV in one direction with a smooth stroke. Do not agitate the brush during application. It is very important that one allows 15 seconds dwelling time for evaporation of solvent after application. Do not air thin as this will disperse the material unevenly causing ripples on the surface.
- BisCover LV uses the following curing lights and curing times to initiate polymerization. Insufficient curing will leave an air-inhibited layer on the surface of BisCover LV. a. LED Lights: Light cure for 30 seconds at close range (0-2mm). b. Halogen Lights: Using a halogen curing unit, light cure for 30 seconds at close range (0-2mm). c. PAC (Plasma Arc) Lights: Using a PAC light, light cure for 10 seconds at close range (0-2mm).
- If a second coat is desired, repeat the above three steps

References

- Clinical Instruction Sheet of Biscover LV
The Diagnostic Diamond

A risk based approach to evaluating patients in four major areas: Periodontics, Biomechanics, Function and Esthetics has been adopted and upon assessing all the major areas a prognosis is derived based on the findings.

### UCLA SOD Comprehensive Diagnosis & Treatment Planning

<table>
<thead>
<tr>
<th>Patient</th>
<th>Clinics: WW WW-SS VDC VDC-SS</th>
<th>Student: VDC-ACTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perio Dx</td>
<td>GEN / LOC Mild / Mod / Sev Chronic / Acute</td>
<td>Hornt / Vert Bone Loss</td>
</tr>
<tr>
<td>Ging Dx</td>
<td>Plaque Ind / Non-Plaque Ind Gen / Loc Mild / Mod / Sev</td>
<td></td>
</tr>
<tr>
<td>Fissuration Involvement</td>
<td>Diabetes Y / N Type I / II HBA1C:</td>
<td>Habits: Smoking PPD: EHDI DPO: Drugs Social / Habit</td>
</tr>
<tr>
<td>Mobility: 1: 1 / 2 2: 2 / 3 3: 3 / 4</td>
<td>Recession: 1mm: 1 2mm: 2mm: 3mm: 3</td>
<td>Alopecia: Muco-Ging Prob:</td>
</tr>
<tr>
<td>AAP Classification: I II III IV</td>
<td>Overall Risk Profile: Low Moderate High</td>
<td>Overall Prognosis: Good Fair Guarded Poor Hopeless</td>
</tr>
</tbody>
</table>

### Medical or Logical Complications to Tx?

- Modifications to Tx?

### Epworth Sleepiness Scale

- Likelihood of dozing when: Cradling Baby 0 1 2 3
- Watching TV 0 1 2 3
- Lying in Bed 0 1 2 3
- Sitting in Public 0 1 2 3
- Car Passenger 0 1 2 3
- Lying in Afternoon 0 1 2 3
- Sitting & Talking 0 1 2 3
- Sitting After Lunch 0 1 2 3
- Stopped in Traffic 0 1 2 3

### Overall Risk Profile:

- Low Moderate High

### Overall Prognosis:

- Good Fair Guarded Poor Hopeless

### Tooth Color: A with Bleaching? Y / N

### TET Staining? Y / N

### Tooth Pos: Alter or Accept Y / N

### Lip Dynamics: Hyper <5mm Normal 6-10mm Hyper 10mm+ Asymmetrical

### Gummy Smile: SUL LHM AE VME WCE AAE APE

### Ging Architecture: Phenotype Thin Nil or THick Sealing Nil or Low Bink Triangles

### Biological Width Problems:

<table>
<thead>
<tr>
<th>Patient Concerns:</th>
<th>Patient Expectations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall Risk Profile: Low Moderate High</td>
<td>Overall Prognosis: Good Fair Guarded Poor Unrealistic</td>
</tr>
</tbody>
</table>

### Patient Healthcare Resources: Unlimited Limited; please explain:
CC: Chief complaint should be recorded in patient’s own words.

HPI: History of present illness, Past Medical/Dental history, and Social history should be recorded.

Medical or Logistical Problems: All the medical concerns, drug allergies (if any) should be recorded and treatment plan modified accordingly.

ASA Classification

<table>
<thead>
<tr>
<th>ASA PS Category</th>
<th>Preoperative Health Status</th>
<th>Comments, Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASA PS 1</td>
<td>Normal healthy patient</td>
<td>No organic, physiologic, or psychiatric disturbance; excludes the very young and very old; healthy with good exercise tolerance</td>
</tr>
<tr>
<td>ASA PS 2</td>
<td>Patients with mild systemic disease</td>
<td>No functional limitations; has a well-controlled disease of one body system; controlled hypertension or diabetes without systemic effects, cigarette smoking without chronic obstructive pulmonary disease (COPD); mild obesity, pregnancy</td>
</tr>
<tr>
<td>ASA PS 3</td>
<td>Patients with severe systemic disease</td>
<td>Some functional limitation; has a controlled disease of more than one body system or one major system; no immediate danger of death; controlled congestive heart failure (CHF), stable angina, old heart attack, poorly controlled hypertension, morbid obesity, chronic renal failure; bronchospastic disease with intermittent symptoms</td>
</tr>
<tr>
<td>ASA PS 4</td>
<td>Patients with severe systemic disease that is a constant threat to life</td>
<td>Has at least one severe disease that is poorly controlled or at end stage; possible risk of death; unstable angina, symptomatic COPD, symptomatic CHF, hepatorenal failure</td>
</tr>
<tr>
<td>ASA PS 5</td>
<td>Moribund patients who are not expected to survive without the operation</td>
<td>Not expected to survive &gt; 24 hours without surgery; imminent risk of death; multiorgan failure, sepsis syndrome with hemodynamic instability, hypothermia, poorly controlled coagulopathy</td>
</tr>
<tr>
<td>ASA PS 6</td>
<td>A declared brain-dead patient who organs are being removed for donor purposes</td>
<td></td>
</tr>
</tbody>
</table>

*ASA PS classifications from the American Society of Anesthesiologists*

PERIODONTAL

Separate Periodontal diagnosis and Gingival diagnosis should be made.

Periodontal Diagnosis

Ranges from GEN/LOC, MILD/MOD/SEV, CHRON/ACUTE HORT/VERT. BONE LOSS

Gingival Diagnosis

Ranges from PLAQUE IND/NON-PLAQUE IND, GEN/LOC, MILD/MOD/SEV
Furcation Involvement

Site and surface should be recorded. Furcation site should be classified according to Glickman’s Classification:

- **Grade 1**: Incipient lesion with slight bone loss in furcation area, no radiographic changes.
- **Grade 2**: Cul-de-sac lesion (bone is destroyed on one or more aspects of furcation, but a portion of alveolar bone and periodontal ligament intact permitting partial penetration of probe, radiographic changes may or may not be present).
- **Grade 3**: Interradicular bone is completely lost, but facial and lingual surfaces are occluded by gingival tissues, bone loss present in radiographs.
- **Grade 4**: Interradicular bone is completely lost. Facial and lingual gingival tissues also recede apically and through and through furcation opening is seen clinically.

Mobility

If present should be recorded (Miller’s Classification)

- **Grade 1**: < 1 mm tooth movement in buccolingual or mesiodistal direction.
- **Grade 2**: 1 mm or more tooth movement in buccolingual or mesiodistal direction, but not in occlusoapical direction.
- **Grade 3**: > 1 mm tooth movement in buccolingual or mesiodistal direction and in occlusoapical direction.

Gingival Recession

If present should be recorded ranging from 1 mm to > 3 mm.

Occlusal trauma

If present should be assessed clinically (Fremitus, Occlusal prematurities/discrepancies, Chipped teeth, Wear facets, Progressive Mobility etc.) and radiographically (Widened PDL space, Bone loss, Root resorption) and distinction should be made between primary and secondary occlusal trauma by assessing the attachment loss in the specific site.

Periodontal risk assessment

- **Patient Specific**: Genetics (Ethnicity), Smoking, Diabetes
- **Tooth Specific**: Secondary Occlusal Traumatism
- **Site Specific**: Infrabony Component

- Bone Loss < 2mm (horizontal) with no infrabony defects (AAP Classification) 0-II: Low risk
- Bone Loss 2-4 mm (horizontal) with isolated infrabony defects (AAP Classification) III: Moderate risk
- Bone Loss > 4 mm (horizontal) with infrabony defects (AAP Classification) IV: High risk

Bone loss is more detrimental than increased pocket depths.

Overall Prognosis should be assessed ranging from Good, Fair, Guarded, Poor and Hopeless.

BIOMECHANICAL

Caries Risk Assessment should be done.

Prevention

It is expected that a CAMBRA profile be generated for every new patient. Patients with Moderate to High caries risk will undergo the Caries Management System prescribed by UCLA as taught in the Caries Curriculum Track.

Sealants

Are indicated in the following clinical situations:
1. Newly erupted molars
2. Susceptible tooth surfaces in patients with a recent downgrade in caries control
3. To replace existing sealants which have worn or been lost
4. In patients with no active class II lesions

**PRR**

Not indicated - these procedures are classified as *composite restorations* by the Division of Restorative Dentistry.

**Caries Control**

*The treatment objective for caries control is to remove the decay from all of the advanced carious lesions, place appropriate pulpal medication, and restore the lesions in the most expedient manner. (The Art and Science of Operative Dentistry, 4th Ed., Sturdevant, pp.126-130, 2002)*

A procedure or series of procedures used to rapidly control the progression of caries. Typically the peripheral caries is removed and a glass ionomer restorative material (Fuji IX) is placed. These temporary restorations usually should be replaced with more permanent restorations at a later date, when factors promoting caries formation have been controlled and the prognosis of the tooth pulp has been determined. No attempt to prepare the tooth beyond this is advised – undermined enamel may remain. The bur of choice is a diamond 330 and a large round bur. Adequate anesthesia and rubber dam are essential.

Caries control is indicated when:

1. the caries is extensive enough that adverse pulpal sequelae are soon to occur,
2. the goal of treatment is to remove the nidus of caries infection in the patient’s mouth or
3. a tooth has extensive carious involvement that cannot or should not be permanently restored because of inadequate time or questionable pulpal progress.

**Overall Biomechanical Risk Assessment and Prognosis**

Should be derived by taking following factors into consideration:

- Direct/ Indirect restorations reqd.
- NCCL’s
- Structural Compromises and Wear
- Pulpal Disease or Questionable RCT
- Extractions/Fixed Partial Dentures/Implants

**Direct Restorations**

The most conservative restoration possible which meets the esthetic, survival and financial concerns and expectations of the patient. Initial caries should normally be restored with direct restorations:

- Class I, II, III, V – Composite or amalgam
- Class IV – Composite
- Root caries – Glass ionomer (GI or RMGI) or amalgam

**Composite Restorations**

Indicated in patients with controlled caries, good oral hygiene, who demand a tooth colored restorative material and are willing to have a rubber dam placed. When remaining enamel exists at all anticipated cavosurface margins.
Great for class II initial lesions – using a slot preparation
May be used in conjunction with sealants on the same surface
First choice for replacing a defective amalgam or composite
Preferred to a ceramic inlay (similar longevity and lower cost to patient)

**Contraindications**

- Worn occlusal surface
- Gingival margin on dentin (unless placing GI open sandwich)
- Isthmus wider than 2 mm (over 1/3 intercuspal dimension)
- Patient unable to tolerate rubber dam
- Uncontrolled caries
- Cracked cusps
- Failed previous composite

**Glass Ionomer Restorations**

At UCLA we have two glass ionomer restoratives available: Fuji II LC, a resin modified light cured material, and Fuji IX GP, a traditional, packable, chemical set glass ionomer.

Either material may be used to restore root caries. The material may be veneered with composite in high esthetic demand areas. A cavity conditioner must be used prior to placing the restorative material, unless a liner of glass ionomer is placed first. Fuji IX is commonly used in caries control procedures or when a long term temporary restoration is required.

**Amalgam Restorations**

Indicated in patients with poorly controlled caries, or when the lowest cost restorative material is desired. We have two amalgam materials: Tytin, a regular set, spherical zinc free amalgam, and Contour, an admixed, zinc free, regular set amalgam. Tytin sets fast and is therefore not indicated in large amalgams, however, makes a good build-up material.

Amalgam may be used in the following situations:

- Class I, II, II, and V lesions (initial or replacement)
- Large class II restorations which require a cusp(s) to be covered
- Slot and pothole retained build-ups
- Pin Build-ups
- Core Build-ups
- Post Build-ups
- Amalgam onlays or crowns (for endodontically treated teeth)

**Indirect Restorations**

Indications for an indirect restoration are:

- Replacing a failed existing indirect restoration
- Restoring a root canal treated posterior tooth
- Restoring a severely worn occlusal surface
- Restoring VDO
- Abutments for FPD’s and RPD’s
- Implant crowns
- Restoring or improving esthetics when bleaching/bonding is not possible
- Cracked tooth syndrome

Whenever possible, the most conservative restoration that satisfies the periodontal, functional, biomechanical and esthetic demands or the patient and situation should be planned. For the majority of cases in the molar region, partial gold veneers are indicated, however, many patients object to the occasional display of gold. Nonetheless, ever effort should be made to encourage the patient to opt for partial coverage gold, especially on second molars. Full gold crowns are another option in these regions.
Occasionally a patient may have an aversion to amalgam and composite and yet still require a conservative intracoronal restoration. In these situations, a gold inlay may be performed.

When patients simply cannot tolerate gold, the options are either a partial bonded ceramic, all ceramic or porcelain fused to metal restoration.

The following options exist:

Partial ceramic (onlay, ¾ crown) – emax, pressed or chairside milled
- NO INLAYS (these should be direct composites)
- Must have enamel margins in ALL areas
- Patient must understand possible limitation on esthetics and longevity
- These ARE ALWAYS bonded

All-Ceramic Crown options
- Emax (lithium disilicate, monolithic or layered with feldspar), Empress Esthetic (Leucite, layered with feldspar)
  LAVA (Zirconia core layered with feldspar)
- These MAY be bonded or cemented
- Only on patients with controlled bruxism
- FPD’s when specific criteria are met (see ACC FPD EMAX GUIDELINES DOCUMENT)

Non-Carious Cervical Lesions (NCCL’s)

We have established SIX indications for the placement of restorative material into these defects:

1. Esthetics (patient generated)
2. Sensitivity (temperature, tactile, bacterial)
3. Plaque trap (risk of disease progression)
4. Decay (previously hard dentin becomes soft)
5. Pulpal encroachment (fear of pulpal disease)
6. RPD clasp planned (to remove undercut)

The Worn Dentition

Before any treatment can be recommended, the worn dentition requires a diagnosis. Worn dentition is described in the Functional diagnosis section of diagnostic diamond.

Fixed Partial Dentures

“The implant is ideally suited for the replacement of a single tooth if the teeth that would have served as abutments are untouched by caries or previous restorations. On the other hand, if those teeth need extensive restorations, the patient can be saved expense and additional treatment if the restorations also serve as retainers for a fixed partial denture.”


In the posterior, normally we used FPD’s to replace a missing tooth up to a molar in size, however, occasionally a 4-unit (more than one molar replacement in size, but not more than two teeth), when adequate root length, bone support and occlusal stability exist. We do not double abut teeth. Third molars should only be used as FPD abutments if they are upright, completely erupted, with little or no mesial inclination, and with long distinctly separate roots.

An abutment: pontic ratio of 1.0 or greater is considered favorable. (Ante’s law)

Maryland bridges are not preferred and if they are attempted, they require very precise, retentive designs (grooves/pins) in order to be successful. They usually should only be considered for younger patients with healthy un-restored abutments.

If a pontic space is less than 7 mm an implant will be difficult to place and restore, hence an FPD would usually be a better option.
Complex FPD’s and Double abutment indications:

<table>
<thead>
<tr>
<th>Missing tooth (teeth)</th>
<th>Abutments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxillary Canine*</td>
<td>First Premolar, Lateral and Central</td>
</tr>
<tr>
<td>Mandibular Canine*</td>
<td>First Premolar, Lateral and Central</td>
</tr>
<tr>
<td>Mandibular Central and Lateral Incisor</td>
<td>Canine, Central and Lateral</td>
</tr>
<tr>
<td>Maxillary Central Incisors</td>
<td>Laterals and Canines**</td>
</tr>
<tr>
<td>Maxillary Lateral Incisor and Canine</td>
<td>Centrals and Premolar(s)</td>
</tr>
<tr>
<td>Mandibular Lateral Incisor and Canine</td>
<td>Lateral Incisor, Canine and Premolar</td>
</tr>
<tr>
<td>Maxillary Canine and First Premolar</td>
<td>Molar, Premolar, Lateral and Central</td>
</tr>
<tr>
<td>Mandibular Canine and First Premolar</td>
<td>Premolar, Lateral and Central</td>
</tr>
<tr>
<td>Both Maxillary Centrals and one Lateral</td>
<td>Canines and Lateral</td>
</tr>
<tr>
<td>All Maxillary Incisors</td>
<td>First Premolars and Canines***</td>
</tr>
<tr>
<td>All Mandibular Incisors</td>
<td>Canines</td>
</tr>
<tr>
<td>Maxillary Premolars and First Molar</td>
<td>Second Molar and Canine****</td>
</tr>
</tbody>
</table>

*single implant greatly preferred

**unless lateral roots are long

***unless A-P spread is minimal or canines are long

****only if opposing is RPD, and abutments are ideal (the abutment: pontic ratio is 0.8)

Pier Abutments

In cases where the planned pontics are on both the mesial and distal sides of a loan tooth, the pier abutment and FPD design will require a non-rigid connector. The keyway (female portion) will be placed in the distal of the pier abutment and the Key (male) will be placed on the mesial of the pontic of the distal FPD segment. Usually non-rigid connectors are not required in mandibular anterior teeth with pier abutments because of the short roots and relatively short spans.

In most situations, implant supported crowns are preferred over FPD’s in patients who are non-smokers, do not have a history of advanced periodontal disease and have well-controlled diabetes.

**COAD (Clean out and diagnose)**

A procedure to determine the restorability of a tooth – not caries control. Examples include: a crown on a tooth with unknown restorability, a failing root canal with an existing crown, and/or a failing FPD.

**Decay, Pulp Exposures and Pulp Caps**

If a tooth has a vital pulp and the diagnosis is that the pulpal inflammation is reversible (cold or sweet sensitive, with no unprovoked pain, no PARL), the decay may be left unexcavated adjacent to the pulpal structures, as long as the following are accomplished:

1. Rubber dam is used.

2. The surrounding DEJ is completely clean and decay free ("squeaky clean!").
3. Calcium Hydroxide is placed over the pulpal area.

4. RMGI liner (Fuji Lining LC) is used to “tack down” the Ca (OH)_2

5. A sealed final restoration is placed.

6. The patient is informed of the risk of pulp disease and subsequent complications (pain, infection, tooth fracture) and treatment possibilities (RCT, Extraction, Implant, etc.)

**Overall Biomechanical Risk Assessment**

- No carious lesions in past 3 years, Minimal Erosion, No Structural Compromises in Teeth: Low risk
- Two carious lesions in past 3 years with other shared factors: Moderate risk
- More than 3 carious lesions in past 3 years with Severe Erosion and Structural Compromises in Teeth: High risk

Overall Prognosis should be assessed ranging from Good, Fair, Guarded, Poor and Hopeless

**FUNCTIONAL**

Making a Functional Diagnosis

- Evaluation of Teeth: Wear/Restoration Fractures/Mobility
- Joint load test
- Joint immobilization test
- 12 Kois Questions

**The Worn Dentition**

Before any treatment can be recommended, the worn dentition requires a diagnosis. The possible causes of the wear are:

- **Bruxism (sleep bruxism)**
  - Note severe posterior wear, suspect OSA, look for signs of GERD
  - Brain mediated – only treated with Night Guard

- **Dysfunction (daytime clenching and parafunction)**
  - Uneven wear – sometimes on one side, or only in the anterior
  - Requires functional work-up and deprogrammer/equilibration

- **Constricted Chewing Pattern (Constricted envelope of function)**
  - Wear of anteriors only, maxillary linguals and mandibular facial
  - Usually requires ortho, new crowns (can’t be equilibrated)

- **Erosion (intrinsic or extrinsic)**
  Intrinsic (GERD, Emesis)
    - cross check with sleep bruxism and OSA
    - lingual of posterior mandibular teeth
    - medical referral
  Extrinsic (Diet, industrial)
    - Soda (low pH) lemons, drug abuse
    - Abrasion (dentifrice and tooth brush habits)
    - Normal Wear (only 10-12 microns per year)
**Joint Load Test**

- Healthy joints will accept unlimited loading
- Pain in the TMJ indicates a Joint problem

**Steps**

- Place cotton rolls near premolar areas
- Push mandible upwards with one of your hands (Brace the forehead of the patient with your other hand)
- Push mandible laterally-right
- Push mandible laterally-left

Pain experienced during this test is from JOINTS

**Joint Immobilization Test**

- Secure jaw by squeezing and have patient try to move the jaw
- Pain in the muscles indicates a MUSCLE problem

**Steps**

- Immobilize Jaws
- Have patient move-left
- Have patient move-right

**12 Questions**

1. **Do you have any problems with your jaw joint (pain, sounds, limited opening, locking, popping)?**
   - Concerns for TMJ stability
   - Differential dx to rule out structural joint problems with Load Test in centric and eccentric positions vs. Immobilization Test. Potentially rules our Acceptable Function, but does not rule out any of the remaining occlusal disorders of non-dental origin
   - Sounds can’t be treated but are warning signs
   - Pain may get worse with your treatment
   - Possible Dysfunction

2. **Do you feel like your lower jaw is being pushed back when you bite your teeth together?**
   - Concerns for TMJ and/or muscles
   - Most likely CCP

3. **Do you avoid or have difficulty chewing gum, carrots, nuts, bagels, baguettes, or other hard, dry foods?**
   - Concerns for TMJ vs. muscles
   - TMJ if CCP or Dysfunction if distalizing vectors exist during chewing
   - Muscle concerns if related to inefficient chewing system which creates premature muscle fatigue and/or attrition, primary occlusal traumatism. However, if the patient is missing many posterior teeth they may have Acceptable Function, but not enough posterior teeth to chew efficiently. Patients that avoid posterior teeth when chewing may present with no posterior attrition (may likely be fast eaters, less chewing cycles) would more likely have a CCP

4. **Have your teeth changed in the last 5 years, become shorter, thinner, worn?**
   - Indicates the problem is active:
   - Generalized attrition/shorter – usually Dysfunction, Parafuction, Neurologic
   - Anterior attrition/thinner – usually CCP
   - Additional shared risk factors for higher friction may be the occlusal relationship or opposing abrasive materials (porcelain – unpolished), tongue parafuction (perimyloysis), cheek suckin. NOTE: May have shared risk factor for erosion. Higher risk of erosion (extrinsic – dietary), note more “chipping” or “cupping”. Attrition with
exposed dentin with no evidence of cupping – higher risk for attrition (Dysfunction), excessive attrition (Parafunction and Neurologic Disorder). Other shared risk factors may include intrinsic erosion i.e. GERD (affects mandibular posterior teeth) and Bulimia (affects linguals of maxillary anterior teeth).

5. Are your teeth becoming crooked, crowded or overlapped?
   - Crowding is usually physiologic as proximal surfaces wear during chewing. Point interproximal contacts become flat surfaces

6. Are your teeth developing spaces or becoming more loose?
   - Developing spaces provide concern for primary occlusal traumatism (mobility with normal bone support) usually a function of Dysfunction or CCP
   - If accompanied with bone loss or periapical infection, diagnosis more likely to be secondary occlusal traumatism

7. Do you have more than one bite, squeeze, or shift your jaw to make your teeth fit together?
   - Consider Dysfunction if clenching is adaptive (to make them fit)
   - Parafunction is not associated with improving fit (usually occurs during stressful events)
   - Possible dysfunction
   - Possible CCP – ask patient where they bite – if it’s on front teeth only, may be CCP

8. Do you place your tongue between your teeth or rest your teeth against your tongue?
   - Concerns for Tongue being used as an appliance

9. Do you chew ice, bite your nails, use your teeth to hold objects, or have any other oral habits?
   - Parafunction

10. Do you clench your teeth in the daytime or make them sore?
    - Parafunction

11. Do you have any problems with sleep (i.e. restlessness), or wake up with a headache/pain?
    - Restless leg syndrome – 15% of these have sleep bruxism
    - Only 8% of people have sleep bruxism

12. Do you wear or have you ever worn a bite appliance?
    - If you look at the splint, the wear patterns will be in the posterior
    - Parafunction
**P1, P2 AND P3 Recording**

P1, P2 and P3 positions should be recorded as described below in the chart along with Epworth Sleepiness Scale Score (10-17 Needs Evaluation for possible Sleep Apnea ? and 18 + is Critical)

<table>
<thead>
<tr>
<th>P1 = POSITION (Orthopedic position of the mandible)</th>
<th>P2 = PLACE (Occlusion, Esthetics)</th>
<th>P3 = PATHWAY (vs. “Guidance”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective: reference, starting point. Deprogram when any of the above questions are “YES”</td>
<td>Objective: vertical support, posterior teeth</td>
<td>Objectives: minimize friction and load, and avoid chewing interferences</td>
</tr>
<tr>
<td>CR may be recorded when MIP is acceptable without deprogramming - use a leaf gauge or Lucia jig</td>
<td>Use thin articulating paper - dry the teeth and use a small amount of Vaseline on the paper to transfer the ink</td>
<td>Use thick paper with patient upright - chew on periphery wax with horseshoe paper in place - no marks on anterior teeth!</td>
</tr>
<tr>
<td></td>
<td>Use shimstock</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Caution: Teeth with Perio or Endo issues may be in hyper occlusion</td>
<td></td>
</tr>
</tbody>
</table>

If there are “yes” answers use the deprogrammer as a diagnostic tool to find the cause. Deprogrammers offer an easy CR mounting technique for patients who do not have accurate bite relationships. Other use: as a diagnostic tool to differentiate between three types of abnormal attrition:

1. Dysfunction: If the jaw moves back on deprogrammer it is mostly occlusal dysfunction
2. Constricted chewing pattern: If the jaw moves forward on deprogrammer it is CCP as the patient now wants to come out of the constricted bite
3. Parafunction: If you see wear patterns on deprogrammer it is most likely parafunction

**Kois Deprogrammer**

- The Kois Deprogrammer (KD) is a Hawley appliance with a modified anterior bite plane.
- It separates the dental arches and provides a single lower-central incisor contact against the anterior bite plane.
- The Kois protocol recommends this design with a labial arch wire.
- The design variation to the right is useful for patients with high esthetic demands.
How does deprogrammer work?

- When patient bites down, their jaw will shift to try and function away from occlusal interferences (muscle splinting)
- Muscles begin to memorize this kind of uncoordinated movement
- Deprogrammer prevents the occlusal interferences from coming into contact and allows muscles to relax
- When muscles are relaxed, condyles can move into CR position (no more uncoordinated muscles or occlusal interferences guiding this movement)
- Patient is considered deprogrammed when he or she reproduces the same single spot on platform without guidance or support.

Delivery Protocol

- One point of contact on platform and want it close to midline
- Platform should allow mandible to move freely anterior-posterior slide without deviating mandible
- Free lateral movement
- Approximately 1-2 mm of clearance between opposing teeth
- Have patient wear for <20 hours/day for 1 week
- Can wear for longer time, but patient is usually deprogrammed after 1 week
- Patient is deprogrammed when he or she reproduces the same single spot on platform without guidance or support
- The bite registration is taken with the appliance in place. This allows great control of the vertical dimension of occlusion.

Functional Diagnosis and Treatment

Acceptable Function

- No yes answers
- MIP is working
- Treat in MIP
- If altering VDO, must use CR
- Wear may exist but patient has adapted

Dysfunction

- Yes answers: wear, pain, poor bite
- MIP is NOT working
- Use KDP to determine CR position – JAW moves BACK
- CR record
- Trial equilibration on mounted casts
- Treat with EQ, REST, ORTHO or SURGERY

Constricted Chewing Pattern

- Yes answers: fast eater, can’t chew hard foods, joint pain
- MIP is NOT working
- Use KDP to determine CR position – JAW moves FORWARD
- CR record
- Equilibration not possible
- Treat with REST, ORTHO or SURGERY

Parafuction

- Yes answers: sleep issues, worn teeth, muscle pain
- MIP may or may not be working
- A brain mediated event – it’s NOT occlusion
- Treat with Sleep Medicine referral, Night Guard
Neuromuscular Disorders

- Yes answers: facial pain, uncontrolled movements, facial tics, burning pain, severe headaches
- MIP MAY or MAY NOT be working
- Refer to OFP for Dx and Tx

Findings from the clinical examination should be related with the answers from the questions and a risk profile and prognosis is generated

**Overall Risk Functionally**

- Acceptable Chewing / Swallowing, Speaking, Breathing: Low risk
- Constricted Chewing Pattern / Dysfunction: Moderate risk
- Parafunction / Neurologic Disorders: High risk

**ESTHETICS**

Esthetics is the area where apart from clinician’s judgment patient’s expectations too play a bigger role. The need here is to establish the delicate balance between patient’s expectations and probable realistic results

**Lip length:** The length of the upper lip is measured from subnasale to inferior border of upper lip in repose. The average length of the upper lip is 20-22 mm in young adult female and 22-24 mm in young adult male. In gentle repose approx. 3-4 mm of the incisal edges of maxillary central incisors should be displayed in young adult female and 1-2 mm in a young adult male. There should be 0 mm display of maxillary cuspids in repose position. The upper lip tends to lengthen with age. After 40 years of age the amount of incisal edge display decreases 1 mm per decade.

**Lip mobility:** Mobility of upper lip is measured from repose position to high smile position. The average lip mobility is 6-8 mm. In a patient with excess gingival display in full smile, hypermobility of the upper lip may be a contributing factor. In full smile, the incisal edges of maxillary anterior teeth are cradled by the lower lip. If there is a reverse incisal edge curve in relation to the lower lip esthetics can be enhanced with increased incisal edge length.

**Smile line:** The upper lip should ideally translate upto gingival line (70% of the population, 10% have high smile line and 20% have low smile line). To evaluate the gingival line, a straight line is drawn from the tooth-gingiva interface of right maxillary canine to the tooth-gingiva interface of the left maxillary canine. The tooth-gingiva interface of both central incisors should be on this line and of both lateral incisors should be 1.5 mm up or below it. Gingival papilla is most coronal between central incisors. Gingival height and contour can be altered restoratively, orthodontically, surgically or a combination of all.

**Lip asymmetry:** Anytime a patient has an upper lip asymmetry, he or she should be advised of the condition before any restorations of maxillary anterior teeth as brighter restored teeth will draw more attention towards smile and accentuate asymmetry. The treatment for a unilateral lower lip asymmetry is usually Botox.

**Gummy smile:** (Class 1) Very high smile line (gummy smile): more than 2 mm of apical display or more than 2 mm of gingival margin to the CEJ within sound periodontium. (Class 2) High smile line: between 0 mm and 2 mm of marginal gingiva display or between 0 mm and 2 mm of the gingival margin apical to the CEJ within sound periodontium. (Class 3) Average smile line: gingival papillae are visible. (Class 4) Low smile line: gingival papillae and CEJ are not visible.

**Gingival phenotype:** The biotype of the gingiva is typically considered thick or thin. The thick or dense biotype may be fibrotic. Thicker tissue is usually more resistant to recession and results often include pocket formation after any apical migration of the junctional epithelium. The thin gingival biotype is often friable and results in increased risk of facial recession and interproximal loss of gingival tissue after any surgical procedure.

**Bone Sounding:** Bone sounding reveals the relationship of the gingiva to the osseous crest and allows predictable placement of restorative margins
**Steps**

- Administer Local Anesthetic
- Place the periodontal probe intrasulcularly keeping pressure against root surface
- Push firmly until meeting the resistance of osseous crest

Bone sounding reveals 3 types of crest relationships:

- Normal Crest: Average degree of gingival scallop (3-4 mm), 3 mm facially to osseous crest, 4 mm interproximally to osseous crest - Predictable, stable tissue levels
- Low Crest: High degree of gingival scallop, > 3 mm to osseous crest on facial, > 4 mm to osseous crest interproximally - Use caution when manipulating tissue, unstable tissue heights. Low crest is an advantage when it is on the facial and is desirable to remove the tissue (all it needs is gingivectomy)
- High Crest: Low degree of gingival scallop, < 3 mm to osseous crest on facial, < 3 mm to osseous crest interproximally - Predictable tissue levels, but needs greater time for healing

**Overall Risk Esthetically**

- Minimum Tooth Display and No Tissue Display: Low risk
- Moderate Tooth Display and Moderate Tissue Display: Moderate risk
- High Tooth Display and Maximum Tissue Display: High risk
**BLOCK-OUT**

**STEP 1:** Remove all caries. DEJ should be squeaky clean. Place RMGI Liner and light cure for 40 seconds.

**STEP 2:** Place Fuji II LC base and cure for 40 seconds. Keep material submarginal in order to maintain margin visibility.

Dry, clean field facilitates cavity preparation.
BLOCK-OUT

Advantages

- Provides 'clean start' for operator
- Conserves tooth structure
- Creates uniform wax pattern
- Reduces irregularities
- Enhances visibility of details
- Improves seating
- Improves fit
- Conserves Gold (if doing a gold restoration)

Technique

Block-Out technique is a two-step process:

Step one:
1. Remove all caries- DEJ "squeaky" clean.
2. Place RMGI liner and light cure 40 seconds.

Step two:
1. Place Fuji II LC or Fuji IX GP base and light cure 40 seconds.
2. Keep the material sub-marginal in order to maintain margin visibility.

Commentary

- Block-outs with glassinomer cements are not removed at the time of cementation.
- Block-outs replace dentin, not enamel.
- Undermined enamel should be removed.
- Undermined cusps should be capped.

References

- Clinical Restorative Dental Materials by Dr. Richard G. Stevenson III, 2014
COAD (Clean Out And Diagnose)

Not sure about how to proceed?

Clean out and diagnose
COAD (Clean Out And Diagnose)

Armamentarium

- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand piece with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)
- Fuji Lining LC

Ideal Guidelines

- If the caries has lead into the pulp chamber, a Pulpectomy is needed, along with root canal treatment and a definitive cusp supporting restoration (Composite or Amalgam Onlay, Gold or Ceramic Onlay, 3/4, 7/8 FGC, or ACC/PFM).
- If the caries has reached proximal to the bone, Crown Lengthening is indicated. Depending upon the extent of the caries, a periodontal flap is usually laid, and bone is removed and re-contoured. There should be about 2.5 to 3.0 mm of distance from the margin of the restoration (Crown) to the bone to avoid biologic width violation.
- If the caries has extended into the furcation of a tooth, extraction is indicated.
- If the caries has extended peripherally everywhere and no walls remain, extraction is indicated. The treatment plan might include a fixed dental or removable dental prosthesis.
- If the tooth is determined to be restorable, yet the tooth has a history of provoked symptoms, the COAD procedure may use a RMGI/GI as a temporary material, and the tooth may then be monitored for several weeks prior to completing the final restoration.
- If the tooth is determined to be restorable, and the tooth is vital and has not experienced unprovoked symptoms, and a build-up is needed, it should be completed immediately. Proceed with the final restoration as soon as possible.
- If the tooth has been root canal treated and the COAD has left only 2 walls remaining, consideration should be given to a robust build-up, usually supported with a prefabricated or cast custom dowel core.

Procedure

- Administer Local Anesthesia.
- Rubber dam is used whenever possible, however, severely compromised teeth often cannot be adequately isolated with dam. Care must be taken to prevent objects and debris from entering the patient’s throat/airway.
- Note: Crowns should ALWAYS be removed under rubber dam. Once they are removed, the dam may need to be removed to allow adequate access to the lesion.
- The old restorative material is removed with high speed, using either a 330 diamond or round bur.
- The DEJ should be completely clean and decay free (“squeaky clean”).
- Complete caries removal within the body of the dentin is not required.
CLASS I AMALGAM PREPARATION

(1) Punch cut for occlusal preparation

(2) Preparation of dovetail and extending occlusal preparation mesial-distal

(3) Finished class I preparation
CLASS I AMALGAM PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth/flowing
- No undermined enamel
- Fissures extending into dentin are removed
- Isthmus width 1mm

Internal Form
- 1.5-2 mm pulpal depth
- Convergent walls
- Well defined internal line angles

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local anesthesia and rubber dam placement.
- Start with a 330 bur and make a punch cut into the occlusal surface in the deepest pit/fissure of the preparation tooth.
- Use the 330 bur to follow the grooves and fissures of the tooth, keeping the ideal depth (1.5-2.0 mm) during the preparation of the cavity. Internal walls of the cavity should be convergent.
- The finished preparation should have completely stain free DEJ and enamel areas.

Commentary
- The indication for an initial Class I amalgam restoration is carious tooth structure in occlusal fissures (or in facial/lingual pits in posterior teeth) detected clinically and confirmed with bitewing radiographs.
- The presence of deep or stained fissures alone does not justify placement of restoration. When there is a concern that dentin at the base of a deep fissure may become carious, the fissure should be sealed with a fissure sealant. If a noncarious fissure is evident in the wall of preparation, the preparation should not be extended solely to include the fissure; the fissure should instead be sealed after amalgam has been placed. If deep fissures that are to be sealed exhibit enamel demineralization or heavy stains they may benefit from Enameloplasty.
- Use of a caries detector solution to ensure that all caries is removed is controversial and should only be employed to learn where caries typically remains.
- If any old restoration is present, modify the outline or remove old restoration 0.5 mm at a time. The preparation should be widened only enough to obtain enamel walls supported by sound dentin. If resistance form of the cavity preparation needs to be improved, it will affect the outline form as well.
- Hand instruments (enamel hatchet, hoe, and bi-angle chisel) can be used to define the line angles and smoothen pulpal floor.
- When the pulp is within 1 mm of the finished preparation wall, a cavity liner is indicated. Use liner (Fuji lining LC, light cure for 40 seconds).

References
CLASS I AMALGAM RESTORATION

(1) Prepared class I cavity
(2) Preparation is acid etched, bonded and cured

(3) Placement of amalgam
(4) Condensation of amalgam using condenser

(5) Condensed, overfilled amalgam, ready for carving
(6) Checking occlusion

(7) Finished class I restoration
CLASS I AMALGAM RESTORATION

Armamentarium

- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Fuji Lining LC (pulpal protection)
- Acid Etchant
- Amalgam Type: Admixed working time: 12 min/Spherical working time: 7 min
- Bonding Agent (All-Bond ACE TE, Bisco)
- Articulating Paper
- UCLA Amalgam Bur Block (BLUE)

Ideal Restoration Guidelines

**Anatomical Form**
- Resembles normal tooth anatomy

**Margins**
- Flush with cavosurface

**Finish**
- Firm condensation
- No voids
- Smooth & polished
- Occlusion: light MIP Contacts/no excursive interferences
- Gingival tissues not damaged

Restoration Steps

- Apply acid etch over the entire preparation for 15 seconds, and rinse thoroughly.
- Use HVAC to suction the preparation of excess moisture, do not air dry.
- Apply bonding agent, as per manufacturer’s instructions and light cure.
- Place amalgam, condense and carve tooth-appropriate anatomy.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursive as indicated.

Commentary

- A smooth flowing outline form plays a great role in determining how the final restoration outcome will be after amalgam placement. If after the amalgam is carved, the margins of the preparation are jagged or rough, it is difficult to know if this is because the enamel margin is rough or because amalgam is extending past the margins onto the surface of the tooth (amalgam flash).
- The survival rate of amalgam restorations is inversely related to the degree of unsupported enamel.
- Postoperative instructions are only for the first 24 hours. Caution with occlusal biting forces on restoration.
- Sensitivity is normal and will typically subside in a few days.

References

**CLASS II AMALGAM PREPARATION**

Amalgam bur block

1. Occlusal preparation of class II cavity  
2. Punch cut is given and proximal box is prepared

3. Check the clearance with RGS I  
4. Prepared proximal box with 90 degree exit angles

5. Retention grooves  
6. Finished class II preparation
CLASS II AMALGAM PREPARATION

Armamentarium

- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth/flowing
- No undermined enamel
- Fissures extending into dentin are removed
- Isthmus width 1 mm
- Proximal clearance 0.4 mm with adjacent teeth (RGS I)

Internal Form
- 1.5-2.0 mm pulpal depth
- Convergent walls
- Well defined internal line angles
- Retention grooves as required
- 1 mm minimum axial depth and 0.5 mm into dentin

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps

- Local anesthesia and rubber dam placement.
- Start with the 330 bur and make a punch cut into the occlusal surface in the deepest pit/fissure of the preparation tooth.
- Use 330 bur to follow the grooves and fissures of the tooth, keeping the ideal depth (1.5-2.0 mm) during the preparation of the cavity. Internal walls of the cavity should be convergent.
- Proximal box prepared using 245 bur.
- Refinement with hand instruments.
- The finished preparation should a have completely stain free DEJ and enamel areas.

Commentary

- Carious dentin should be removed with the largest round bur that will fit into the area. After the periphery of the preparation is clean of demineralized tooth structure, the carious dentin near the pulp should be removed. This procedure is less likely to result in a pulpal exposure than use of a spoon excavator.
- S-curve should be located in occlusal portion, not in the proximal box portion of preparation. When preparing the tooth for a proximal box, a shell of enamel should be left between the preparation and the adjacent tooth. The proximal preparation begins with the creation of a small slot in the center (mesio-distally) of the crest of marginal ridge and occlusal to the proximal surface carious lesion (usually located facio-lingually in the center of interproximal contact area). The preparation is widened facially and lingually to eliminate all demineralized tooth structure at DEJ.
- Retention accomplished with retention grooves, convergence of proximal box and dovetail placement.
- Exit angles of the prepared cavity should be 90 degrees. Very acute margins are subject to marginal fracture leading to marginal gaps, or ditches, between the amalgam and the enamel.
- If the faciolingual width of the preparation exceeds one-third of distance between tips of facial and lingual cusps (average intercuspal distance 6 mm), the remaining cusps should be evaluated and if a cusp is too weak to withstand function, it should be reduced for coverage/cuspal reinforcement.

References

CLASS II AMALGAM RESTORATION

(1) Prepared class II cavity

(2) Tofflemire matrix band & wedge placement

(3) Bonding and curing

(4) Placement and condensation of amalgam

(5) Initial and final carving

(6) Checking occlusion

(7) Finishing and polishing

(8) Finished class II restoration
CLASS II AMALGAM RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- Dental Floss
- Fuji Lining LC (pulpal protection)
- Acid Etchant
- Bonding Agent (All-Bond ACE TE, Bisco)
- High & Slow Speed Hand pieces with attachments
- 0.0015” matrix band (approx. 40 microns thick)
- Tofflemire matrix retainer
- Amalgam Type: Admixed working time: 12 min/Spherical working time: 7 min
- Wooden wedges
- Articulating Paper
- UCLA Amalgam Bur Block (BLUE)

Ideal Restoration Guidelines

Anatomical Form
- Resemble normal tooth anatomy
- Interproximal contact

Margins
- Flush with cavosurface

Finish
- Firm condensation
- No voids
- Smooth & polished
- Occlusion: light MIP Contacts/no excursive interferences
- Gingival tissues not damaged

Restoration Steps
- Assemble toffelmire matrix, place interproximally and secure with wooden wedge (ensure gingival seal, and adjacent tooth contact).
- Apply acid etch over the entire preparation for 15 seconds, and then rinse thoroughly.
- Use HVAC to suction the preparation of excess moisture, don’t air dry.
- Apply bonding agent, as per manufacturer’s instructions and light cure.
- Place amalgam, condense and carve tooth-appropriate anatomy.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts in MIP and excursive afterwards.

Commentary
- It is good to register a mental picture of the outline form of the preparation before amalgam is placed so that the outline can be visualized after carving. Carving can begin immediately after condensation and precarve burnishing. While carving it is advisable to pull the carver from amalgam to enamel so that there is no overcarving and also by keeping the carver on tooth while carving.
- In Class II restorations, the marginal ridge should be carved very nearly to the height of adjacent marginal ridge. Development of occlusal embrasure of the marginal ridge is begun with the top of an explorer angled at approximately 45 degree angle to the long axis of tooth and touching the matrix band. The explorer tip should be moved from facial enamel, past the margin of the box, to the center of the marginal ridge. The same procedure should be followed on lingual side as well.
- Caution with occlusal biting forces on restoration. Sensitivity is normal and will typically subside in a few days.

References
CLASS III AMALGAM PREPARATION

Amalgam bur block

(1) Preparation of class III cavity
(2) Squeaky clean DEJ
(3) Finishing and smoothening the margins
(4) Finished class III preparation
CLASS III AMALGAM PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth/flowing
- No undermined enamel
- 4 wall preparation design
- No dovetail (unless required for retention)
- Proximal clearance 0.4 mm with adjacent tooth (RGS I)

Internal Form
- 90 degree to the surface
- Incisal cove and gingival groove

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local anesthesia and rubber dam placement.
- Prepare ideal cavity for amalgam.
- Cavity liner if needed (Fuji lining LC, if used light cure for 40 seconds).

Commentary
- Modify outline or remove old restoration 0.5 mm at a time. The DEJ should be “squeaky” clean.
- Usually class III amalgam preparations are indicated on the distal surface of canines.

References
- Class III Amalgam PowerPoint Presentation; Dr. Gritz, 2013
CLASS III AMALGAM RESTORATION

(1) Prepared class III cavity

(2) Assembled custom sectional matrix

(3) Bonding and curing

(4) Placement of amalgam in the cavity

(5) Condensation of amalgam

(6) Carving of the placed amalgam

(7) Finished Class III restoration
CLASS III AMALGAM RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Fuji Lining LC (pulpal protection)
- Acid Etchant
- Bonding Agent (All-Bond ACE TE, Bisco)
- Amalgam Type: Admixed working time: 12 min/Spherical working time: 7 min
- Articulating Paper
- UCLA Amalgam Bur Block (BLUE)

Ideal Restoration Guidelines

<table>
<thead>
<tr>
<th>Anatomical Form</th>
<th>Margins</th>
<th>Finish</th>
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</thead>
<tbody>
<tr>
<td>Resembles normal tooth anatomy</td>
<td>Flush with cavosurface</td>
<td>Firm condensation</td>
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</tbody>
</table>

Restoration Steps
- Assemble custom sectional matrix and secure with wedge and green stick compound.
- Apply acid etch over the entire preparation for 15 seconds, and then rinse thoroughly.
- Use HVAC to suction the preparation of excess moisture, do not air dry.
- Apply bonding agent, as per manufacturer’s instructions and light cure.
- Place amalgam, condense and carve tooth-appropriate anatomy.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursives as indicated.

Commentary
- After completion of carving and post carve burnishing, a rubber prophylaxis cup with damp flour of pumice or prophylaxis polishing paste can be used to smooth the amalgam. If the cup is used, it should be rotating at a very slow speed and should be kept moving at all times; if the cup is allowed to rotate in one place, it may ditch the recently carved amalgam.

References
CLASS V AMALGAM PREPARATION

Amalgam bur block

(1) Rubber dam with 212-retractor
(2) Convex axial wall surface
(3) Finished class V preparation
CLASS V AMALGAM PREPARATION

Armamentarium
- Local Anesthesia
- Basic cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth/flowing
- No undermined enamel
- Kidney bean shape

Internal Form
- 90 degree to the surface
- Occlusal/Incisal groove
- Gingival groove

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local anesthesia.
- Place rubber dam, then place a 212 retractor on the tooth to be prepared with greenstick compound, parallel the bows to occlusal plane.
- Prepare ideal cavity for amalgam (kidney shaped). The axial surface should be convex.
- 90 degree exit angle towards gingival surface.
- Cavity liner if needed (Fuji lining LC, if used light cure for 40 seconds).

Commentary
- Retention grooves to be placed in the occlusogingival and occlusoincisal line angles.
- Amalgam preparations will be same whether the lesion requiring restoration is carious or a NCCL.

References
CLASS V AMALGAM RESTORATION

(1) Prepared class V cavity

(2) Preparation is acid etched, bonded and cured

(3) Restored class V preparation
CLASS V AMALGAM RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Fuji Lining LC (pulp protection)
- Acid Etchant
- Bonding Agent (All-Bond ACE TE, Bisco)
- Amalgam Type: Admixed working time: 12 min/Spherical working time: 7 min
- UCLA Amalgam Bur Block (BLUE)
- Use 212 retractor with greenstick compound
- Torch
- Water for tempering in cup

Ideal Restoration Guidelines

Anatomical Form
- Resembles normal tooth anatomy

Margins
- Flush with cavosurface

Finish
- Firm condensation
- No voids
- Smooth & polished
- Gingival tissues not damaged

Restoration Steps
- Apply acid etch over the entire preparation for 15 seconds, and then rinse thoroughly.
- Use HVAC to suction the preparation of excess moisture, do not air dry.
- Apply bonding agent, as per manufacturer's instructions and light cure.
- Place amalgam, condense and carve proper tooth anatomy.
- Amalgam flash should be thoroughly cleaned and preparation should be finished according to the tooth contour.
- Excess/Over-contoured amalgam can be a potential gingival irritant.

Commentary
- Post-operative instructions for first 24 hours.
- For NCCL’s, preparation requires the removal of sound tooth structure to create a box form for amalgam bulk and retention, so the use of adhesive materials is usually preferred.

References
CLASS VI AMALGAM PREPARATION

Amalgam bur block

Finished class VI preparation
CLASS VI AMALGAM PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth/flowing
- No undermined enamel
- 90 degrees cavosurface margin

Internal Form
- 1.5-2 mm pulpal depth
- Small undercut in internal line angles

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Commentary
- Don't remove dentin that is immediately supporting enamel.
- Conservative tooth preparation is particularly important because it is easy to undermine the enamel on incisal edges and cusp tips.

References
CLASS VI AMALGAM RESTORATION

Class VI cavity ready for amalgam placement
CLASS VI AMALGAM RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Fuji Lining LC (pulp protection)
- Acid Etchant
- Bonding Agent (All-Bond ACE TE, Bisco)
- Amalgam Type: (Admixed working time: 12 min/Spherical working time: 7 min)
- Articulating Paper
- Amalgam Bur Block (BLUE)

Ideal Restoration Guidelines

Anatomical Form
- Resembles normal tooth anatomy

Margins
- Flush with cavosurface

Finish
- Firm condensation
- No voids
- Smooth & polished
- Occlusion: light MIP contacts/no excursive interferences
- Gingival tissues not damaged

Restoration Steps
- Apply acid etch over the entire preparation for 15 seconds, and then rinse thoroughly.
- Use HVAC to suction the preparation of excess moisture, do not air dry.
- Apply bonding agent, as per manufacturer’s instructions and light cure.
- Place amalgam, condense and carve tooth-appropriate anatomy.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursives as indicated.

Commentary
- Postoperative instructions are only for the first 24 hours.
- Caution with occlusal biting forces on restoration.

References
CLASS I COMPOSITE PREPARATION

Composite bur block

(1) Punch cut for occlusal preparation

(2) Preparation of dovetail and extension of occlusal preparation mesial-distal

(3) Finished class I preparation
CLASS I COMPOSITE PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Vita Classical Shade Guide
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth/flowing
- No undermined enamel
- Convergent walls
- Cavosurface angles 90 degrees to slightly flared (obtuse)
- Minimal preparation which removes all carious and infected tooth surfaces (dentin & enamel)

Internal Form
- 1-1.5 mm axial & pulpal depth
- Rounded internal angles

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched or smoothed/repaired
- Pulpal protection (indicated with deep dentin)

Preparation Steps
- Select shade using Vita Classical shade guide.
- Local anesthesia and rubber dam placement.
- Prepare ideal cavity for composite using 330D bur (minimal preparation: may be in enamel only).
- Modify outline or remove old restoration 0.5 mm at a time. The DEJ should be “squeaky” clean.
- Cavity liner if needed (Fuji lining LC, if used light cure for 40 seconds).

Commentary
- The only absolute contraindication to the use of composite as a restorative material is if the patient is allergic or sensitive to resin based materials. Some of the relative contraindications can be in cases where there is high caries risk and poor oral hygiene or in large restorations in teeth of a patient with significant parafunction, bruxism, or heavy occlusal stress, where most or all function will be on restoration and not on tooth structure.
- Composite cavity preparation design limits the removal of tooth structure to that needed to eliminate only carious tooth structure and fragile enamel. The preparations tend to be shallower as retention is provided through bonding to tooth structure rather than mechanical undercuts. There is no need to penetrate dentin if the carious lesion does not. Any dentinal caries, remove with slow hand piece (round bur), 0.5 mm at a time.

References
CLASS I COMPOSITE RESTORATION

(1) Preparation is acid etched, bonded and cured

(2) Composite is placed in increments in the cavity and light cured

(3) Checking occlusion with articulating paper

(4) Finishing and polishing

(5) Finished class I restoration
CLASS I COMPOSITE RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Acid Etchant
- Micro brushes
- Composite Compule Syringe
- ACE All-Bond TE
- Fuji Lining LC
- Aelite Composite
- UCLA Composite Bur Block (GREEN)
- Opti-Disc kit
- Jiffy Polishers
- Articulating Paper

Ideal Restoration Guidelines

<table>
<thead>
<tr>
<th>Anatomical Form</th>
<th>Margins</th>
<th>Finish</th>
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<tbody>
<tr>
<td>Resembles normal tooth anatomy</td>
<td>No flash or white lines</td>
<td>No voids</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smooth &amp; polished</td>
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<tr>
<td></td>
<td></td>
<td>Occlusion: light ICP contacts/no excursive interferences</td>
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<td></td>
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<td>Gingival tissue not damaged</td>
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</table>

Restoration Steps
- Etch the surface for 15 seconds and then rinse thoroughly.
- Bonding agent; 2 layers and light air blow and wait for 10 seconds.
- Place Aelite composite in <2 mm increments (build lobes not layers), cure 20 seconds after each increment.
- Cure final layer for 40 seconds.
- Finish and polish with fine carbides. Jiffy polishers with ample water spray.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursives as indicated.

Commentary
- Incremental insertion and light-activation of the composite may reduce the negative C-factor effects for class I composite restorations.
- While light curing composites, the curing light should be placed as close to the composite being cured as possible without touching it.
- Proper isolation contributes a lot towards the success of composite restoration.

References
COMPOSITE CLASS II PREPARATION

Composite bur block

(1) Occlusal preparation for class II composite  
(2) Punch cut for the preparation of the proximal box

(3) Finished class II preparation
CLASS II COMPOSITE PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Vita Classical Shade Guide
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth/flowing
- No undermined enamel
- Convergent walls
- Cavosurface angles 90 degrees to slightly flared (obtuse)
- Adjacent teeth 0.4 mm space (contact)

Internal Form
- 1-1.5 mm axial & pulpal depth
- Rounded internal angles

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched or smoothed/repairsed
- Pulpal protection (indicated with deep dentin)
- Gingival tissue not damaged

Preparation Steps
- Select shade using Vita Classical shade guide followed by local anesthesia and rubber dam placement.
- Prepare ideal class I cavity for composite using 330D bur, and drop box using 245 bur.
- Smoothen pulpal floor and gingival floor with 56 bur. For the proximal walls use 169 bur.
- Cavity liner if needed (Fuji lining LC, if used light cure for 40 seconds).

Commentary

Box Preparation-
- The proximal wall may be left in contact with the adjacent tooth and proximal ditch cut is initiated.
- Place instrument in such a way that gingivally directed cut creates the axial wall 0.2 mm inside the DEJ.
- Faciolingual direction of axial wall preparation follows the DEJ.
- Use a small hand instrument such as chisel, hatchet or gingival marginal trimmer to finish enamel wall.
- For large caries lesions, additional axial wall caries excavation may be necessary later, during final tooth preparation.
- Prewedging before the cavity preparation can be helpful to open up the interproximal contact. It promotes more conservative preparation and helps in protecting adjacent teeth during proximal surface preparation. Prewedging also helps to compensate for the thickness of matrix band.

References
CLASS II COMPOSITE RESTORATION

(1) Centripital Wall technique: (i) Prepared class II with rubber dam in place (ii) V-ring and matrix band is placed (iii) & (iv) Proximal wall is built in increments (v) Matrix band is removed (vi) & (vii) The rest of the cavity is filled as class I with incremental placement of composite (viii) Final class II restoration

(2) Finished class II restoration
CLASS II COMPOSITE RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Acid Etchant and Micro brushes
- Composite Compule Syringe
- ACE All-Bond TE
- Fuji Lining LC
- Aelite Composite
- UCLA Composite Bur Block (GREEN)
- Opti-Disc kit
- Jiffy Polishers and Composite Finishing Strips
- Articulating Paper
- Sectional matrix system (V-ring, 0.013” matrix and wedge)

Ideal Restoration Guidelines

Anatomical Form
- Resembles normal tooth anatomy
- Interproximal contact

Margins
- No flash or white lines

Finish
- No voids
- Smooth & polished
- Occlusion: light ICP contacts/no excursive interferences
- Gingival tissue not damaged

Restoration Steps
- Place sectional matrix and wedge and assemble V-Ring.
- Etch the surface for 15 seconds and then rinse thoroughly.
- Bonding agent: 2 layers and light air blow and wait for 10 seconds.
- Place Aelite composite in <2 mm increments (build lobes not layers), cure 20 seconds after each increment.
- Cure final layer for 40 seconds.
- Build Box first with composite and then treat the rest of the cavity like class I.
- Use Opti-discs to finish interproximal surfaces.
- Finish and polish with fine carbides, Jiffy polishers. Rinse with ample water spray.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursives as indicated.

Commentary
- **Snowplow Technique/Clark’s Technique**: In order to reduce marginal leakage, flowable composite is placed first (not cured separately), followed with a paste composite injected into the flowable, which is then “squeezed” out of the sides of the restoration.
- **Wall Technique**: Build the proximal wall (distal/mesial box or both) with composite and then fill the rest of the Class I cavity.
- **Successive cusp build-up technique**: Build lobes occlusally. An increment of restorative composite is adapted to the lingual incline of facial cusp of the tooth. Then, the facial incline of the lingual cusp is built successively. The entire occlusal surface is cured for 40 sec.
- Interproximal areas are finished with composite finishing strips.
- Contac EZ strips may be used to achieve ideal proximal contact adjustments and contouring.
- Postoperative instructions are only for the first 24 hours.

References
CLASS III COMPOSITE PREPARATION

Composite bur block

(1) Design and preparation of the class III cavity

(i) Without rubber dam       (ii) With rubber dam in place

(2) Finished class III preparation
CLASS III COMPOSITE PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Vita Classical Shade Guide
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- No undermined enamel
- Minimal rectangular shaped preparation
- Break gingival contact 0.25 - 0.5 mm
- Preference to leave incisal contact
- Optional bevel 0.5 mm around lingual (6888 finishing bur)
- Cavosurface angles 90 degrees to slightly flared (obtuse)

Internal Form
- 1.25 mm axial depth (0.5mm into dentin)
- Rounded internal angles
- Starburst bevel in esthetic areas (facial)

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothened/ repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Select shade using Vita Classical shade guide.
- Local anesthesia and rubber dam placement.
- Use radiographs and transillumination to locate lesion.
- Prepare ideal class III cavity for composite using 330 D bur in center of lesion.
- Using a 6888 bur for a bevel if indicated.
- Modify outline or remove old restoration 0.5 mm at a time. The DEJ should be “squeaky” clean.

Commentary
- Facial wall follows tooth contour and can be left undermined when esthetic needs are critical and occlusal stresses are controlled.
- When the preparation includes esthetic areas, a star-burst bevel is indicated.
- Carious lesions cause a more opaque appearance of tooth structure. Incipient lesions tend to be V shaped and confined to enamel; deeper lesions tend to spread within dentin.
- The most common variables influencing the survival of anterior composite restorations are reported to be the individual practitioner, the location and size of the restoration, the patient age and caries risk, and the bonding substrate.

References
COMPOSITE CLASS III RESTORATION

(1) Prepared class III cavity

(2) Finished class III restoration
CLASS III COMPOSITE RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Acid Etchant
- Micro brushes
- Composite Compule Syringe
- ACE All-Bond TE
- Fuji Lining LC
- Aelite Composite
- UCLA Composite Bur Block (GREEN)
- Opti-Disc kit
- Jiffy Polishers
- Articulating Paper
- Composite Finishing Strips
- Mylar strips

Ideal Restoration Guidelines

Anatomical Form
- Resembles normal tooth anatomy
- Interproximal contact

Margins
- No flash or white lines

Finish
- No voids
- Smooth & polished
- Occlusion: light ICP contacts/ no excursive interferences
- Gingival tissue not damaged

Restoration Steps
- Etch the surface for 15 seconds and then rinse thoroughly.
- Bonding agent: 2 layers and light air blow and wait for 10 seconds.
- Place Aelite composite in <2 mm increments (build lobes not layers), cure 20 seconds after each increment.
- Cure final layer for 40 seconds.
- Finish and polish with fine carbides, Jiffy polishers. Rinse with ample water spray.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursive as indicated.

Commentary
- Dip your hand instrument in Modeling Resin (BISCO) when condensing the composite; this will prevent the composite from sticking.
- Remove gingival flash with #12 blade.
- Interproximal areas are finished with composite finishing and polishing strips.
- If the patient has just whitened their teeth. If possible, it is advisable to wait for two weeks after bleaching before shade selection. For selection of the final shade, the middle portion of the tooth should be observed and matched to the closest shade tab. The selected shade then becomes the overall or “basic shade” of the restoration.

References
(1) Design and preparation of the class IV cavity
CLASS IV COMPOSITE PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Vita Classical Shade Guide
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- No undermined enamel
- Includes proximal surface and incisal angle

Internal Form
- 1.25 mm axial depth (0.5 mm into dentin)
- Rounded internal angles
- Bevel all accessible margins 1mm (full enamel thickness)
- Starburst bevel in esthetic areas (facial)

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothed/ repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Select shade using Vita Classical shade guide.
- Local anesthesia and placement of rubber dam.
- Prepare ideal class III cavity, and then convert to class IV with a 330 D bur.
- For small lesions or chips no additional retention is needed and fractured incisal corners are roughened.
- For large lesions, preparation is determined by caries/fractures, enamel cavosurface is beveled 45 degrees to external surface, using a star-burst bevel.
- Additional retention may be added with a gingival groove/undercut, which is placed 0.5 mm into dentin, near the DEJ.
- Cavity liner if needed (Fuji lining LC, for 40 seconds).

Commentary
- Any portion of class IV restoration that extends onto the root requires a 90-degree cavosurface margin and possible groove retention form, regardless of whether a beveled conventional or modified preparation design is used.
- Facial wall follows tooth contour and can be left undermined when esthetics are critical and occlusal stresses are controlled.

References
CLASS IV COMPOSITE RESTORATION

(1) Preparation is acid etched, bonded and cured

(2) Composite is placed and excess material is carved

(3) Finishing and polishing

(4) Finished class IV restoration
CLASS IV COMPOSITE RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Acid Etchant and Micro brushes
- Composite Compule Syringe
- ACE All-Bond TE
- Fuji Lining LC
- Aelite Composite
- UCLA Composite Bur Block (GREEN)
- Opti-Disc kit
- Jiffy Polishers
- Articulating Paper
- Composite Finishing and Polishing Strips
- Mylar Strips
- Putty Material (for matrix made from diagnostic wax up)

Ideal Restoration Guidelines

<table>
<thead>
<tr>
<th>Anatomical Form</th>
<th>Margins</th>
<th>Finish</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resembles normal tooth anatomy</td>
<td>No flash or white lines</td>
<td>No voids</td>
</tr>
<tr>
<td>Interproximal contact</td>
<td></td>
<td>Smooth &amp; polished</td>
</tr>
</tbody>
</table>

Restoration Steps
- Protect adjacent tooth with a mylar strip secured with a wedge or Teflon tape.
- Etch the surface for 15 seconds and then rinse thoroughly.
- Bonding agent: 2 layers and light air blow and wait for 10 seconds
- Place Aelite composite in <2 mm increments, cure 20 seconds after each increment.
- Build lingual wall with opaque composite with the help of a putty stent.
- Inner layer should be made using dentin shades and cover subsequently with enamel shades.
- Cure final layer for 40 seconds.
- Finish and polish with fine carbides, jiffy polishers. Rinse with ample water spray.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursive as indicated.

Commentary
- Putty stent made from the preoperative condition or more ideally a diagnostic wax up may help to achieve ideal lingual and incisal contours.
- In esthetically challenging situations, the ultimate shade selection is best achieved by producing a mock-up on un-etched surfaces. As in class IV restorations, when no lingual or facial tooth structure remains in the planned restoration, the test shade should be placed with the approximate thickness of the tooth structure to be replaced.

References
CLASS V COMPOSITE PREPARATION

Composite bur block

(1) Rubber dam with 212 retractor and cavity preparation

(2) Finished class V preparation
CLASS V COMPOSITE PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Handpieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Vita Classical Shade Guide
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Kidney bean shaped preparation
- Extension dictated by caries/old restoration
- No undermined enamel
- Cavosurface angles 90 degrees

Internal Form
- 1-1.5 mm axial depth (0.5 mm into dentin on incisal/occlusal)
- Divergent mesial and distal walls
- Bevel all accessible enamel margins 0.5 mm, 45 degrees to external surface
- Starburst bevel in cases with high esthetic demand

Operative Environment
- Rubber dam isolation
- Adjacent tooth surface untouched, or smoothed/ repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Select shade using Vita Classical shade guide.
- Local anesthesia and placement of rubber dam.
- Extension dictated by caries/old restoration.
- Axial wall follows contour of tooth surface and is convex mesio-distally and occluso-gingivally and divergent mesial and distal walls.
- Place retention grooves in both occlusal (incisal) and gingival walls with ¼ bur (0.5mm).
- Bevel enamel cavosurface at 45 degrees to external surface.
- Cavity liner if needed (Fuji lipping LC for 40 seconds).

Commentary
- Any portion of any class V restoration that extends onto the root requires a 90-degree cavosurface margin and possible groove retention along axio-gingival and axio-incisal angles.

References
CLASS V COMPOSITE RESTORATION

Prepared class V cavity

Incremental placement of composite after etching and bonding

Finishing and polishing using Opti Disc system
CLASS V COMPOSITE RESTORATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Acid Etchant
- Micro brushes
- Composite Compule Syringe
- ACE All-Bond TE
- Fuji Lining LC
- Aelite Composite
- UCLA Composite Bur Block (GREEN)
- Mylar strips
- Opti-Disc kit
- Jiffy Polishers

Ideal Restoration Guidelines

Anatomical Form
- Resembles normal tooth anatomy

Margins
- No flash or white lines

Finish
- No voids
- Smooth & polished
- Gingival tissue not damaged

Restoration Steps
- Usually no matrix is needed to adapt the composite.
- Ideally, a 212 retractor isolates tooth, otherwise, use rubber dam with septal areas along with a narrow retraction cord placed in sulcus.
- Place liner over all dentin (Fuji lining LC).
- Re-prepare the surfaces if liner is overextended.
- Etch the surface for 15 seconds and then rinse thoroughly.
- Bonding agent: 2 layers and light air blow and wait for 10 seconds.
- Place Aelite composite in <2 mm increments, (build lobes not layers) cure 20 seconds after each increment.
- Cure final layer for 40 seconds.
- Finish and polish with fine carbides, Opti-disc kit followed by Jiffy polishers. Rinse with ample water spray.

Commentary
- Use rotary instruments carefully on root surface as they can cause ditching on the cementum if not used correctly.
- Micro filled composite can be used as they can flex with the tooth.
- It is important to clean the excess composite material around the margins of the restoration as excess composite is a gingival irritant and can lead to potential periodontal problems.

References
CLASS VI COMPOSITE PREPARATION

Composite bur block

Finished Class VI preparation
CLASS VI COMPOSITE PREPARATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Vita Classical Shade Guide
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

<table>
<thead>
<tr>
<th>Outline &amp; Ext. Form</th>
<th>Internal Form</th>
<th>Operative Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Football stadium shaped preparation</td>
<td>0.5-.75 mm to 1 mm reduction</td>
<td>Rubber dam isolation</td>
</tr>
<tr>
<td>Extension dictated by caries/old restoration</td>
<td>Divergent mesial and distal walls</td>
<td>Adjacent tooth surface untouched, or smoothed/repaired</td>
</tr>
<tr>
<td>No undermined enamel</td>
<td>Bevel all accessible margins 0.5 mm, 45 degrees to external surface</td>
<td>Pulpal protection (indicated with deep dentin)</td>
</tr>
<tr>
<td></td>
<td>Starburst bevel on facial surface</td>
<td>Gingival tissues not damaged</td>
</tr>
</tbody>
</table>

Preparation Steps
- Select shade using Vita Classical shade guide.
- Local anesthesia and placement of rubber dam.
- Extension dictated by caries/old restoration with axial depth of 0.75 to 1 mm.
- Axial wall following the contour of tooth surface with divergent mesial and distal walls.
- Beveled enamel cavosurface at 45 degrees to external surface.
- Cavity liner if needed (Fuji lining LC, for 40 seconds).

Commentary
- The preparation should be as small in diameter and shallow in depth as possible.
- Some undermined but not friable, enamel may be left and bounded to the composite.

References
CLASS VI COMPOSITE RESTORATION

Finished class VI restoration
CLASS VI COMPOSITE RESTORATION

Armamentarium
- Local Anesthesia
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- Dental Floss
- Acid Etchant
- Micro brushes
- Composite Compule Syringe
- ACE All-Bond TE
- Fuji Lining LC
- Aelite Composite
- UCLA Composite Bur Block (GREEN)
- Mylar strips
- Opti-Disc kit
- Jiffy Polishers
- Articulating Paper

Ideal Restoration Guidelines

Anatomical Form
- Resembles normal tooth anatomy

Margins
- No flash or white lines

Finish
- No voids
- Smooth & polished
- Occlusion: light ICP contacts/no excursive interferences
- Gingival tissue not damaged

Restoration Steps
- Etch the surface for 15 seconds and then rinse thoroughly.
- Bonding agent: 2 layers and light air blow and wait for 10 seconds.
- Place Aelite composite in <2 mm increments (build lobes not layers), cure 20 seconds after each increment.
- Cure final layer for 40 seconds.
- Finish and polish with fine carbides, Jiffy polishers. Rinse with ample water spray.
- Check occlusion with thin articulating paper with the patient upright in the chair.
- Adjust occlusal contacts and excursive as indicated.

Commentary
- Incremental insertion and light-activation of composite may reduce the negative C-factor effects.
- Finishing should be done carefully to avoid damaging the surface or margins of the resin composite restoration.
- Surface characterization is obtained by observing and copying details of the adjacent dentition onto the restoration.

References
PREPARATION DESIGN FOR ROOT CARIES

Root Caries

Clean out and preparation made for composite with a large bevel using 6888 bur
Preparation Design for Root Caries

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Handpieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Caries Detector Solution (optional)

Ideal Preparation Guidelines

Outline & Ext. Form
- Class V lesion is extended as necessary for caries removal
- Incisal or occlusal margin is beveled only if in enamel. The root portion has a retention groove for increased retention

Internal Form
- 1.25 mm axial depth (determined by depth of carious dentin)
- Rounded Internal angles
- No undermined enamel

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/ repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- Prepare a Class V shaped preparation, including all carious and infected dentin/cementum. Axial wall should be convex. The preparation should have divergent walls.
- Bevel placed on the incisal portion only if in enamel and if composite is the final restoration.

Commentary
- For Class V preparations, which are on cementum only, no bevel is placed.
- Isolation is the key to long-term success in root surface restorations. The inability to obtain a dry operating field, unobstructed access and good visibility frequently result in a compromised restoration.
- In case the lesion in question is NCCL (non-carious cervical lesion), the decision to restore the lesion should be only made if:
  1) It is impossible to greatly reduce the rate of lesion progression through elimination of etiologic factors.
  2) Esthetic unacceptability.
  3) Significant sensitivity of exposed dentin to cold liquids, food and air.
  4) Threat to the strength of the tooth and integrity of the coronal-radicular unit because of lesion’s depth.
- If crown lengthening surgery is planned on the restorative site it is advised to wait for 4 to 8 weeks (posterior teeth) and up to 6 months (incisors) in case margins of the restorations are most likely to be subgingival.
- If glass ionomer is the material of choice for restoration, cavosurface bevels are not recommended.

References
ROOT CARIES RESTORATION WITH COMPOSITE

Restored with composite and contoured following tooth anatomy

Polished composite restoration

Treatment options showing when to use closed and open sandwich techniques
ROOT CARIES RESTORATION WITH COMPOSITE

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Composite Bur Block (GREEN)
- Vita Classic Shade Guide
- Caries Detector Solution (optional)

Ideal Restoration Guidelines

Anatomical Form
- Resembles normal tooth anatomy

Margins
- No flash or white lines

Finish
- No voids
- Smooth & Polished
- Gingival tissue not damaged

Restoration Steps
- Etch the surface for 15 seconds and then rinse thoroughly.
- Bonding agent: 2 layers and light air blow and light cure for 10 seconds.
- Place Aelite composite in <2 mm increments, cure 20 seconds after each increment.
- Place final increment over gingival area to reseal this area (due to composite shrinkage) and light cure entire restoration for 40 seconds.
- Finish and Polish with fine carbides, Jiffy polishers. Rinse with ample water spray.

Commentary
- Adequate retraction of the gingival tissues can be attained by the use of rubber dam and 212 retractor. The 212 retractor can be modified using orthodontic pliers depending upon the extension of the lesion and can be secured down with the help of modeling compound.
- In case of limited access, miniflaps can provide sufficient access to subgingival lesions. The incisions should not be extended past the mucogingival junction and in most cases sutures are not necessary.
- For restorations that are moderate to large in size, the first increment of resin composite should be placed from about the midpoint of gingival floor to incisal or occlusal cavosurface margin and light cured. The second increment can fill the remainder of the preparation. Larger restorations may require more than two increments. Resin should not be placed in increments no thicker than 2 mm.
- Restoration overhang can adversely affect periodontal health.
- Diamond burs, carbide finishing burs and composite finishing discs can be used for final finishing and contouring.

References
Closed sandwich technique

Open sandwich technique

[Diagram courtesy of Dr. Edmund Hewett]
ROOT CARIES RESTORATION WITH RESIN MODIFIED GLASS-IONOMER

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Handpieces with attachments
- UCLA Amalgam Bur Block (BL)UE
- UCLA Composite Bur Block (GREEN)
- Caries Detector Solution (optional)
- GC Fuji IX (Chemical set, Mixing time: 10 sec, Working time: 2 min)
- Fuji II LC (Dual cure, Mixing time: 10 sec, Working time: 3 min)
- Cavity Conditioner
- Fuji Lining LC

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth and Flowing
- Extension of cavity should cover caries in susceptible areas.

Internal Form
- Minimum axial depth
- Rounded Internal angles
- No undermined enamel

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/ repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- Prepare a Class V shaped preparation, including all carious and infected dentin/cementum. Axial wall should be convex. The preparation should have divergent walls.
- Fuji Lining LC placed on dentin and light cured for 40 seconds.
- Prepare the cavity with Cavity conditioner, rinse with water and air dry.
- Triturate GC Fuji IX or Fuji II LC for 10 seconds and fill the cavity.

Commentary
- A unique property of GC Fuji IX is that it is condensable after it reaches a matte appearance.
- Good material for restoration of teeth with root-surface caries because of their inherent anti-carcinogenic property and adhesion to dentin. Similarly because of the potential for sustained fluoride release, glass-ionomers may be indicated for other restorations in patients exhibiting high caries activity.
- Not recommended for occlusal fillings on posterior teeth, due to the low resistance to wear and low strength compared to composite.
- When a restoration is placed in conjunction with a flap, placement of an all RMGI restoration or an open sandwich restoration with the apical aspect of restoration restored with RMGI provides an environment most likely to be conducive to tissue attachment.

References
- Clinical Restorative Dental Materials Guide by Dr. Richard G. Stevenson III, 2014
1) Failing occlusal amalgam

2) Clean out

3) After placing block-out, outline form is made with a tapered fissure bur

4) 3-5 degree taper on all internal walls
OCCLUSAL GOLD INLAY PREPARATION

Armamentarium

- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)
- UCLA Gold Bur Block (GOLD COLOR)
- UCLA Fixed Prosthodontics Preparation Bur Block (BLACK)
- Tucker Hand Instruments

Ideal Preparation Guidelines

Outline & Ext. Form
- Class I cavity, including entire occlusal surface

Internal Form
- 3-5 degree taper for each internal wall (diverging)
- Depth should allow for 1mm gold thickness (1.5-2.0 mm minimum pulpal depth)
- Sharp internal line angles

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps

- Local Anesthesia and Rubber dam placement.
- Block out is placed using Fuji IX / Fuji II LC.
- Occlusal preparation: Initial entry is made in the central fossa using a 330 bur to establish the pulpal floor depth (1.5-2.0 mm).
- Diverge the walls using a 56 for premolars and 57 for the molars creating a 3-5 degree taper for each internal wall.
- An occlusal finishing bevel is placed using a 7404 bur, if indicated.

Commentary

- Block-out technique: After removing the existing caries and obtaining a stain free dentinoenamel junction, the cavity should be checked for cracks if any and the cavity preparation design should be modified accordingly. The next step is placement of liner in deep dentinal areas followed by placement of either a composite resin or reinforced glass ionomer cement filled to the cavosurface margin. The operator completes the preparation. Final completed preparation should leave the block-out material only in areas that were previously occupied by dentin and all enamel should be supported by dentin and not the block-out material.
- Compared with all-ceramic inlays and onlays, cast gold restorations have proven to be more effective under mechanical stresses such as bruxism.
- Gold wears at a rate similar to that of enamel, so it does not cause accelerated wear of the opposing teeth.

References

CLASS II GOLD INLAY PREPARATION

1) MO Amalgam needs replacement

2) Removal of old restoration and clean out

3) After block out placed, box is dropped and proximal walls flared

4) Internal walls 3-5 degree taper & internal and external bevels placed
CLASS II GOLD INLAY PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Gold Bur Block (GOLD COLOR)
- UCLA Fixed Prosthodontics Preparation Bur Block (BLACK) and Tucker Hand Instruments

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth flowing with no "S" curves, with dovetail
- Flared exit angles in box and proximal clearance should be 0.75 mm

Internal Form
- Combined divergence of 6-10 degrees
- Depth should be 1.5 - 2.0 mm pulpal, 1.0 - 1.5 mm axial
- Sharp internal line angles

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- Block out is placed using Fuji IX / Fuji II LC.
- Occlusal preparation: Initial entry is made in the central fossa using a 330 bur to establish depth cut of 1.5mm.
- Establish required extensions and depth.
- Dove tail is placed near the marginal ridge to provide a geometry that will resist proximal displacement.
- Diverge the walls using 56 bur for premolars and 57 bur for the molars creating a 3-5 degree taper for each internal wall. Create flared occluso-proximal walls (approximately 135 degree angle). Check draw of the preparation before proceeding with proximal box.
- Proximal box: Use 169L bur to create mesial or distal box. Axial depth should be 1-1.5 mm. First break gingival contact and then extend to meet the flares. Keep axial wall narrow facio-lingually.
- The proximal clearance should be 0.75-1.0 mm.
- Refine line angles and smooth walls using Off-Angle Chisels (42S for distal box and 43S for mesial box).
- Use the Tru-Bal GMT’s to create a 30 degree internal bevel to the gingival wall.
- External gingival bevel is placed using a H248S Bur and 232/3 Tucker Gingival Margin Trimmers (60 degree, 0.5 mm wide bevel). Use 7404 bur to create an occlusal bevel, if indicated.

Commentary
- When a dovetail is not possible because of tooth structure limitations, an internal retentive feature such as a pin or a slot may be incorporated into the preparation design. The 169 L bur can be used to create a divergent pinhole, which may be captured in the impression by injecting the hole with impression material and by placing 30-guage anesthetic needle in the hole to vent out the air. A general guide to the placement of slots or pinholes is to place them as far away from the proximal box as possible.

References
MOD GOLD INLAY PREPARATION

Picture displaying Class II Gold Inlays preps. Tooth # 13 (2nd Premolar)
MOD Gold Inlay Preparation

Cementation of Class II Gold Onlays and Inlays
MOD GOLD INLAY PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)
- UCLA Gold Bur Block (GOLD)
- UCLA Fixed Prosthodontics Preparation Bur Block (BLACK)
- Tucker Hand Instruments

Ideal Preparation Guidelines

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<tr>
<th>Outline &amp; Ext. Form</th>
<th>Internal Form</th>
<th>Operative Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Smooth flowing with no “S” curves, with dovetail</td>
<td>- Combined divergence of 6-10 degree</td>
<td>- Rubber Dam Isolation</td>
</tr>
<tr>
<td>- Flared exit angles in box and proximal clearance should be 0.75mm</td>
<td>- Depth should be 1.5 -2.0mm pulpal, 1.0 mm axial.</td>
<td>- Adjacent tooth surface untouched, or smoothed/repaired</td>
</tr>
<tr>
<td></td>
<td>- Sharp internal line angles</td>
<td>- Pulpal protection (indicated with deep dentin)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Gingival tissues not damaged</td>
</tr>
</tbody>
</table>

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- Block out is placed using Fuji IX / Fuji II LC.
- Occlusal preparation: Initial entry is made in the central fossa using a 330 bur to establish depth cut of 1.5mm.
- Establish required extensions and depth.
- Diverge the walls using 56 bur for premolars and 57 bur for the molars creating a 3-5 degree taper for each internal wall. Create flared occluso-proximal walls (approximately 135 degree angle). Check draw of the preparation before proceeding with proximal boxes.
- Proximal boxes: Use 169L bur to create mesial and distal box. Axial depth should be 1 mm. First break gingival contact and then extend to meet the flares. Keep axial wall narrow facio-lingually.
- The proximal clearance should be 0.5-0.75 mm.
- Refine line angles and smooth walls using Off-Angle Chisels (42S for distal box and 43S for mesial box).
- Internal gingival bevels are not indicated.
- External gingival bevel is placed using a H248S Bur and 232/3 Tucker Gingival Margin Trimmers (60 degree, 0.5 mm wide bevel).
- Use 7404 bur to create an occlusal bevel, if indicated.

Commentary
- Prepping an MOD Inlay without undercuts is challenging. Make sure to see that the MB wall draws with DL and the DB wall draws with the ML.
- The axial walls should lean towards each other.
- If the draw is tight on the MB and you are concerned about the esthetics, obtain the draw from the lingual walls and preserve the minimal facial extension.
- 7404 bur should be used to place 0.5 mm wide occlusal, proximal and gingival bevels along the entire cavosurface finish line.

References
MOD GOLD ONLAY

1) Prepare an MOD Inlay

2) Non-functional Cusp reduction

3) Functional Cusp reduction

4) Shoulder bevel placed

5) Finishing bevel on functional cusp

6) Finishing bevel on buccal cusp
MOD GOLD ONLAY

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)
- UCLA Gold Bur Block (GOLD)
- UCLA Fixed Prosthodontics Preparation Bur Block (BLACK)

Ideal Preparation Guidelines

**Outline & Ext. Form**
- Smooth flowing
- Flared exit angles in box
- Proximal clearance of 0.75 mm

**Internal Form**
- Depth should be 1.5-2.0mm
- Internal line angles sharp
- Combined divergence of 6-10 degree

**Operative Environment**
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Anesthesia and Rubber dam placement.
- Block out placed with Fuji IX / Fuji II LC.
- Perform MOD Inlay first.
- Reduce Cusps: Use 57 bur to achieve a 1.5 mm clearance on all cusps, 1 mm clearance for buccal cusps of maxillary teeth and lingual cusps of mandibular teeth.
- Place a shoulder using a 56, 57 or 170 bur on buccal cusp of mandibular and lingual cusps of maxillary teeth (1mm wide and 1mm in height).
- Using a H248S, make an external gingival bevel.
- Finishing Bevels placed with a 7404 bur:
  1. Place 0.5 mm bevel on shoulder (Mandibular buccal cusp & Maxillary lingual cusp)
  2. Place 0.5 mm bevel on occluso-lingual (Mandibular preparation)
  3. Place a 0.2-0.3 mm bevel on maxillary buccal cusp

Commentary
- Indication for an MOD Onlay: failed large amalgam/composite/inlays or when an inlay leaves remaining cusps too weak.
- Wherever possible the margin placement of the gold restoration should be kept supragingival.
- Gingival, buccal and lingual finish lines are beveled.
- The proximal flare is established with 169 L bur. Proximal flares should blend smoothly with the gingival bevel and the buccal as well as lingual bevels. Creation of an undercut during beveling at faciogingival or linguogingival line angles must be avoided. Divergence is established from the gingival floor occlusally.
- If any adjustments need to be done in the occlusion after cementation is completed, a football shaped carbide bur (7404) should be used to remove the high spots followed by use of abrasive polishers (brownies, greenies and super greenies) on the adjusted area.

References
- The MOD Gold Onlay, Power Point Presentation by Richard G. Stevenson III, 2013
OCLUSSO-BUCCAL CERAMIC INLAY PREPARATION

OB Ceramic Inlay Preparations with Final Restorations

OB Ceramic Inlay Cementation
OCCLUSO-BUCCAL/OCCLUSOLINGUAL CERAMIC INLAY PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Ceramic Bur Block (RED)
- UCLA Fixed Prosthodontics Preparation Bur Block (BLACK)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth and Flowing
- Includes caries susceptible areas
- Extended for optimal esthetics

Internal Form
- 6-10 degree taper (diverging)
- Depth should allow 2 mm of minimum thickness of porcelain.
- Internal line angles rounded

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/ repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- A Class I cavity made with extension into lingual or a buccal groove using a 330D bur. The depth should allow for minimum 2mm of occlusal thickness.
- Diverge walls with 847KR 016 or 845 KR 016 bur.
- Smoothen pulpal floor and gingival wall with fine diamond burs.
- All internal line angles should be rounded.

Commentary
- Enameloplasty reduces extension along the fissures, conserving tooth structure.
- It is important that there should be an adequate path of draw for seating the ceramic restoration.

References
CLASS II CERAMIC INLAY PREPARATION

1) MOD & DO Amalgam need replacement

2) MOD & DO Amalgam clean out

3) MOD & DO Ceramic preparation with rounded internal angles
CLASS II CERAMIC INLAY PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Ceramic Bur Block (RED)
- UCLA Fixed Prosthodontics Preparation Bur Block (BLACK)

Ideal Preparation Guidelines

Outline & Ext. Form
- Smooth flowing with no “S” curves, with dovetail
- 90 degree exit angles in box and proximal clearance should be 0.5 mm

Internal Form
- 6-10 degree taper (diverging)
- Depth should be 1.5 -2.0 mm pulpal, 1.0-1.5 mm axial
- Rounded internal line angles

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/repaired
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- Occlusal preparation: Initial entry is made in the central fossa using a 330 bur to establish depth cut of 1.5mm.
- Establish required extensions and depth.
- Dove tail is placed near the marginal ridge to provide a geometry that will resist proximal displacement.
- Diverge the walls using 847KR 016 or 845KR 016 bur as with occlusal inlay technique.
- Proximal box: Use 846KR 012 bur to create mesial or distal box. Axial depth should be 1.0-1.5 mm.
- The proximal clearance should be 0.5 mm.
- Smoothen pulpal floor and gingival wall with fine diamond burs.
- Smooth flowing of all walls and rounded internal line angles is essential.

Commentary
- Resistance form is achieved through rounded proximal boxes (primarily relies on chemical bonding) so, no grooves should be used.
- Supragingival margin placement is desired to facilitate isolation for the adhesive cementation of an inlay or an onlay.
- APF and Stannous Fluoride solutions should not be used intraorally in patients with ceramic restorations. Only neutral sodium fluoride solutions should be used.
- When patient has a history of a parafunctional habit, a protective appliance should be fabricated to protect both the inlay and onlay as well as opposing teeth.

References
MOD CERAMIC INLAY PREPARATION

1) MOD & DO Amalgam need replacement

2) MOD & DO Amalgam clean out

3) MOD & DO Ceramic preparation with rounded internal angles
MOD CERAMIC INLAY PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Ceramic Bur Block (RED) and UCLA Fixed Prosthodontics Preparation Bur Block (BLACK)

Ideal Preparation Guidelines

Outline & Ext. Form
- Include entire occlusal surface along with mesial and distal sides
- 90 degree exit angles, proximal clearance should be 0.5 mm

Internal Form
- 6-10 degree taper (diverging)
- Depth should be 2.0 mm pulpal, 1.0 mm axial
- Internal line angles rounded

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/repair
- Pulpal protection (indicated with deep dentin)
- Gingival tissues not damaged

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- Occlusal preparation: Initial entry is made in the central fossa using a 330 bur to establish depth cut of 1.5 mm.
- Establish required extensions and depth.
- Diverge the walls using 847KR 016 or 845KR 016 bur as with occlusal inlay technique.
- Check draw of the preparation before proceeding with proximal boxes.
- Proximal boxes: Use 846KR 012 bur to create mesial and distal box. Axial depth should be 1 mm. First break gingival contact and then extend to meet the flares. Keep axial wall narrow facio-lingually.
- The proximal clearance should be 0.5-0.75 mm.
- Smoothen pulpal floor and gingival wall with fine diamond burs.

Commentary
- Resin luting cement is the only material recommended for cementing this type of restoration because it bonds to enamel, dentin and the restorative material.
- When using Dual-cured luting resin it is important that curing light be applied to dual-cured resin for an adequate period of time, because the dual-curing process results in more complete polymerization than that achieved with chemical polymerization alone. Please refer to cementation protocols for more detail.
- It is advisable that hand instruments should be used while performing oral prophylaxis on esthetic inlays and onlays. Ultrasonic and piezo scalers should be used with caution.

References
MODB CERAMIC ONLAY PREPARATION

MODB Onlay Preparation (Mesial View). Compared to a Gold Onlay, the internal angles are rounded.

MODB Onlay Preparation (Buccal View)
MODB CERAMIC ONLAY PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Ceramic Bur Block (RED) and UCLA Fixed Prosthodontics Preparation Bur Block (BLACK)

Ideal Preparation Guidelines

Outline & Ext. Form
- Includes entire occlusal surface, and extends to both buccal and lingual grooves.
- Reduce all cusps 2 mm
- Proximal clearance should be 0.5 mm

Internal Form
- 10-12 degree taper (diverging)
- Depth should be 2 mm.
- 1 mm axial depth, 2 mm axial height
- Internal line angles rounded

Operative Environment
- Rubber Dam Seal
- Pulp protection (deep dentin)

Preparation Steps
- Local Anesthesia and Rubber dam placement.
- Occlusal preparation: Initial entry is made in the central fossa using a 330D bur to establish depth cut of 2 mm.
- Establish required extensions and depth.
- Diverge the walls using 847KR 016 or 845KR 016 bur as with occlusal inlay technique.
- Check draw of the preparation before proceeding with proximal boxes.
- Proximal boxes: Use 846KR 012 bur to create mesial and distal box. Axial depth should be 1 mm. First break gingival contact and then extend to meet the flares. Keep axial wall narrow facio-lingually.
- The proximal clearance should be 0.5-0.75 mm.
- Smoothen pulpal floor and gingival wall with fine diamond burs.
- Reduce cusps with suitable diamond bur.
- Create smooth transitions between boxes and cusps.

Commentary
- Shoulders are not required in most cases - the use of a single plane of reduction usually suffices.
- There is no benefit to the placement of bevels at the occlusal or gingival margins; in fact, bevels should be avoided because thin margins of most ceramics are susceptible to chipping during function.
- Though one would think that 90-degree butt joint minimizes chipping problem but it may result in a visible demarcation between the tooth and the restoration. Therefore, in areas where optimum esthetics is needed such as facial surface of maxillary premolar, the entire facial surface may be included to have an optimum color match with adjacent tooth.

References
POST & CORE BUILD-UP WITH COMPOSITE

Clinical case for Post and Core Build up
POST & CORE BUILD-UP WITH COMPOSITE

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fuji lining LC
- ACE All Bond
- CORE-FLO (BISCO)
- Prefabricated Stainless Steel Post Kit

Preparation Steps (Post Cementation and Core build up Technique)
- Apply the etchant to the tooth for 15 seconds. Rinse thoroughly with water. Blot the canal with large paper point to remove moisture.
- Apply two coats of All Bond in the canal and blot the excess from the canal with paper points until paper point returns dry from the canal and light cure for 10 seconds.
- Cavity Liner if needed (Fuji Lining LC, if used light cure for 40 seconds>) in a layer less than 1 mm.
- Coat the post with one coat of ACE All Bond, air dry and light cure for 10 seconds.
- Prepare the Dual Syringe dispenser for CORE- FLO and express it into the canal
- Seat the post maintaining firm pressure for 5-10 seconds.
- Continue to express CORE-FLO around the post to build up core.
- Remove excess material and light cure for 40 seconds.
- Continue with final preparation.

Commentary
- Placement with a hand instrument is not recommended due to the flowable consistency of CORE- FLO.
- Alternate Technique: Cement post with Fuji I, then perform Build-up as a second step.

References
- Core Build ups by Dr. William Morgan (May, 7 2012)
CORE BUILD-UP WITH COMPOSITE

# 3 COAD

# 3 Build-up

# 3 Finished Preparation
CORE BUILD-UP WITH COMPOSITE

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fuji lining LC
- ACE All Bond
- CORE-FLO (BISCO)

Preparation Steps (Core build-up Technique)
- Apply Fuji liner to seal gutta percha if tooth is endodontically treated.
- Clean all surfaces that will receive the core material.
- Etch, rinse, bond, light cure
- Prepare the dispenser for CORE- FLO and express it into the preparation in bulk.
- Remove excess material and light cure it for 40 seconds.
- Continue with final preparation and impression.

Commentary
- The final margins of the restoration should not be on the Build-up material.

References
- Core Build ups by Dr. William Morgan (May, 7 2012)
PIN BUILD-UP WITH AMALGAM

Pin placement in sound dentin in a structurally compromised tooth

Completed pin build-up with amalgam
PIN BUILD-UP WITH AMALGAM

Armamentarium

- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Pin, Post And Core Preparation kit (ORANGE)
- \#1/2 round bur and Max 021 pins (0.023”)

Ideal Guidelines

- Assess tooth for endodontic & periodontal health (tooth should be vital).
- If uncertain about need or type of buildup, perform the crown preparation first.
- Determine proper location(s) using radiographs and careful clinical evaluation.
- 1 mm of dentin around the pin and 2 mm of space is needed occlusal to the pin to allow sufficient occlusal clearance.
- Pin should be placed parallel to the root of the tooth and hence protecting PDL and pulp.

Preparation Steps

- Under rubber dam, remove old restorations & caries and evaluate remaining tooth structure for adequate resistance & retention (Will there be enough of a ferrule?)
- Determine proper location for threaded pin. Primary sites are generally external line angles. Avoid high-risk areas, generally occlusal to furcations. Pin should be in an area to retain build up.
- Prepare location for pin: flatten surface where pin will be placed and indent pin location with \#1/2 round bur.
- Line up drill with the root surface of the tooth, avoiding pulp chamber & outer surface of the tooth. Drill a channel 2 mm deep with self-limiting drill. A depth greater than 2 mm will not improve retention but increase the risk of pulp exposure or external perforation.
- First place pilot hole with 0.017” drill.
- Then ream the pilot hole with 0.021” drill.
- Thread pin into channel until the pin bottoms out in the channel. If pin is not retentive, re-drill pin channel with regular drill. Pin may need to be cut off with a diamond stone or wire cutters so it is within the anticipated final crown preparation. This cannot be done with “MAX 0.021” as it is self-shearing.
- Place build up material and prepare tooth for final restoration. Finish lines for preparation must be on healthy tooth structure with at least 0.5 mm beyond build up, and preferably 2 mm of ferrule.

Commentary

- Amalgam as a buildup material is stronger and more stable, however, it takes longer to set and can be used as interim restoration, whereas, composite can be cut immediately after it sets, but it is weaker and less stable.
- If a Max 021 pin is inadvertently stripped, hole may be increased to regular size and TMS self-threading pin (0.027”) is used.

References

- Core Build ups by Dr. William Morgan (May 5, 2012)
**PIN BUILD-UP WITH COMPOSITE**

- Pin hole placed in dentin
- Max 021 Pin placed
- Core Build up material placement
- Refined preparation after placement of Build up

Sequence of pin placement drills:
- 1/2 round bur
- 0.017” twist drill
- 0.021” twist drill
- 021 pin
PIN BUILD-UP WITH COMPOSITE

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fuji lining LC
- ACE All Bond
- CORE-FLO (BISCO)
- PINS Max 021 sizes: Max. 0.017"/0.425 mm or MAX 0.021"/0.525 mm (Coltene-Whaledent)

Procedure
- Select pin sites. Keep in mind that MAX Restorative Pins shall not be bent.
- Preparation of drilling site: With a rotary instrument create a flat surface approximately 2 mm in diameter.
- Create shallow indents at channel sites with ¼ round bur in a high speed contra angle headpiece
- With MAX Depth Limiting Drill in a slow speed contra angle hand piece prepare channel to a depth just short of the counter bore.
- Remove drill from channel while drill is still rotating.
- Remove debris from drill and channel with air/water spray.
- Complete channel preparation to full depth (colored drill shank acts as stop).
- The MAX Depth Limiting Drill automatically creates the correct counter bore for the MAX shoulder stop.
- As with all pin channels, channels should first be dried and cavity varnish applied with a hygienic paper point.
- Insert a MAX Pin into a latch type reduction gear hand piece (or into the Universal Hand Driver if placing manually).
- Operate hand piece at a very low speed and apply light downward pressure. The MAX Pin will align and thread into the prepared channel and shear when seated at the shoulder stop.
- Build up with CORE-FLO.

Commentary
- Channels should be at least 1 mm from the dentinoenamel junction and at least 4mm from each other.
- Rotate drill in a clockwise direction. The drill must be kept in a continuous clockwise rotation during the entire drilling procedure until the drill has been fully withdrawn from the channel.
- Do not bend Pins.
- Blunt drills may cause oversizing of channels. Always use sharp drills. Replace drills every 12-14 channels.
- Max Depth Limiting Drills are precise delicate instruments. Used according to instructions they will allow you to prepare ideal channels for MAX restorative pins.
- Improper use will result in premature drill failure and breakage.

References
- MAX Restorative pins instruction manufacturer Coltene-Whaledent
CUSTOM CAST DOWEL CORE

Indications for using Custom Cast Dowel Core

- Successful Endodontics
- Significant tooth structure missing
- Anterior or single rooted teeth
- Oval shaped canals
- Occasionally, the angle of the core in relation to the root must be altered; custom cast post and core successfully fulfills this need

(1) Armamentarium

(i) UCLA Pin and Post preparation kit

(ii) Peeso reamer with non-cutting pilot tip

(2) Insertion of tooth pick into the canal (to adapt the resin to the walls of the canal and the resin will adhere to the tooth pick)

(3) Core portion overbuilt slightly so that properly formed axial contours will exist after trimming

(4) Prepared resin core - occlusal view

(5) Finished dowel core
CUSTOM CAST DOWEL CORE

Armamentarium
- Local Anesthesia
- Basic Cassette
- Restorative Cassette
- High Speed and Straight with Latch Attachment handpieces
- Peeso Reamers #1-6
- Duralay Pattern Resin
- Separating Medium, Two Dappen Dishes, Plastic Toothpick and Disposable Brushes
- Diamond and Acrylic Burs
- Stent, Paper Clip, Temporary Resin
- Chloroform, Rouge Stick, Fuji I Capsules and GC Metal Capsule Applier
- Polycarbonate Crowns (optional)

Ideal Guidelines
- Reduce crown of the tooth so that there is a minimum of 2 mm of occlusal or incisal clearance.
- Make an anti-rotational keyway if needed in a bucco-lingual direction (2 mm in depth towards the apical portion of the tooth) and wherever possible, a contra-bevel should be placed over the remaining tooth structure.
- Be sure to remove all gutta percha from the walls of the canal and be careful to maintain at least 5 mm of gutta percha as apical seal.

Preparation Steps
- Prepare crown of the tooth.
- All existing restorations, caries, and unsupported enamel must be removed.
- Prepare the remaining axial surfaces. Determine the approximate length of the dowel by measuring the periapical radiograph.
- Enlarge the canal space with the peeso reamer(s) until the reamer starts to plane the dentinal walls. Make an anti-rotational keyway if needed in a bucco-lingual direction in the coronal portion of the canal.
- Select a plastic toothpick that will fit into the canal passively and it should extend all the way to the apical end of the preparation. Cut off the toothpick so that there is approximately \( \frac{3}{4} \) of an inch extending out of the canal.
- Create retentive slots on side of the toothpick to retain resin.
- Lubricate the canal with Vaseline. Place 5 or 6 drops of monomer into a dappen dish and add powder. Mix to form a flowable mixture.
- Inject the resin into the canal so that the canal is filled and some excess comes out from the coronal portion of the canal. Immediately place the previously fitted toothpick into the canal in one smooth motion.
- Allow the resin in the canal to set undisturbed until it reaches a doughy stage. Pump the pattern in and out of the canal to prevent it from adhering to the walls of the canal.
- Build up the core or coronal portion of the pattern by injecting resin. Allow the resin core to set and then prepare it as though it were a part of the tooth. The pattern must be invested and cast with minimal expansion technique by using a higher water/powder ratio or by not using a liner in the casting ring.

Commentary
- Re-check the canal to verify that there are no undercuts in the preparation, there are no perforations and all finish lines must be on tooth structure.
- The greater the amount of tooth structure lost, the greater will be the need for additional retention for the core.
- Dowel core is placed to provide retention that ordinarily would have been gained from coronal tooth structure. A variation usually employing two dowels, is used for the molars that have little or no remaining tooth structure.

References
- Power Point Presentation on Core Build ups by Dr. William Morgan, 2012
FIBER POST BUILD-UP WITH COMPOSITE

(1) Armamentarium

(i) DT light post system

(ii) UCLA Pin and Post preparation kit

(2) Radiograph showing fiber post

(3) Clinical picture of fiber post

Helpful Tips

- Evidence supports PASSIVE (safer) - Less chance of root fracture
- FIBER (bonded) not better than METAL - Fiber has good esthetics
- TAPERED and PARALLEL same if TAPERED removes minimal root structure
- Key is FERRULE - “2-4-2” rule
- Length of the post should be at least equal to the amount of tooth coronal to the bone or at least 2/3 of the length of the root, whichever is greater
- Dual-cured cements are recommended for cementation of posts
The most important function of the post is to retain the core build-up.

Absence of the two opposing vertical walls after removing compromised/carious tooth structure is a good indication for the need of a post.

Recent studies show that dentin of an endodontically treated teeth exhibits mechanical properties equivalent to that of untreated teeth. As a portion of the sensory feedback mechanism is lost when the neurovascular tissue has been removed during endodontic therapy, the patient can inadvertently bite with more force on an endodontically treated tooth resulting in complications/failure of the treatment.

Never use pliers to cut the post and sandblasting or roughening with a bur is contraindicated.

**References**

- Power Point Presentation on Core Build ups by Dr. William Morgan, 2012
POSTERIOR FULL GOLD CROWN

(1) Armamentarium - Fixed Prosthodontics Bur Block

(2) Occlusal reduction is done by placing depth grooves first

(3) Completed occlusal reduction and functional cusp bevel

(4) Axial reduction and chamfer margin all over the preparation

(5) Finishing bevel

(6) Final preparation and cemented gold crown
POSTERIOR FULL GOLD CROWN (FGC)

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Caries Detector Solution (optional)
- Fuji Lining LC
- Fixed Prosthodontics Bur Block (BLACK)
- Bis-Acryl temporizing material

Ideal Preparation Guidelines
- Occlusal clearance should be 1.5 mm on facial and lingual cusps with functional bevel on the functional cusp. Proximal clearance should be 0.75 mm minimum at gingival.
- Finish line should be a 0.5 mm chamfer and supragingival if retention and resistance forms are satisfied.
- Axial walls taper with 6-10 degree total occlusal convergence.

Preparation steps
- Finish line design and occlusal scheme need to be determined prior to initiating preparation.
- Local Anesthesia and Rubber Dam placement.
- Use 1.0 mm diameter 57-010 carbide bur to place depth grooves. Place grooves in primary buccal and lingual grooves and triangular ridges, maintaining occlusal planes (alternate technique: use 330 bur in a vertical manner and place depth cuts).
- Use 57-010 carbide bur to connect the grooves, maintaining the desired occlusal planes.
- 1.5 mm clearance required on facial and lingual cusps.
- Line up 878K-012 bur in line of draw and move the bur to the axial wall to be reduced without changing angulation. Perform axial reduction and create chamfer finish line, extending into lingual embrasure until adjacent teeth will be affected. Follow contour of gingiva from mesial to distal and remain supragingival unless there is a good reason to go subgingival.
- Perform interproximal reduction using 850-012 bur by avoiding adjacent tooth damage, over-tapering, and excessive axial reduction. Reduce walls and create chamfer finish line with 877-009 diamond bur.
- Functional cusp bevel made on the functional cusp using 7404-014 bur.
- Check occlusion and provisionalize with temporary material from pre-op matrix button or putty stent.

Commentary
- Reduction parallels opposing tooth structure. Minimum height of crown should be 3 mm (posterior teeth).
- Occlusal clearance measured with RGS 4 (1.5 mm dia.). Instrument passes freely over occlusal surface from mesial to distal.
- Functional cusp bevel should be given for adequate clearance.
- In cases where there is recession present and a part of root/furcation is visible clinically, the finish line of the crown preparation should be made according to the contour of the root/furcation (‘Flute the root’). Over-contoured crown can lead to potential periodontal problems.
- Gold crowns can be used to restore teeth with multiple defective axial surfaces. They provide the maximum retention possible in any given situation provided there are no major esthetic expectations. Esthetic expectations may limit their use to second molars, some mandibular first molars and occasionally mandibular second premolars.

References
- Power Point Presentation on Posterior FGC by Dr. William Morgan, 2011
¾ MAXILLARY GOLD PARTIAL VENEER

(1) Armamentarium - Fixed Prosthodontics bur block

(2) Mesio-facial extension marking

(3) Occlusal reduction is done by placing depth grooves first

(4) Functional cusp bevel

(5) Axial reduction and finish line

(6) Interproximal reduction and retention grooves

(7) Occlusal offset

(8) Non-functional bevel and final preparation
3/4 MAXILLARY POSTERIOR GOLD PARTIAL VENEER

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- Bis-Acryl temporizing material

Ideal Preparation Guidelines
- Mesial facial extension should follow contour of tooth mesial to preparation and finish line tucked in behind mesial of the tooth. Occlusal reduction is 1.0 mm on facial cusps and 1.5 mm on lingual cusps with functional cusp bevel on lingual. Less than 0.5 mm reduction on facial cusp tip if sufficient horizontal overlap.
- Proximal clearance should be 0.75 mm at gingival with exit angle flared.
- For retention and resistance, sharp internal line angles and 6-10 degree taper is needed.

Preparation steps
- Finish line design and occlusion need to be determined prior to beginning.
- Local Anesthesia and Rubber Dam placement.
- Depth grooves placed with 57-010 bur to a depth of 1.5 mm in central groove and lingual cusp. Grooves taper off to a depth of 0.5 mm on buccal cusp. Reduce occlusal surface maintaining occlusal planes.
- Use 57-010 bur to place functional bevel. Parallel bur with opposing cusp and triangular ridge inlines.
- Use 878K-012 tapered diamond bur to reduce axially and create finish line. Align bur with line of draw both mesio-distally and bucco-lingually. Reduce axial walls evenly and extend axial reduction into interproximal. Maintain even distance from gingival.
- For interproximal reduction, extend facially and gingivally to break contact with adjacent tooth. Initial reduction with 850-012 diamond bur and follow up with 878K-012 diamond bur. Extension of flare clears adjacent tooth. Finish line at this point will be a knife-edge.
- Use 169 L for making mesial groove, which draws with rest of the preparation and ends 0.5 mm from gingival finish line. When satisfied with initial groove placement, use the groove to line up for placement of second groove.
- Use 169L to place offset parallel to facial finish line, 1.5 mm wide and 0.5 mm deep, and use 7404 finishing bur to place nonfunctional bevel.
- Check occlusion and provisionalize with temporary material from pre-op matrix button or putty stent.

Commentary
- Maxillary molar 3/4 crown: lingual 1/2 of preparation is the same as a full gold crown preparation. Mesio-lingual cusp about 2/3 of the mesio-distal dimension and disto-lingual cusp about 1/3 of the mesio-distal dimension.
- Use flame-shaped diamond to eliminate unsupported enamel on flare and to make flares draw with each other.
- Maxillary molar 3/4 crown is the most commonly used 3/4 crown. If designed skillfully, it can be very esthetic. However, it will not satisfy the patient who demands absolute esthetics as metal cannot be made invisible.
- Pin modified three-quarter crowns (one of the variations of a 3/4 crown) can be used to repair incisors and canines with severe lingual abrasion, but it should not be used on teeth with caries or restorations or in patients with extensive caries.

References
- Power Point Presentation on ¾ crowns by Dr. William Morgan, 2012
MAXILLARY MOLAR 7/8 CROWN

1. Armamentarium - Fixed Prosthodontics Bur Block

2. Occlusal reduction is done by placing depth grooves first

3. Axial reduction and taper 6-10 degrees

4. Gingival extension (0.5mm) and marginal depth (0.3-0.7 mm)

5. Proximal clearance and flare

6. Grooves and ‘triangle of success’

7. Offset and occluso-buccal bevel

8. Finished preparation and crown
MAXILLARY MOLAR 7/8 CROWN

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- Bis-Acryl temporizing material

Ideal Preparation Guidelines
- For optimal outline form, extend the facial margin just distal to the mesial-distal buccal height of contour.
- Occlusal reduction is 1.0 mm on facial cusps and 1.5 mm on lingual cusps with functional cusp bevel on lingual.
- Proximal clearance should be 0.75 mm at gingival with exit angle flared.
- Finish line should be 1 mm shoulder. For retention and resistance, sharp internal line angles and 6-10 degree taper is needed.

Preparation Steps
- Finish line design and occlusion need to be determined prior to beginning.
- Local Anesthesia and Rubber Dam placement.
- Occlusal reduction: 1.0 mm clearance on mesio-buccal cusp and 1.5 mm on disto-buccal and lingual cusps. Reduction should follow cusp inclines. Use 878K diamond bur.
- Occlusal shape: ML cusp 2/3 of mesio-distal dimension, DL cusp 1/3 of mesio-lingual dimension, and oblique ridge is preserved.
- Proximal clearance should be 0.5-0.75 mm with 850-012 bur to prevent display of gold and exit angle flared (135 degrees). Must allow die saw blade to pass through interproximal.
- Margin depth form is chamfer (0.5-0.7 mm).
- Mesial groove placed in “triangle of success” diameter of 170L bur when completed. Lingual wall forms 90-degree angle with axial wall and 0.5 mm above finish line. Buccal groove: longer than mesial groove, placed in approximate location of anatomic buccal groove.
- Offset: 1.5 mm wide and 0.5 mm deep with 169 L bur. Follows outer cusp form.
- Occluso-buccal bevel: 0.2-0.3 mm wide; disto-buccal cusp beveled 0.5 mm using 7404 bur.
- Finish: defined occlusal line angles, smooth diamond or carbide finish, no adjacent tooth damage, and remove nicks, if any, with Moore’s discs.
- Check occlusion and provisionalize with temporary material from pre-op matrix button or putty stent.

Commentary
- To check buccal clearance, RGS 3 instrument fits easily (DB cusp) and RGS 2 instrument tightly (MB cusp).
- To check lingual clearance, RGS 3 instrument fits easily (DL and ML cusps).

References
- Power Point Presentation on 7/8 crowns by Dr. Richard G. Stevenson III, 2011
**ANTERIOR PFM CROWN**

(1) Armamentarium - Fixed Prosthodontics Bur Block

(2) PFM preparations (check the height of the preparation in relation to adjacent tooth and evaluate lingual clearance by viewing from below)

(3) Lingual clearance (RGS 3 passes freely from mesial to distal)

(4) Facial reduction with depth grooves (with 856-016 bur)

(5) Interproximal clearance should be adequate

(6) Finish lines (shoulder on labial and chamfer on the lingual side)

(7) Finished preparation and provisional restoration
ANTERIOR PORCELAIN FUSED TO METAL CROWN (PFM)

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- PMMA temporizing material

Ideal Preparation Guidelines
- Incisal reduction should be 2 mm, tapering towards lingual. Lingual clearance should be 1 mm and proximal clearance 0.75 mm at gingival. Minimum height of crown should be 3 mm.
- Finish line should be 1 mm shoulder on facial and 0.5 mm chamfer elsewhere. For retention and resistance, line angles should be beveled and 6-10 degree taper is needed.

Preparation steps
- Finish line design and occlusion need to be determined prior to beginning.
- Local Anesthesia and Rubber Dam placement.
- Use 57-010 bur to place depth grooves about 1.5 mm deep and start to reduce the incisal edge.
- Use 7404 bur to gain adequate lingual clearance.
- Facial reduction should be done in two planes. Use 57-010 bur to place depth grooves in two planes.
- Use 856-016 diamond bur to do initial facial reduction, keeping even axial depth.
- Break proximal contact with 850-012 diamond bur without excess axial reduction, over-tapering, or damage to adjacent tooth. Break contact with adjacent teeth gingivally and carry reduction lingually without following outer contour of the tooth being prepared.
- Use 878K-012 bur to reduce cingulum to create axial wall and finish line, being careful to line up lingual with facial wall.
- Use 7404-014 bur to reduce fossa to gain clearance-concave for incisors.
- End cutting diamond, 10839-012 bur is used to smooth shoulder finish line and remove lip if any.
- Check occlusion and provisionalize with temporary material from pre-op matrix button or putty stent.

Commentary
- RGS 3 passes freely mesial-distal over occlusal surface of the preparation. Shoulder extensions can also be checked with RGS 3.
- Given the proper preparation depths, metal ceramic system can also be as esthetic as all ceramic system.
- Teeth that are opaque or have a high chroma and high value can be much easier to match using a metal ceramic system as compared to an all ceramic system.
- Patients with low lip lines and with poor quality dentinal substrate are good candidates for anterior PFM crowns.
- Diagnostic wax-up on a cast from preliminary impression and a preformed stent can serve as a guide tool to check adequate reduction during crown preparation procedures.

References
- Power Point Presentation on maxillary anterior PFM by Dr. William Morgan, 2011
POSTERIOR PFM CROWN

(1) Armamentarium - Fixed Prosthodontics Bur Block

(2) Occlusal reduction (RGS 4 should pass)

(3) Functional cusp bevel

(4) Axial reduction (axial wall length should be 3 mm minimum)

(5) Finish lines (shoulder on the facial side and chamfer on the lingual)

(6) Final preparation and finished crown
POSTERIOR PORCELAIN FUSED TO METAL CROWN (PFM)

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- Bis-Acryl temporizing material

Ideal Preparation Guidelines
- Occlusal clearance should be 2 mm on facial and lingual cusps with functional bevel. Proximal clearance should be 0.75 mm at gingival. Minimum height of crown should be 3 mm.
- Finish line for Porcelain margin: 1 mm shoulder and for Metal Collar: 1 mm shoulder with 0.5 mm bevel.
- For retention and resistance, line angles should be beveled and 6-10 degree taper is needed.

Preparation steps
- Finish line design and occlusion need to be determined prior to beginning.
- Local Anesthetics and Rubber Dam placement.
- 1.0-1.5 mm depth grooves help accomplish adequate occlusal clearance; maintain occlusal contours. Connect grooves to gain adequate occlusal clearance.
- Finish occlusal reduction on buccal cusps; RGS 4 fits loosely. Reduce buccal inclines of lingual cusps like a FGC.
- Facial reduction (856-016 bur) 1.5 mm reduction on axial wall and rounded internal line angles. Line up bur in desired line of draw both bucco-lingually and mesio-distally.
- Initial interproximal reduction done with 850-012 bur. Break proximal contact without excess axial reduction, over-tapering, or damage to adjacent tooth. Minimum of 3 mm long axial walls.
- Axial reduction (878K-012 bur) 1 mm on lingual, lining up lingual wall with buccal and blend chamfer into the proximal. There should be 6-10 degree occlusal taper of opposing walls.
- Give functional cusp bevel on the functional cusp using 7404-014 bur.
- End cutting diamond, 10839-012 bur is used to smooth shoulder finish line and remove lip if any.
- Check occlusion and provisionalize with temporary material from pre-op matrix button or putty stent.

Commentary
- The transition between the buccal (shoulder/deep chamfer) and lingual (chamfer) finish lines should be gradual.
- Patients with moderate parafunction are best treated with PFM crowns.
- Tooth contacts may be developed in metal rather than porcelain to decrease wear of opposing dentition.

References
- Power Point Presentation on posterior PFM by Dr. William Morgan, 2011
ANTERIOR LITHIUM DISILICATE ALL CERAMIC CROWN (ACC)

Incisal reduction
Straight and uniform, 2 mm. May be beveled lingually

Lingual reduction
Clearance with lower incisors 1.5 mm. Lingual fossa slightly concave. Lingual axial wall 1.5 mm

Axial reduction
Facial 1.0-1.2 mm at gingival. Lingual 0.5-0.7 mm at gingival. Proximal 1.0 mm (as viewed from facial)

Draw and Taper
6-10 degrees mesio-distal. One should be able to visualize the walls. Draw follows long axis of tooth (crown)

Refinement and Finish
Sharp line angles are rounded. No adjacent tooth or tissue damage
ANTERIOR LITHIUM DISILICATE ALL CERAMIC CROWN (ACC)

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- PMMA temporizing material

Ideal Preparation Guidelines
- Incisal reduction should be 2 mm, tapering towards lingual. Lingual clearance should be 2 mm and proximal clearance should be 0.75 mm at gingival.
- Finish line should be 1 mm shoulder.
- For retention and resistance, line angles should be beveled and 6-10 degree taper is needed.

Preparation steps
- Finish line design and occlusion need to be determined prior to beginning.
- Local Anesthesia and Rubber Dam placement.
- Use 57-010 bur to place depth grooves about 1.5 mm deep and start to reduce incisal edge.
- Use 7404 bur to gain adequate lingual clearance.
- Facial reduction should be done in two planes. Use 57-010 bur to place depth grooves in two planes.
- Use 856-016 diamond bur to do initial facial reduction, keeping even axial depth.
- Break proximal contact with 850-012 diamond bur without excess axial reduction, over-tapering, or damage to adjacent tooth. Break contact with adjacent teeth gingivally and carry reduction lingually without following outer contour of the tooth being prepared.
- Use 878K-012 bur to reduce cingulum, to create axial wall and finish line, being careful to line up lingual with facial wall. Use 7404-014 bur to reduce fossa to gain clearance-concave for incisors.
- End cutting diamond, 10839-012 bur is used to smooth shoulder finish line and remove lip if any.
- Check occlusion and provisionalize with temporary material from pre-op matrix button or putty stent.

Commentary
- The preparation RGS 4 passes freely mesial-distal to verify adequatelingual clearance. Shoulder finish line’s extension can be checked with RGS 3.
- Facial finish line design: maximum esthetics- by giving subgingival shoulder/deep chamfer.
- Strength should not be the overriding factor in selection of an ACC as a full coverage restoration.
- After administration of local anesthetic and before starting the preparation, it is advisable to measure the length of dentogingival complex (Bone sounding) with a periodontal probe (if anticipated finish line of the preparation is subgingival). In case finish line is subgingival the apical limit is 2.5 mm coronal to the osseous crest. At no point biologic width should be violated.
- Patients with low crest relationships (where gingival scallop does not mimic the osseous crest) are at high risk for facial recession and loss of papilla height after the treatment. One alternative to avoid this complication is to opt for surgical correction of the low crest before proceeding with preparation. However, if position of cementoenamel junction or esthetic demands prevent proactive treatment, it is recommended to take great care to avoid damage to the attachment during preparation and impression making. The finish line should be located at or coronal to the free gingival margin.
- Patients with high crest relationships (where probing measurements are less than 3 mm facially and interproximally) such as in cases of noncarious cervical lesions and altered passive eruption, an equigingival or supragingival placement of finish line is an ideal choice.

References
POSTERIOR LITHIUM DISILICATE CROWN

- Little enamel remains
- Tooth structure compromised
- Margins may be subgingival
- Stump shade within 3-4 shades of desired result
- MATERIAL OF CHOICE: Lithium Disilicate, monolithic (CAD/CAM or pressed), stained
  CEMENTATION: Adhesive (DUAL CURE) or Cohesive (RMGI)

Finished posterior lithium disilicate crown
POSTERIOR LITHIUM DISILICATE ALL CERAMIC CROWN

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- PMMA temporizing material

Ideal Preparation Guidelines
- Occlusal clearance should be 2 mm on facial and lingual cusps with functional bevel. Proximal clearance should be 0.75 mm at gingival.
- Finish line should be 1 mm shoulder. For retention and resistance, line angles should be beveled and 6-10 degree taper is needed.

Preparation steps
- Finish line design and occlusion need to be determined prior to beginning.
- Local Anesthesia and Rubber Dam placement.
- 1.5 mm depth grooves help accomplish adequate occlusal clearance; maintain occlusal contours. Connect grooves to gain adequate occlusal clearance.
- Finish occlusal reduction on buccal cusps; RGS 4 fits loosely. Reduce buccal inclines of lingual cusps like a FGC.
- Facial reduction (856-016 bur) 1.5 mm reduction on axial wall and rounded internal line angle. Line up bur in desired line of draw both bucco-lingually and mesio-distally.
- Initial interproximal reduction done with 850-012 bur. Break proximal contact without excess axial reduction, overdumping, or damage to adjacent tooth. Minimum of 3 mm long axial walls.
- Axial reduction (878K-012 bur) 1 mm on lingual, lining up lingual wall with buccal and blend chamfer into the proximal. There should be 6-10 degree occlusal taper of opposing walls.
- Give functional cusp bevel on the functional cusp using 7404-014 bur.
- End cutting diamond, 10839-012 bur is used to smooth shoulder finish line and remove lip if any.
- Check occlusion and provisionalize with temporary material from pre-op matrix button or putty stent.

Commentary
- To check occlusal clearance, RGS 4 instrument passes freely from mesial to distal.
- Functional cusp bevel should be given for adequate clearance.
- Use of all ceramic crowns in a patient with active parafunction as a treatment option is not advised.
- The minimum height for adequate resistance form of the preparation should be one-half the diameter of the tooth.

References
LAVA CROWNS

To assure clinical success, the following minimum material thickness is recommended:

**Anterior Crown**
- 1.5 - 2.0 mm incisal reduction
- 1.0 - 1.5 mm labial and lingual reduction
- Chamfer margin

**Posterior Crown**
- 1.5 - 2.0 mm occlusal/incisal reduction
- 1.0 - 2.0 mm axial reduction
- Round the internal line angles
- Chamfer margin

**Preparation:**
- The optimal preparation is a shoulder or chamfered preparation with a chamfer which must be applied at an angle of >5° (horizontal).
- The angle of the preparation (vertical) should be 4° or larger.
- The inside angle of the shoulder preparation must be given a rounded contour.
ZIRCONIA CORES FOR ALL-CERAMIC CROWNS (LAVA)

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- Bis-Acryl temporizing material

Ideal Preparation Guidelines

Anterior crown
- 2 mm incisal reduction
- 1 mm labial and lingual reduction
- Round internal line angles
- Chamfer margin

Posterior crown
- 2 mm occlusal and incisor reduction
- 1 mm axial reduction
- Round internal line angles
- Chamfer margin

Preparation Steps
- Local anesthesia.
- Place rubber dam; retain 2 teeth distal to prep tooth and at least to midline.
- Ideal preparation is shoulder or chamfer with circumferential step or chamfer at an angle of >5 degrees (horizontal).
- The angle of preparation (vertical) should be 4 degrees or larger.
- The inside angle of the shoulder should be given a round contour.

Commentary
- Feather edge finish line does not provide adequate reduction for porcelain build-up.
- Lava is a core material and needs to be layered with appropriate feldspathic porcelain.

References
- Power Point Presentation on Zirconia (Lava) crowns by Dr. Richard G. Stevenson III, 2012
- 3 M All Ceramic System Preparation guide 2012
(1) Armamentarium

(i) GC pliers  
(ii) Crown removal bur  
(iii) Backhaus Forceps  
(iv) Crown Removal – Richwils

(2) Crown removal with bur in 5 steps

Begin at the most accessible margin, usually the buccal, and cut a groove until the cement line is exposed, being careful to not damage the tooth. Use carbide burs with metal crowns and diamond burs (30 microns fine grit) with ceramic crowns.

Once the cement line is exposed, continue up the buccal surface to the occlusal, barely cutting through to the cement.

Continue across the occlusal surface in the same manner. It may be necessary to change burs during this process if cutting becomes inefficient or the bur breaks.

Continue from the occlusal surface onto the lingual surface until 1-2 mm of uncut crown remains near the lingual margin.

Use a T-bar, a strong spoon excavator or other instrument and place it in the groove and gently separate the two parts of the crown.

Sectioned gold castings
CROWN AND BRIDGE REMOVAL

Armamentarium
- Local anesthetic
- Basic cassette
- Rubber dam cassette
- High speed hand pieces with attachments
- H 34 bur (1.2 mm carbide bur), 330 bur and 846 bur
- Richwill Crown and Bridge Removers
- T bar/Spoon excavator

Considerations in Removal of Permanent Restorations
- Safety to the patient & tooth
- Radiographic evaluation
- Internal retentive features
- Grooves
- Boxes
- Pins/Posts
- Isthmus

Richwill Crown & Bridge Removers: used to remove permanent restorations that are to be maintained. They are safe for the tooth. They can also be used for removal of temporarily cemented permanent restorations.

Technique:
- Evaluate dentition-opposing crowns? (The opposing teeth need to be healthy and solid periodontally)
- Warm removers in packet.
- Instruct patient (They should be told that they will be closing into the remover material, holding steady for about ten seconds and then opening with a quick movement).
- Dry off crown & opposing teeth.
- Adapt remover to crown.
- Patient closes & holds for 10 seconds (In the case of a molar or premolar crown, the patient should close in centric position, while for anterior crowns; the patient should close in a protrusive position).
- Cool the removers.
- Ask the patient to open with a quick movement.
- Repeat if necessary.

Removal of Permanent Restoration with a Bur
- Local Anesthesia and Rubber Dam placement.
- Choose a sharp H 34 bur to section the crown in case it is a gold crown.
- If a metal-ceramic crown is being removed, make a slot in the porcelain to the metal with 846 diamond bur and then cut through the thin metal coping with H 34 bur. If an all ceramic crown is to be removed follow the same steps as described below, but use 846 diamond bur throughout the procedure.
- Begin at the most accessible margin, usually the buccal; cut a groove until the cement line is exposed, being careful not to damage the tooth.
- Once the cement line is exposed, continue up the buccal surface to the occlusal, barely cutting through to the cement.
- Continue across the occlusal surface in the same manner. It may be necessary to change burs during this process if cutting becomes inefficient or the bur breaks.
- Continue from the occlusal surface onto the lingual surface until 1-2 mm of uncut crown remains near the lingual margin. Be sure that the entire crown has been cut through, except for the lingual.
- Avoid cutting too deep into the axial walls of the tooth.
- Use a T-bar, a strong spoon excavator or other instrument and place it in the groove and gently separate the two parts of the crown. Gentle pressure usually is sufficient. If no separation, re-evaluate possible retentive features.

Gold Inlay Removal
- Section through isthmus with a bur such as 330 or 56.
- Make section so the distal part does not engage the isthmus.
• Place instrument such as a spoon excavator into slot & gently separate two parts of casting.
• If they do not separate with gentle pressure, reevaluate retention of inlay.
• Continue sectioning the inlay by cutting through the isthmus in a mesio-distal direction.
• Gently remove sections of gold, being careful to protect the tooth.

Commentary
• Removal of a cast restoration, whether permanently or temporarily cemented requires some force. If the force is too great, or is misdirected, damage to the tooth may ensue. To reduce this possibility, the force applied should be directed as closely as possible in the long axis of the preparation.
• Provisional restorations can be removed using GC Pliers or Backhaus Forceps.

References
• Power Point Presentation on Crown Removal by Dr. William Morgan, 2011
DIAGNOSTIC WAXUPS

How to arrive at the proper contour for a given case?

1) Ideas are developed by the dentist about how to design the case
2) Duplicate casts are made of the diagnostic casts
3) On the mounted casts, modifications are carried out including as indicated: waxing, carving of stone, setting of prosthetic teeth
4) The modified casts are duplicated in the stone
5) The casts are used in case presentation and making stents as needed for guiding preparation cutting and for provisional restorations
6) After the tooth preparations are done, a provisional restoration is made which duplicates the contours of the stone casts and is seated in the patient
7) The provisional restoration is modified as needed
8) A new cast is made from the modified provisional
9) The final restoration is made in lab which duplicates the contours of the restoration in the modified diagnostic cast
DIAGNOSTIC WAX-UPS

Armamentarium
- Study casts mounted on articulator
- Plaster bowl and spatula
- Alginate impression material
- Impression trays
- Yellow stone
- Waxes
- Sticky wax
- Q-tip applicators
- Waxing instruments
- Inlay wax
- Facebow
- Baseplate wax
- Lab plaster

Technique
- Make maxillary and mandibular full arch impressions with alginate. Most cases will need diagnostic casts even if no wax-up is needed.
- If a diagnostic wax-up is to be completed, duplicate the original casts and save them as your permanent record with the patient's name and date written on the casts. Diagnostic wax-ups should be on original mounted casts.
- Make interocclusal record in CR if required (use Leaf gauge technique with Futur registration material), otherwise hand mount casts in MIP.
- Mount original maxillary cast with a facebow and original mandibular cast with CR record or hand mounted in MIP.
- If it is determined that the case is to be completed in different mandibular position than CR, remount mandibular cast in that position, usually MIP.
- Make duplicate casts.
- Wax on mounted original casts, modifying cast as needed. The goal is to anticipate ultimate correction of the various deviations from normal in that particular case.
- All provisional restoration splints should be fabricated using a duplicate stone cast of the diagnostic wax-up wherever possible.
- Have these casts available when treating the patient.

Commentary
- A diagnostic wax-up will usually be necessary in cases involving any of the following clinical situations: fixed partial dentures (bridges), implants, multiple crowns, anterior crowns or veneers, alterations of occlusal plane, cross bite corrections, significant contour changes (tilted or rotated teeth involved in a cast restoration), orthodontics and significant changes in the VDO.

References
- Power Point Presentation on Diagnostic Wax ups by Dr. Don Fisher, 2013
POSTERIOR (OCCLUSO-BUCCAL) CERAMIC VENEER PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Fixed Prosthodontics Bur Block (BLACK)
- UCLA All Ceramic Bur Block (RED)
- Putty Material
- Contac E-Z Strips

Ideal Preparation Guidelines

Outline & Ext. Form
- Include buccal 1/3 portion of occlusal surface; reduce buccal cusp 1.5-2.0 mm

Axial Depth/Extensions
- 0.5 mm at gingival, 1.0 mm at occlusal
- Rounded internal angles
- 6-10 degree taper
- Margin form: chamfer or mini-shoulder

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, smoothed/repaired
- Gingival tissues not damaged

Preparation Steps
- Use the prototype wax-up to fabricate a putty preparation guide or use a putty stent to spot bond composite on to the surface to create a mock-up.
- Administer local anesthetic and place rubber dam.
- Depth cuts on the facial with 828-026 or 828-022 bur.
- Gingival mini shoulder margin with 6844 bur.
- Occlusal reduction on buccal cusps of 1.5-2.0 mm.
- Correct draw issues.
- Refine entire finish line areas.
- Round sharp line angles.
- Break proximal contact with diamond strip.
- Keep margins on tooth surface.

Commentary
- Use RGS 4 (1.5 mm) to measure occlusal reduction.
- To prevent marginal staining it is good to extend the preparations interproximally. There is no esthetic need to extend the preparations through the contact areas, unless indicated to close diastema or to extend past caries/previous restorations

References
- Veneers Preparation Power Point Presentation by Dr. Richard G. Stevenson III, 2012
ANTERIOR INCISO-FACIAL CERAMIC VENNER PREPARATION

(1) Armamentarium

(i) Esthetic bur kit

(ii) Dialite Composite finishing kit

(2) Depth cuts

(3) Finished preparation and direct composite provisional

(4) Variations

(i) Facial only: No reduction of incisal length

(ii) Incisal butt: Most common, better esthetics, multiple lines of draw, definitive seating

(iii) Lingual wrap: Restricted line of draw, definite seating, may be stronger?
ANTERIOR (INCISO-FACIAL) CERAMIC VENEER PREPARATION

Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Fixed Prosthodontics Bur Block (BLACK)
- UCLA All Ceramic Bur Block (RED)
- Putty Material
- Contac E-Z Strips

Ideal Preparation Guidelines

Outline & Ext. Form
- 0.5 mm facial reduction

Axial depth/Extensions
- 0.5 mm at gingival, 1.0 mm at occlusal
- Rounded internal angles
- 6-10 degree taper
- Margin form: chamfer or mini-shoulder

Operative Environment
- Rubber Dam Isolation
- Adjacent tooth surface untouched, or smoothed/ repaired
- Gingival tissues not damaged

Preparation Steps
- After the prototype wax-up is finalized, prepare the tooth.
- Administer local anesthetic and place rubber dam.
- Depth cuts on the facial with 828-026 or 828-022 bur.
- Gingival mini shoulder margin with 6844 bur.
- Incisal reduction 2.0 mm.
- Refine entire finish line areas.
- Round sharp line angles.
- Break proximal contact with diamond strip.
- Bevel occluso-facial line angle.
- Keep margins on tooth surface.

Commentary
- To prevent papilla failure, make sure the osseous crest to contact area is not more than 4 mm.
- Use RGS 1 to measure facial reduction.
- While making a treatment plan, attention must be directed not only to the shape and color of the teeth, but also to the shape of the face, lip lines and the skin color.
- When esthetic demands are high, an enamel-bonded veneer is the first choice. The most important areas in which to maintain enamel during the preparation are incisal and cervical areas. Incisal reduction allows creation of additional incisal translucence.
- The amount of exposed dentin in central portion of veneer preparation becomes less important when all margins are bonded to enamel.
- Since in most patients the gingival half of the mandibular incisors remains covered by lower lip at all times so, the gingival margins of the preparations for mandibular anterior teeth are ideally placed 1 mm incisal to marginal gingiva.
- Incisal Edge Designs:
  1. Facial only- for cases where veneers will not be lengthened.
  2. Incisal Butt- for most cases as it allows for lengthening, and flexibility with line of draw.
  3. Lingual Wrap- usually not indicated as it thins incisal edge and limits line of draw.

References
SUP VENEERS

• 50% of enamel remains
• Lingual tooth structure involved
• More than 2 mm of unsupported ceramic
• Margins may be on dentin
• Stump shade within 2 shades of desired result
• MATERIAL OF CHOICE: Lithium Disilicate, cut back and layered
• CEMENTATION: Adhesive, LIGHT-CURED
Armamentarium
- Local Anesthetic
- Basic Cassette
- Rubber Dam Cassette
- Restorative Cassette
- High & Slow Speed Hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- UCLA Fixed Prosthodontics Bur Block (BLACK)
- UCLA All Ceramic Bur Block (RED)
- Putty Material
- Contac E-Z Strips

Ideal Preparation Guidelines

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<td>Margin form: chamfer or mini-shoulder</td>
<td></td>
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</tbody>
</table>

Preparation Steps
- After the prototype wax-up is finalized, prepare the tooth.
- Administer local anesthetic and place rubber dam.
- Depth cuts on the facial with 828-026 or 828-022 bur.
- Gingival mini shoulder margin with 6844 bur.
- Incisal reduction 2.0 mm.
- For lingual wrap, reduce 0.5-1.0 mm axially on the lingual side (this is done to place margins on enamel for extra retention).
- Gingival mini shoulder margin on the lingual side prepared with 6844 bur.
- Refine entire finish line areas. Round sharp line angles.
- Break proximal contact with diamond strip. Bevel occluso-facial line angle.
- Keep margins on tooth surface.

Commentary
- Super veneers are used for extra retention when clinically needed. The only difference between these and other veneers is that the super veneers wrap around the tooth more lingual and interproximal.
- Thin laminate of porcelain provides an optical refractive index similar to translucent enamel, allowing the natural tooth to act as color substrate. When tooth substrate is an ideal color, veneer restoration can bring out the best esthetic results.
- Before final cementation of the veneer for optimum esthetics and color matching it is advisable to try the veneer in the mouth using try-in paste (Choice 2 try-in paste).

References
- Veneers Preparation Power Point Presentation by Dr. Richard G. Stevenson III, 2012
PROVISIONAL RESTORATIONS

(1) Armamentarium

(i) Visalys

(ii) Matrix buttons

(iii) Jet Acrylic

(iv) Dura Seal

(v) Tescera Clear Matrix

(vi) Pro Form Coping Material

(2) Provisional fabrication by indirect technique using Jet Acrylic

Patient’s Cast

Rubber-Sep applied

Gross trimming with # H251 060 bur

Refinement of embrasures with # 934 disk

Provisional restoration
PROVISIONAL RESTORATIONS

Crows

Direct with Bis-Acryl Clear Stent Technique
- Trim stent to fit teeth and tissues.
- Place thin coating of Vaseline on prepared teeth.
- Fill clear stent with ample amount of Bis-Acryl material.
- Insert stent on teeth and wait for 2 minutes.
- Trim and polish with burs and composite finishers.
- Check and adjust occlusion as necessary.

Inlays and Onlays

Direct with Bis-Acryl Matrix Button Technique
- Warm button in water bath until it turns clear.
- Insert onto teeth and push into proximal embrasures.
- Remove after it turns opaque and save for temporary fabrication.
- Coat with internal surface of button with Vaseline.
- Add Bis-acryl to matrix and insert on prepared teeth.
- Wait for 2 minutes.
- Trim and polish with burs and composite finishers.
- Check and adjust occlusion as necessary.

Direct with Composite (Fermit)
- Express Fermit from syringe and apply with condenser.
- Remove excess, but leave interlocking aspects proximally.
- Have patient occlude and remove excess.
- With patient closed, light cure for 30 seconds.
- Adjust occlusion carefully as necessary.

Veneers

Direct Composite Provisionals
- Dry and isolate teeth.
- “Spot” etch.
- Rinse and dry.
- Apply adhesive resin on all prepared surfaces.
- Light cure 20 seconds.
- Apply composite (mold with finger into even thickness; DO NOT LENGTHEN)
- Light cure 40 seconds.
- Repeat for each tooth.

“Shrink-to-fit” Provisionals
- Make stent/matrix from diagnostic wax up.
- Spot etch/adhesive resin/cure.
- Fill matrix with provisional material (Bis-Acryl or VLC provisional material).
- Seat matrix in mouth, remove when cured.
- Remove excess from margins.
- Adjust occlusion and polish.

Bonded Functional Esthetic Prototype
- Long Term (over 6 weeks): Composite + larger etch pattern.
- Short Term (2-4 weeks): Bis-Acryl + smaller etch pattern.
- Spot etch, apply bonding agent, then stent and cure.
Commentary
- Margin excess can lead to inflammation and recession.

References
- Provisional Crowns, Provisional Veneers and BFEP Preparation Power Point Presentation by Dr. Hewlett, 2013
CAD CAM CAPTURE AND PREPARATION

**Occlusal reduction**: It should be at least 2 mm when measured from central fossa walls.

**Walls**: Avoid steps in the wall; should be smooth from the floor to the margin. Avoid bevels at the margin. Undercuts on internal walls are acceptable based on clinical judgment of adequate cuspal support.

**Proximal box**: Rounded, smooth box shape; avoid sharp corners. Walls should taper 6-8 degree to avoid open margins. Avoid undercuts in walls. Smooth floor; rough areas may inhibit seating. Avoid sharp internal angles.

**Proximal margins**: Minimal separation from adjacent teeth = “bridging”. Need separation to avoid connecting the surface, prep. as close to gingival margin as possible.

**Crowns**: 6-8 degree wall taper. Rounded internal line angles. Smooth, crisp margins; avoid bevels. Adequate tooth reduction. Shoulder - 90 degrees.

**Camera**: Must be held steady; no movement. Use a pen grasp with a finger rest for maximum control. Be aware of the pitch, yaw, and roll of the camera. Pitch controlled by a solid rest on an adjacent tooth. Yaw and roll determined by the path of insertion. No cotton rolls, fingers and wedges.
CAD/CAM PREPARATIONS AND DIGITAL IMPRESSIONS

CAD/CAM (Computer-aided design and milling) is a term that refers to computer software that is used to both design and manufacture a wide range of dental restorations. CAD/CAM preparations differ from the way normal tooth preparations are made.

**Keys to Success**
- Good preparation
- Good digital impression

**Preparation**
- Smooth, tapered walls—ensure good internal adaptation.
- Smooth, well-defined margins—aid in margin detection and fit.
- Rounded internal angles—ensure passive seating and prevent fracture.
- Exit angles and margins approaching 90 degrees—ensures bulk of ceramic at margins for strength.
- Adequate tooth reduction—ensures strength of ceramic material.
- Vertical walls should be divergent from the floor.
- Narrow isthmus = weak area.
- Onlays: desire 2 mm reduction over functional cusps and central fissure and 1.5 mm over non-functional cusps.
- Crowns: 6-8 degree taper, shoulder margins and tip of anterior preparations greater than 1 mm.

**Digital Optical Impressions**
- Proper isolation followed by CEREC Optispray.
- The contrast spray balances out the different optical properties of the natural tooth (dentin and enamel) and thus permits optimum recording using the camera (if less powder is used: data will not be recorded and more powder can lead to inaccurate data recording also possibly resulting in open contacts in the final restoration).
- Camera must be held steady using pen grasp with finger rest.
- Be aware of pitch, yaw, and roll of the camera and avoid extraneous items in the picture.

**Commentary**
- Avoid steps in the walls. It should be smooth from the floor to the margin.
- Avoid bevels at the margins.
- Undercuts on the internal walls are acceptable based on clinical judgment of adequate cuspal support.

**References**
- Digital Dentistry: Using the Chair Side CAD/CAM System by Dr. Richard G. Stevenson III
Polishing should be done extra orally. Polishing is done by using Extra-Oral Dialite system. (Blue adjust wheel followed by pink and grey)

**Glazing Sequence**
- Use fine diamonds to refine contour
- Avoid overheating to prevent micro cracks in the restoration
- Use coarse rubber wheels for less surface texture
- Smoother the surface, greater is the value
- Prepared ceramic should be thoroughly cleaned, free from dirt and grease before glazing
- Follow the manufacturer’s instructions for firing

**Restoration Adjustment**
- Micro fine diamonds = < 40 mm
- Milling diamonds = 64 mm. Copious water spray required
- Do not use carbides as the “chatter” across porcelain causes micro fractures

**Polishing – Intraoral**
- Extreme caution that you do not overheat the tooth
- Intraoral polishing only if you have to make small occlusal adjustment after seating
- Polishing porcelain generally includes a series of grits and time
- Intra-oral Polishing is done with Dialite Intra-Oral system
Glazing Sequence
- Restoration preparation (use fine red stripe diamonds to refine contour and avoid overheating).
- Use coarse rubber wheels (Dialite Blue) for the surface texture (the smoother the surface, the higher the value).
- Prepared ceramic is thoroughly cleaned using steam cleaner, flowing hot water, or alcohol/acetone.
- Dry the prepared cad restoration. Fill the intaglio of the restoration with IPS Object Fix Flow (an auxiliary firing paste to support e. max cad restorations during the crystallization process) and place it on the firing tray. Fire following the manufacturer's instructions. The firing cycles are conducted in a Programat CS or any other ceramic furnace from Ivoclar Vivadent.
- After firing, place the restoration on cooling tray and allow it to reach room temperature.
- Avoid quenching, as it causes micro cracking.

Fitting, Polishing, and Cementation
- After recovery from the milling chamber, rinse.
- Trial fit (if glazing is done, retry for fit).
- Finish and polish the restoration.
- Prepare the restoration surface.
- Isolation by using rubber dam.
- Prepare the tooth surface (etching and silanization).
- Application of luting agent.
- Polymerization and bonding (ceramic limits light transmission to cement; be aware of curing light power as over curing will cause tooth sensitivity).
- Restoration adjustment with micro fine red stripe diamonds (never with carbides).
- Intraoral-polishing only for small adjustments using Dialite intra oral system with water spray (avoid overheating).

Commentary
- Polishing can create smooth surface equal to glazing if adequate time is taken with porcelain polishers.
- Ceramic etching: 5% buffered HF for 20-30 seconds followed by steam cleaning and silane application.
- Cement should be cleaned thoroughly prior to light curing.
- A postoperative bitewing radiograph may be used to confirm removal of the excess cement and fit.
- Oven Protocol:

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References
- Digital Dentistry: Using the Chair Side CAD/CAM System by Dr. Richard G. Stevenson III
**IMPLANT IMPRESSIONS (Open tray technique)**

1. Place throat pack/barrier. Remove healing abutment

2. Place pick-up impression coping on the implant and engage hex. Thread pick-up impression coping screw into the implant until finger tight

3. Radiograph interface to verify complete seating

4. Cut small hole in stock tray to allow access to screw head

5. Use light body impression material around impression coping. Load impression tray with heavy body and seat in mouth

6. Once set remove impression coping screw. Remove impression from mouth

7. Verify impression material has adapted and that there is no impression material on restorative platform

8. IMMEDIATELY replace healing abutment

9. Shade selection

10. Straumann Open tray and Closed tray impression posts
Armamentarium
- Dispenser (1:1, 50 ml)
- PVS cartridge heavy body & light body (base & accelerator)
- Mixing tip for dispenser
- Free Flo syringe (Kerr) with disposable tip
- BFC syringe (Ho Dental)
- Impression tray (OPEN/CLOSED)
- PVS tray adhesive and disposable tray painting brush

Indications for Closed tray impression
- Limited inter-arch space.
- In patients with a tendency to gag.
- Difficult access to the posterior region of the mouth.

Advantages of Closed tray impression
- Easier.
- Suitable for short arch distance.

Disadvantages of Closed tray impression
- Nonparallel placed implants.
- Deeply placed implants.

Closed tray impression procedure
- Remove healing abutment and place closed tray impression coping.
- Tighten the impression coping and take radiograph to confirm complete seating of the impression coping.
- PVS material and a stock impression tray are used to take the impression. The closed tray coping, lab analog, and impression are sent to the lab for fabrication.

Advantages of Open tray impression
- Reduces the effect of implant angulation.
- Reduces the deformation of the impression material.
- Removes concern for placing the coping back into its respective space in the impression.

Disadvantages of Open tray
- Some rotational movement of the impression coping when securing the implant analog may occur.
- Blind attachment of the implant analog to the impression coping may result in a misfit of components.

Open tray procedure
- Remove the healing abutment.
- Place the open tray impression coping into the implant body.
- Hand tighten and take radiograph to confirm complete seating of the impression coping.
- A stock tray with a relief hole is used to take the impression.
- When the impression material sets, the coping is unscrewed and trapped in the impression.
- Completed PVS impression is sent to the lab with the analog and lab screw.

References
**IMPLANT DELIVERY**

**Instructions**

- Attach abutment to implant and tighten the screw
- Wait 10 minutes and retighten to manufacturers recommended torque (Astra 25 Nm, Nobel 30 Nm and Straumann 30 Nm)
- Take radiograph to confirm the proper seating of abutment
- Check the delivered crown/bridge restoration on the abutment(s); CimoE Contacts, Intaglio, Margins, Occlusion and Esthetics
- Place a dry cotton pellet into abutment
- Cement the crown/bridge using Temp Bond cement and remove excess cement meticulously
- Evaluate and adjust occlusion if needed

1) Healing Abutment

2) Impression coping placed and radiograph taken

3) Custom abutment screwed in and fit verified by radiograph

4) Final cementation
**IMPLANT DELIVERY**

**Armamentarium**
- Basic cassette
- Restorative cassette
- High and slow speed hand pieces with attachments
- UCLA Amalgam Bur Block (BLUE)
- Fixed Prosthodontics Bur Block (BLACK)
- Fit checker (GC)
- HI-MARK medium articulating strips (California Dental)
- Arti-Fol (Bausch)
- Arti-Spray (Bausch)
- Dialite (blue, pink, and white) wheels in straight slow-speed hand pieces for extra oral adjustment
- Dialite (blue, pink, and white) bells and points in friction grip for slow speed for intraoral adjustment

**Ideal cements**
- Resin cements (Duo-link, Choice 2) for translucent crowns in highly aesthetic areas with equi-gingival margins
- Temp-Bond (Kerr) is the preferred cementation material for cemented implant restorations.

**Instructions**
- Attach abutment to implant and tighten the screw.
- Wait 10 minutes and retighten to manufacturers recommended torque (Astra 25 Nm, Nobel 30 Nm and Straumann 30 Nm).
- Take radiograph to confirm the proper seating of abutment.
- Check the delivered crown/bridge restoration on the abutment(s); CIMOE.
- Place a dry cotton pellet into abutment.
- Cement the crown/bridge using Temp Bond cement and remove excess cement meticulously.
- Evaluate and adjust occlusion if needed.

**Commentary**
- Margins should be no more than 1 mm subgingival.
- Custom designed abutments facilitate ideal margins.
- Only cement in mature gingiva (use extreme caution if minimal keratinization).
- Use semi-soluble cements (Temp Bond) to guard against subgingival cement entrapment.
- Apply Vaseline to subgingival abutment emergence.
- Do not load the crown with cement; instead, coat the intaglio with a thin film.
- Wait until cement sets prior to removal.

**References**
- Esthetic Implant Power Point Presentation by Dr. Todd Schoenbaum, 2012
- Excellence Restorative Dentistry Power Point, by Dr. Richard G. Stevenson III
PREPARATION DIFFERENCES BETWEEN SINGLE CROWNS AND BRIDGES

Anterior Crowns
- IPS EMPRESS: Incisal reduction: 2 mm. Facial and lingual reduction: 1.5 mm. Taper: 6-10 degree. Finish line: shoulder of at least 1 mm.
- ZIRCONIA: Incisal reduction: 2 mm. Facial and lingual reduction: 1.5 mm. Taper: 6–10 degree. Finish line: deep chamfer/shoulder of 1 mm.
- IPS E. Max: Incisal reduction of 1.5 mm. Minimum 0.5 mm facial reduction (low force area) to 1.5 mm in high force area. Lingual clearance: 1.5 mm. Taper: 6–10 degree. Finish line: shoulder/chamfer of at least 1 mm.
- PFM: Incisal reduction: 2 mm. Facial and lingual reduction: 1.5 mm. Taper: 6–10 degree. Finish line: deep chamfer/shoulder of 1 mm.

Anterior Bridges
- IPS E. Max: Incisal reduction of 1.5 mm. Minimum 0.5 mm facial reduction (low force area) to 1.5 mm in high force area. Lingual clearance: 1.5 mm. Taper: 6–10 degree. Finish line: shoulder/chamfer of at least 1 mm. Bridge connector: minimum of 4X4 mm.
- PFM: Facial reduction: 1.5 mm. Incisal reduction: 2 mm. Lingual reduction: 1.5 mm. Finish line: deep chamfer/shoulder of 1 mm. Taper: 6–10º. Bridge connector: minimum of 3X3 mm.

Posterior Crowns
- IPS EMPRESS: Occlusal clearance: 1.5-2.0 mm from deepest occlusal pit. Buccal and lingual reduction: 1.5 mm. Taper: 6–10 degree. Finish line: shoulder/chamfer of at least 1 mm.
- IPS E. Max: Occlusal clearance: 1.5 mm at least in contact area. Buccal and lingual reduction: 1.5 mm. Taper: 6–10 degree. Finish line: shoulder of at least 1 mm.
- ZIRCONIA: Occlusal clearance: 1.5-2.0 mm from deepest occlusal pit. Buccal and lingual reduction: 1.5 mm. Taper: 6–10 degree. Finish line: deep chamfer of 1 mm.
- PFM: Occlusal clearance: 1.5-2.0 mm from deepest occlusal pit. Proximal reduction: 1.5 mm. Taper: 6–10 degree. Finish line: shoulder/deep chamfer of 1 mm.

Posterior Bridges
- IPS E. Max: Occlusal clearance: 1.5 mm at least in contact area. Buccal and lingual reduction: 1.5 mm. Taper: 6–10 degree. Finish line: shoulder of at least 1 mm. Bridge connector: minimum of 4X4 mm.
- PFM: 1.5 mm. Incisal reduction: 2 mm. Lingual reduction: 1.5 mm. Finish line: deep chamfer of 1 mm. Taper: 6–10 degree. Bridge connector: minimum of 3X3 mm.
BONDING PROTOCOL

Armamentarium
- Rubber dam cassette
- Basic cassette
- Restorative cassette
- Ultra etch & tip (35% phosphoric acid)
- ACE All-Bond TE (Bisco)
- Polymerization light

Indications for Use
- Direct composite restorations
- Composite core build-ups
- Indirect restorations (metal, composite, alumina/zirconia, porcelain, and lithium disilicate)
- Endodontic post bonding
- Repair of porcelain/lithium disilicate restorations
- Repair of porcelain-fused-to-metal restorations
- Repair of porcelain-fused-to-zirconia/alumina restorations
- Repair of old or indirect composite restorations
- For desensitization of preparations prior to provisionalization/immediate dentin sealing
- For exposed root desensitization

Preparation Steps
- Etch all prepared surfaces with phosphoric acid for 15 seconds (allow etch to extend 2 mm beyond the finish line).
- Rinse thoroughly (10 seconds), gently air dry, and avoid desiccating any exposed dentin.
- Dispense and mix ACE All-Bond TE for 5 seconds, apply 1–2 coats to prepared surfaces with light agitating motions for 5–10 seconds, gently air dry for 5 seconds until there is no visible movement of the material, and then thoroughly air dry for a minimum of 10 seconds.
- Optional: light cure 20 sec.

Commentary
- For all bonded ceramic restorations:
  DIRECT THE OPERATORY LIGHT AWAY FROM PATIENT’S TEETH when applying.
  DO NOT LIGHT CURE THE ACE ALL-BOND TE. It can cause discoloring of the tooth surface and negatively affect final esthetic results.

References
- Manufacturer’s instruction guide (Bisco) ACE ALL-BOND TE
PORCELAIN VENEER CEMENTATION PROTOCOL

Armamentarium

- Choice II (Bisco) cement kit
- 1 syringe of each shade: A1, A2, A3, B1, B3, C2, D2, Milky Bright, Milky Opaque, Universal Opaque, and Translucent
- 1 syringe Try-In Gel of each shade: A1, A2, A3, B1, B3, C2, D2, Milky Bright, Milky Opaque, Universal Opaque, and Translucent
- Bis-Silane primer—part A and B
- Technique guide and directions for use
- Glycerin, USP (from Pre-doctoral Esthetic Clinic)
- Phosphoric acid gel
- All-Bond TE ACE
- #12 Bard-Parker scalpels
- Flexible composite polishing discs (Opti Discs)
- Fine finishing diamonds (RED stripe on shank)
- Brasseler Dialite porcelain polishing wheels for straight hand piece
- Brasseler Dialite porcelain polishers for straight latch hand piece
- Interproximal diamond strips (Contac EZ)
- Arti-Spray (Bausch)
- Hi-Mark medium articulating strips (California Dental)
- Arti-Fol (Bausch) metallic 12-micron shimstock film

Try-in

- Remove provisional veneers.
- Check for residual provisional material or adhesive resin and remove as necessary with flexible composite polishing discs.
- Clean preparations with fine pumice/prophy cup. DO NOT USE PROPHY PASTE! Avoid trauma to gingiva to prevent bleeding.
- Try-in veneers DRY (no try-in gel) to verify margin adaptation and proximal contacts.
- Adjust proximal contacts, if necessary, to allow simultaneous seating of all veneers:
- Hold veneer on stone die and carefully adjust contact area with blue Dialite wheel and then polish with pink and grey wheels.
- Try-in veneers with glycerin or translucent try-in gel.
- Allow patient to see try-in.
- Wipe away excess try-in gel with gauze.
- Warn patient not to bite down and that veneers are not tightly attached to teeth.
- Sit patient upright in chair
- DIRECT OPERATORY LIGHT AWAY FROM PATIENT’S FACE.
- Hand mirror to patient and allow patient to see veneers in place.
- Recline patient and carefully remove veneers.
- Repeat try-in with other shades of try-in gel (or a combination of the any of the try-in gels) ONLY IF NECESSARY!

Cementation

- Apply slit rubber dam on the arch to be restored
- Carefully hold each veneer over the sink and spray with the air/water syringe to remove try-in gel.
- Dry thoroughly and visually verify removal of gel.
- Apply phosphoric acid to internal surface of each veneer for 5–10 seconds and then rinse and dry thoroughly.
- Dispense one drop from each of the two bottles of Bis-Silane Primer (part A and B) into a single well and stir. Brush on 1–2 coats to the internal surface of each veneer, wait for 30 seconds, and dry with (warm) air syringe.
- Apply a thin layer of porcelain bonding resin to the internal surface of the veneer. DO NOT LIGHT CURE!
- (It is recommended that the following steps be performed for TWO veneers at a time, beginning with the central incisors where applicable.)
- Use clear Teflon tape inter-proximally to isolate uninvolved teeth from etching and bonding.
• Etch all prepared surfaces with phosphoric acid for 15 seconds (allow the etch to extend 2 mm beyond the finish line).
• Rinse thoroughly (10 seconds), gently air dry, and avoid desiccating any exposed dentin.
• Dispense ACE All-Bond TE into well and mix for 5 seconds, apply 1–2 coats to prepared surfaces with light agitating motions for 5–10 seconds, gently air dry for 5 seconds until there is no visible movement of the material, and then thoroughly air dry for a minimum of 10 seconds.
• DIRECT OPERATORY LIGHT AWAY FROM PATIENT’S TEETH.
• DO NOT LIGHT-CURE THE ACE ALL-BOND TE!
• Apply Choice II light cure cement to internal surface of each veneer.
• Place each veneer gently on its tooth, allowing the cement to ooze slowly from all margins.
• Remove Teflon tape.
• Remove excess cement with a clean applicator brush, re-seating the veneers if they move slightly.
• Holding veneers securely in the seated position, spot cure each veneer into place on the facial surface away from the margins using a small diameter light guide for 10 seconds.
• Remove interproximal cement with dental floss.
• Light cure labial and lingual surfaces each for 60 seconds (alternating labial side for 20 seconds and lingual side for 20 seconds)
• Try-in any remaining veneers on adjacent teeth if applicable to re-verify proper seating. Adjust/polish proximal contacts with Dialite wheels if necessary.
• Repeat cementation steps for remaining veneers.

Adjustment and Polishing

• Use #12 Bard-Parker scalpels to “scale” off remaining cement from facial and interproximal margins.
• Use interproximal saw or Contac EZ (Blue, 0.065 mm) as needed to open proximal contacts and confirm with floss.
• Perform the 5-STEP Occlusal Test and adjust as necessary:
  1: No contacts on incisor veneers in MIP—only when the patient squeezes closed do the incisors hold Mylar (shim stock).
  2: Canine guidance for lateral excursive movements.
  3: Equal simultaneous bilateral protrusive contacts on canines, lateral, and centrals.
  4: Chew test reveals no marks on veneers with Hi Mark strips during function.
  5: Crossover test reveals broad smooth contacts with canines and centrals touching simultaneously in lateral movements.
• Use a “football”-shaped fine finishing diamond at high speed with water spray to remove excess cement from lingual aspect and to refine lingual margins as needed. DO NOT USE ROTARY INSTRUMENTS ON LABIAL SURFACES WITHOUT INSTRUCTOR APPROVAL AND SUPERVISION.
• Adjust centric, lateral, and protrusive contacts as necessary with a fine finishing diamond at high speed with water spray.
• Use Dialite polishers on the latch hand piece to polish ONLY THE AREAS ADJUSTED WITH DIAMONDS.
**CERAMIC INLAY/ONLAY BONDING & CEMENTATION PROTOCOL**

**Armamentarium**
- Duo-Link Universal (Bisco) cement kit (only bold items from the kit are needed for this procedure)
- 1 syringe of each shade: Milky Opaque, and Translucent
- Bis-Silane primer—part A and B
- Technique guide and directions for use
- Phosphoric acid gel
- All-Bond TE ACE
- #12 Bard-Parker scalpels
- Flexible composite polishing discs
- Fine finishing diamonds (RED stripe on Shank)
- Brasseler Dialite porcelain polishing wheels for straight hand piece
- Brasseler Dialite porcelain polishers for straight latch hand piece
- Interproximal diamond strip (Contac EZ)
- Arti-Spray (Bausch)
- Arti-Fol (Bausch) metallic 12-micron shimstock film

**Try-in**
- Remove provisional restoration and cement.
- Place rubber dam.
- Clean preparations with fine pumice/prophy cup or brush. DO NOT USE PROPHY PASTE!
- Try-in restoration DRY (no try-in gel) to verify margin adaptation and proximal contacts.
- Adjust proximal contacts as needed.
- Hold restoration on stone die and carefully adjust contact area with blue Dialite wheel. DO NOT OVER-ADJUST!
- Finalize adjustment with pink Dialite wheel.
- Polish to high gloss with grey Dialite wheel.

**Cementation**
- If lab does not etch the intaglio surface and edges of the margins of restoration, apply 9.5 % phosphoric acid for 15 seconds and then rinse and dry thoroughly.
- Dispense one drop from each of the two bottles of Bis-Silane primer (part A and B) into a single well and stir. Brush on 1–2 coats to the internal surface of each restoration; wait for 30 seconds and then dry with air syringe.
- Use a matrix band to isolate adjacent teeth from etching and bonding.
- Etch all of the preparation with phosphoric acid for 15 seconds (allow etch to extend 2 mm beyond finish line).
- Rinse thoroughly (10 seconds), gently air dry, and avoid desiccating any exposed dentin.
- Dispense ACE All-Bond TE into well and mix for 5 seconds, apply 1–2 coats to prepared surfaces with light agitating motions for 5–10 seconds, gently air dry for 5 seconds until there is no visible movement of the material, and then thoroughly air dry for a minimum of 10 seconds.
- DIRECT OPERATORY LIGHT AWAY FROM PATIENT’S TEETH.
- DO NOT LIGHT-CURE THE ACE ALL-BOND TE!
- Remove matrix band.
- Bleed the Duo-link Universal syringe and attach an automix syringe tip.
- Apply Duo-link Universal dual-cure cement directly from the syringe to the preparation.
- Seat the restoration firmly allowing the cement to ooze slowly from all margins.
- Remove excess cement with a clean applicator brush and dental floss.
- Holding the restoration in place with a hand instrument, light cure occlusal, buccal, and lingual surfaces for 60 seconds each (alternating lingual side for 20 seconds followed by occlusal and buccal side for 20 seconds each).

**Adjustment and Polishing**
- Use no. 12 Bard-Parker scalpels to “scale” off remaining cement from interproximal margins.
- Use interproximal saw or Contac EZ strips (Blue, 0.065 mm) as needed to open proximal contacts and confirm with floss.
• Use fine finishing diamonds (red stripe only) at high speed with water spray to remove excess cement from margins as needed.
• Remove rubber dam.
• Adjust centric contacts as necessary with fine finishing diamonds at high speed with water spray.
• Use Dialite polishers with water spray on the latch hand piece to polish.
CROWN CEMENTATION

Cementation

- **Traditional cementation technique:** Both zirconia core-based crowns and lithium disilicate crowns may be cemented with either glass ionomer (Fuji I) and resin modified glass ionomer (Fuji PLUS) cements.
- **Bonded option:** Lithium disilicate restorations will be delivered from the laboratory with etched surfaces, ready for silanization and cementation. The cementation protocol includes the use of fourth-generation dentin bonding agent and adhesive (ACE All Bond TE) and a composite luting agent (Duo-Link).
- **Cement-shade effect:** Care must be exercised when using cements with highly translucent crowns, as the cement shade and opacity will affect the final shade. In these cases, it is important to use composite try-in pastes. Traditional cements are opaque (Fuji 1 and Fuji Plus) and the final shade must be determined with the Milky Bright try in paste. Anterior all ceramic crowns require Light Cured cements.

Commentary

- The use of Dual Cure cements is contraindicated on translucent crowns, as it is known that Dual Cure cements have an observable "graying effect" due to the photo initiator "Tertiary Amine".

References

- Handout on Ceramic Protocols by Dr. Edmond Hewlett and Dr. Richard G Stevenson III, 2012
CAST GOLD RESTORATIONS TRY-IN AND CEMENTATION PROTOCOL

Follow the sequence of steps as listed below (left-right)

1) 
2) 
3) 
4) 
5) 
6)
CAST GOLD RESTORATIONS TRY-IN AND CEMENTATION PROTOCOL

- **Try-in**: Plan to use rubber dam for cementations. Remove temporary completely before rubber dam application. Use Hurriseal to disinfect cavity. Try-in casting carefully and do not seat with full pressure (hard, but not impossible to remove), adjust proximals with brownie wheel (straight handpiece) and then look for shiny spots on intaglio. Remove with bur (48L or round burs), and then carefully sandblast (protect margins with finger) with 50 micron aluminum oxide and re-try casting for fit. This process should be repeated up to three cycles. If casting still does not seat, re-prep and re-impress. If it fits well, use FUJI 1 cement on the casting and in the prep and seat as follows:

1. **Inlays**: Use a chop stick/off-angle seater with great pressure and LIGHT tapping with a mallet until all of the cement is expressed through the margins.

2. **Onlays**: Use double-stacked and floss tethered Temrex bite sticks- have patient occlude and squeeze.

- **Finish and Polish**: With Moore’s disks in this sequence: Medium Garnet (the work horse to get gold tooth on the same plane), Fine Sand, and then Fine Cuttle. Rotate from gold to tooth. Use air spray. Use #4 flour pumice wet, then 15 micron aluminum oxide wet, then 1 micron aluminum oxide dry with new young’s cup for each to polish. Blow air during each step for maximum shine. Use brownie, greenie and super greenie points in the grooves if needed with slow speed handpiece.

- **Occlusal Adjustment**: Use Bausch Arti-Fol thin articulating paper to mark high spots. Check excursive- there should be no marks with anterior guidance. Gold too smooth to show marks? HINT: use Vaseline on paper and dry teeth to transfer ink. Use 7404 bur to adjust and brownie/greenie/super greenie set to re-polish.
**USING LEAF GAUGE**

**Technique**

- Insert with maximum leaves and instruct the patient to close and slide forward and then back.
- After sliding back, instruct the patient to squeeze with a "half hard bite"—about the same as what your muscles do when you swallow.
- Ask the patient if any back teeth touch. If none, then remove half the leaves and repeat and continue removing leaves until patient feels first point of contact.

**Taking a CR Record**

- Add back one leaf and take interocclusal record with rigid bite registration material.
- Save records. Trim away all except cusp tips. Use the record for mounting casts.
**OCCLUSAL ADJUSTMENTS**

**Arti-Spray (Bausch®)** – a blue spray in 75 ml spray can for delivering on a veneer for disclosing discrepancies/interferences prior to cementation. Easy to administer and leaves a thin colored film which can easily be removed with water, leaving no trace of residues. Apply at a distance of 3-5 cm onto the occlusal surface or inside the bridge or crown. Arti-Spray can be used for proximal contacts when trial seating crowns and bridges.

**Arti-Fol (Bausch®)** – a metallic red/black 12-micron shimstock- film for precision occlusal and proximal adjustments on all restorations.

**HI-MARK Medium Articulating Strips and U-shaped sheets (California Dental®)** - Medium (.003", 75 µm) articulating strips are indicated for orthotic equilibration. The wax base gives clear and sharp markings on cusps and occlusal surfaces. It is comes in blue or red.

**Occlusal equilibration with leaf gauge**

1. Placed in midline resting on lingual of maxillary anterior teeth
2. Patient instructed to slowly close down until feeling contact on leaf gauge/anterior teeth
3. Start with maximum leaves and adjust leaves until “just barely” feel a posterior tooth touch (X)
4. Add another leaf (X+1) and instruct patient to close using half hard closing force – in 15-20 seconds patient should feel posterior contact again
5. Mandible is now “tripodized”
6. Make CR interocclusal record by increasing 5 leaves from contact (X+5) to allow minimal room for material
7. Mount casts
8. Perform preliminary occlusal adjustments on casts – repeat Intra-orally
9. Done!
ASSESSING OCCLUSION AND MAKING ADJUSTMENTS

Occlusal indicator wax
- A superior indicator to define occlusal prematurities with positive reading of contacting surfaces. It comes in 180-unit strip box. Each layer is 0.4 mm and stacking 4 strips may assess occlusal clearance. To check occlusion, adapt one strip to the crown and have patient occlude. Perforated wax corresponds to contact areas.

HI-Mark Medium Articulating U-Shaped Sheets
- Medium (.003", 75) articulating strips are indicated for orthotic equilibration.
- The wax base gives clear marking on occlusal surface. It comes in blue and red horseshoe configuration.
- This product is also used in the chew test technique.

Arti-Fol
- Metallic red/black 12-micron shim stock film for precision occlusal and proximal adjustment on all restorations.
- Teeth should be dry. Use a small amount of Vaseline on the paper to transfer the ink better.

Arti-Spray
- Blue spray in 75 ml spray can, delivered on the facial prepared surface of teeth before cementation of veneers.
- Easy to administer and leaves a thin color film that can be easily removed with water.
- Apply at a distance of 3 or 5 cm onto occlusal surface or inside crown.
- When testing occlusion or trial seating of crown, all contact points should be visible.

Mylar
- Mylar strips are very thin (~ 11 micrometers) and can be used for additional occlusion checking once initial adjustments are made.

Patient Positioning
- Patient should be in upright sitting position.
- The 5-Step Checklist: MIP, EXCURSIVES, PROTRUSIVE, CHEW TEST, CROSS-OVER TEST (MIP, Excursive and Protrusive are done for both posterior and anterior teeth whereas Chew test and Cross-over test is just for anterior teeth).

Commentary
- Chew Test - This test is used to assess occlusion in the anterior teeth. In this technique the posterior portion of HI-Mark Medium Articulating sheet is torn and the anterior part of the sheet is placed in between the patient's upper and lower anterior teeth and patient is asked to chew on the periphery wax placed in between upper and lower posterior teeth. Hi-Mark sheet is retrieved and checked for marks. This technique is one of the many ways to diagnose Constricted Chewing Pattern.

References
POST-OPERATIVE INSTRUCTIONS FOR THE PATIENT

Local Anesthetics
- If a local anesthetic is used to numb the area treated, this numbness in your lips, teeth and tongue might last for several hours after the procedure. To avoid damage to your tongue and lips, you should avoid any chewing until the numbness has completely worn off. It is easy to bite or burn your tongue or lip while numb. It is recommended that you take some ibuprofen (Motrin or Advil, 1–2 tablets every 4–6 hours as needed) before the anesthetic completely wears off. This will help with any swelling or pain at the injection sites where the anesthetic was administered. It will also help diminish any swelling in the nerve that may be existent (swelling often occurs in the nerve after cleaning out decay from the tooth).

Amalgam Restorations
- With silver fillings, you should not chew hard or sticky foods or chew directly on the new fillings for the first 24 hours. If possible, chew only on the opposite side of your mouth. New silver fillings can be sensitive to hot and cold liquids and other foods.
- If the sensitivity should continue for longer than two weeks or if the discomfort is extreme, please have the patient call, evaluate the situation, and prescribe the appropriate therapy.

Composite Restorations
- It is normal to experience some hot, cold, and pressure sensitivity after your appointment. Your gums may be sore for several days. Rinse your mouth three times a day with warm salt water (put a teaspoon of salt in a cup of warm water, rinse, and spit) to reduce pain and swelling.
- Your new composite fillings are fully hardened before you even leave the clinic; however, it is wise to chew on the opposite side from the location of the newly placed filling(s). One of the most common problems following filling placement with anesthesia is an incorrect bite. If your bite feels uneven, if you have persistent pain, or if you have any other questions or concerns, please contact your dentist immediately to obtain help or advice.

Post-op Night Guard
- Wear your night guard at night and soak in water during the day.
- If you are using your night guard during the day, or eating at night before you go to bed, food can accumulate underneath it. Brush and floss your teeth thoroughly and then brush and rinse the inside and outside of the night guard before returning it to your mouth. Clean your night guard the same way before placing it in water when you are not wearing it. Dental plaque will find a haven, stimulating dental decay, if you do not take care regarding the cleanliness of your mouth and night guard. If you suffer a high rate of dental decay, fluoride-containing rinses or gels can be placed in your appliance once per day.
- Deodorize your night guard in hot water with a tablespoon of bleach for 1 hour (You may opt to do this monthly).

Temporary Crowns/Bridges
- Temporary crowns aren’t strong. They can break or may occasionally come off. Temporary restorations can leak saliva or food onto the tooth. You may experience sensitivity to hot, cold, pressure, or sweets. If you experience unusual discomfort or feel the bite is not correct, please call for an appointment for a simple adjustment.

Veneers
- Do not chew hard or sticky foods on your restoration for 24 hours from the time it was cemented. The cement must harden during this time to provide optimum strength.
- It may take a few days to get used to your new veneers after the final cementation. Hot and cold sensitivity may occur for a few weeks and occasionally may last for several months. As with the temporary, if the bite does not feel comfortable, please call and make an appointment so that we may adjust it.
- Proper brushing, flossing, and regular re-care visits are necessary to maintain your final restoration. The one area where a veneered tooth can decay is at the bottom edge of the veneer at the gum line. Small problems that develop around restorations can usually be found at an early stage and easily corrected, but postponing proper care can result in the need to replace the entire restoration. Avoid foods, which can lead to color changes in your teeth/veneers, including: red wine, soy sauce, tobacco, coffee, tea & berries. If staining occurs, it may be removed with professionally applied bleaching solutions.

Crowns
- Whenever anesthesia is used, avoid chewing on your teeth until the numbness has worn off. Avoid hard or sticky foods that may dislodge crowns, such as hard, chewy breads, protein bars, bagels, baguettes, caramels, or gum.
• Rinse your mouth with a mouthwash or warm saline water to minimize inflammation of the gum tissue. Mild to moderate discomfort after dental work is common. An over-the-counter pain reliever/anti-inflammatory is recommended. If discomfort increases, please call your dentist.

Implant Crowns
• Chew away from/on the opposite of new implant crown for the first 24 hours after placement. Any gum sensitivity or tenderness, as well as any soreness, should go away in a few days.
• Brush gently and floss carefully for first few days. After 24–48 hours, if teeth feel like they do not properly fit together, please call for a follow-up appointment.
• A large percentage of implant crowns experience a gum inflammation called peri-implantitis. To minimize the negative effects of this, please take extra care to floss your implant restoration thoroughly with a product that reaches below the gum line, like Super Floss or Piksters. These hygiene aids are available online or at your local pharmacy.
ESSENTIAL COMPONENTS OF UCLA DIVISION OF RESTORATIVE DENTISTRY LABORATORY PRESCRIPTION

- Patient name and chart number
- Dr. name and number
- Type of restoration/tooth number
  - PFM, FGC, Gold Onlay, Dowel Core, etc.
- For Partial Gold Restorations type of alloy to be used should be clearly mentioned along with special requests if any (Vented, RGS Pontic, SHOOSHAN PIN)
  1) Jensen’s JRVT alloy: 77% Au, 13 % Ag, 8.5 % Cu and 1 % Pd (systemic toxicity?) - Type II gold alloy ideal for inlays, onlays and short span bridges
  2) JRVT- PF (Palladium Free): 1% Pd is substituted with 1 % Pt in JRVT gold alloy type
  3) Hardened protocol: JRV-PF can be heat treated if desired for extra strength in crowns and bridges requiring moderate to high stress
  4) ARGENCO 40 HN: (40% Au, 45 % Ag, 4.95% Pd)- Type III gold alloy finds its use in short span and long span bridges and sometimes for inlays, onlays and crowns
- FPD instructions/pontic design, connector design including type(rigid/no-rigid), Key##(mesial)/Key way #(distal) should be clearly specified
  1) Modified ridge lap: Esthetic and easy to clean - anterior teeth and premolars
  2) Sanitary/ hygienic: Posterior mandible (non-esthetic areas)
  3) Conical: Used when occlusal 2/3 lies in appearance zone - lower incisors, premolars and sometimes molars without esthetic requirements
  4) Ovate: Esthetic and hard to clean - maxillary incisors, cuspids and premolars
  5) Saddle: Most difficult to clean
- Type of ceramic to be used should be clearly specified (Feldspathic/Zirconia/Lithium Disilicate/Leucite/Belle glass)
- Collar design: Type of margin desired should be indicated ranging from porcelain facial butt to metal (facial/lingual) collar along with dimensions
- Occlusal design (whether occlusion should be on ceramic or on metal) - in non-esthetic zone metal occlusion can be beneficial; less sacrifice of sound tooth structure and less wear of the opposing dentition
- Everything from casts, double bite impressions, thumb drive etc. that is sent to the lab along with the laboratory prescription slip should be clearly indicated on the lab slip
- Shade (closest matching shade should be indicated in gingival, middle and incisal further divided into gingival, body and incisal portions of shade map) - if PFM/Ceramic and special shade requirements (use VITA Classical for Ceramic Inlays/Onlays and VITA 3 D for PFM and All Ceramic crowns)
- Laboratory prescription slip must be signed and dated by the faculty with the faculty number
- RPD instructions if applicable
- Special instructions if any should be written down clearly
- Finish
The acronym CAMBRA stands for ‘Caries Management by Risk Assessment’. CAMBRA is a method of assessing caries (cavity) risk and making dental treatment and restoration recommendations based on a patient’s caries risk.

Caries Risk Assessment:

- History and Clinical Exam
- Assessment of Risk factors-

**HIGH RISK** (If YES to 1 or any 2)
1. Visible cavitation/ Caries into dentin by radiograph
2. Caries restored in the last 3 years
3. Readily visible heavy plaque
4. Frequent (≥3 time daily) BETWEEN meal snacks
5. Saliva reducing factors (Head & Neck radiation exposure, Medications, Systemic reasons, etc.)
6. Visually inadequate saliva flow (If YES, measure: <0.7 ml/min.=LOW salivary FLOW)
7. Appliances present, fixed or removable (bridges, removable partials, orthodontic wires/bands and brackets)

**MODERATE RISK** (If YES to any one or 2)
1. GINGIVAL RECESSION (exposed roots)
2. Deep pit & fissures/developmental defects
3. INTERPROXIMAL ENAMEL lesions/ radiolucency
4. Enamel WHITE spots (DRY TEETH)
5. Recreational drug use
**ASSESSMENT OF PROTECTIVE FACTORS:**
1. Community water fluoridation
2. Uses fluoride toothpaste once/twice DAILY
3. Uses fluoridated mouthwash/ gel DAILY
4. Adequate salivary FLOW (>1ml/min by TEST)
5. Use of Xylitol gum 4 times a day last 6 months
6. Chlorhexidine rinses prescribed/used daily for 1 week every month in the last 6 months

- Click ‘Yes’ on any risk and protective factors that apply. Count the ‘Yes’s.

- Make notes, entries e.g.
  1. Number of lesions present
  2. Oral hygiene level
  3. Brand of fluoride used
  4. Types of snacks
  5. Medications causing dry mouth

- Make an overall judgment as to whether the patient is at HIGH, MODERATE or LOW risk. Consider the balance between disease indicators/ risk factors and protective factors.

- **STATE THE OVERALL CARIES RISK: HIGH / MEDIUM / LOW**

![The Caries Imbalance diagram](image)

- Complete the treatment recommendations.
- Explain how lesions/caries occur along with your findings.
- Provide therapeutic and home care recommendations to the patient, preferably in writing.
- Provide results of any tests (saliva, bacterial, etc.)
- Recall & Reassess Caries Risk
  - HIGH: Every 3 months or less
  - MODERATE: Every 4 months
  - LOW: Every 6 to 12 months
Caries Risk Assessment Forms in UCLA GSD EPR:

PREVTX1:
Preventive Dentistry Consultation Notes

PREVTX2:
Caries Risk Assessment (High Risk)

PREVTX3:
Caries Risk Assessment (Moderate Risk & Protective Factors)
Clinical Guidelines for Adult Patients:

### Caries Management by Risk Assessment (CAMBRA)

<table>
<thead>
<tr>
<th>Risk Level</th>
<th>Frequency of Radiographs</th>
<th>Frequency of Caries Recall Exams</th>
<th>Saliva Test (Saliva Flow &amp; Bacterial Culture)</th>
<th>Antimicrobials</th>
<th>Fluoride</th>
<th>pH Control</th>
<th>Calcium Phosphate Topical Supplements</th>
<th>Sealants (Resin-based or Glass Ionomer)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
<td>Every 12 months to minimize caries risk.</td>
<td>Every 6-12 months to minimize caries risk.</td>
<td>Per saliva test if done</td>
<td>OTIC fluoride-containing (toothpaste or gel) daily, after brushing and before bedtime; 5-minute fluoride varnish if plaque index exceeds 50% or sensitivity.</td>
<td>Not required</td>
<td>Not required</td>
<td>Optional or as per CDAS Sealant Protocol (Table 2)</td>
<td>Optional or as per CDAS Sealant Protocol (Table 2)</td>
</tr>
<tr>
<td>Moderate Risk</td>
<td>Every 6 months to minimize caries risk.</td>
<td>Every 4-6 months to minimize caries risk.</td>
<td>Per saliva test if done</td>
<td>OTIC fluoride-containing (toothpaste or gel) daily, 5 minutes fluoride varnish.</td>
<td>Not required</td>
<td>Not required</td>
<td>Optional for erosive or nail-biting.</td>
<td>As per CDAS Sealant Protocol (Table 2)</td>
</tr>
<tr>
<td>High Risk</td>
<td>Every 6 months to minimize caries risk and apply fluoride varnish.</td>
<td>Every 3-4 months to minimize caries risk and apply fluoride varnish.</td>
<td>Saliva flow test and bacterial culture initially and at every caries recall visit to assess efficacy and patient cooperation.</td>
<td>Chlorhexidine gluconate 0.12% or 1.1%, 30% fluoride varnish, 20% NaF gel, 5% NaF gel, 5% NaF gel, 5% NaF gel.</td>
<td>Not required</td>
<td>Not required</td>
<td>Optional for erosive or nail-biting.</td>
<td>As per CDAS Sealant Protocol (Table 2)</td>
</tr>
<tr>
<td>Extreme Risk</td>
<td>Every 3 months to minimize caries risk and apply fluoride varnish.</td>
<td>Every 3 months to minimize caries risk and apply fluoride varnish.</td>
<td>Saliva flow test and bacterial culture initially and at every caries recall visit to assess efficacy and patient cooperation.</td>
<td>Chlorhexidine gluconate 0.12% (oral rinse); 30% fluoride varnish, 20% NaF gel, 5% NaF gel, 5% NaF gel, 5% NaF gel.</td>
<td>1.1% NaF toothpaste (xylitol) daily instead of regular fluoride toothpaste. 1.2% NaF gel, 5% NaF gel, 5% NaF gel, 5% NaF gel, 5% NaF gel.</td>
<td>Not required</td>
<td>Optional for erosive or nail-biting, fluoride varnish daily.</td>
<td>As per CDAS Sealant Protocol (Table 2)</td>
</tr>
</tbody>
</table>

**Note:**
- For all risk levels, patients must maintain good oral hygiene and a diet low in frequency of fermentable carbohydrates.
- Patients with one or more carious lesions or high risk patients.
- Patients with one or more carious lesions and severe caries patients are at increased risk of developing severe caries.
- All restorative work should be done with the minimally invasive philosophy in mind. Existing smooth surface lesions that do not penetrate the CEJ and are not carious should be preserved. Direct repairs should be done with minimal intervention. Direct repairs are not recommended for extensive caries lesions that require extensive intervention. Patients with amalgam restorations (AMRs) or porcelain crowns require excellent oral hygiene techniques and frequent monitoring.

**References:**
- Power point Presentations by Dr. Hewlett, 2013 and Dr. Spolsky, 2013
- CAMBRA: Best Practices in Dental Caries Management by Michelle Hurbutt, RDH, MSDH