

---

# FIXED PROSTHODONTICS CLINIC MANUAL 2015-2016

---

GUIDELINES FOR CLINICAL  
INSTRUCTION IN FIXED  
PROSTHODONTICS

---

DEPARTMENT OF ORAL REHABILITATION  
GRU COLLEGE OF DENTAL MEDICINE

---



**DEPARTMENT OF ORAL REHABILITATION**  
**GUIDELINES FOR CLINICAL INSTRUCTION IN FIXED PROSTHODONTICS**

**Table of Contents**

<b>I. TEACHING PHILOSOPHY.....</b>	<b>4</b>
<b>II. CLINICAL PROTOCOLS .....</b>	<b>5</b>
A. Patient Management & Treatment Sequence .....	5
B. Patient Scheduling .....	8
C. Clinic Hours .....	9
D. Records .....	10
E. Fixed Prosthodontics Clinical Program.....	11
F. Equipment, Instruments, & Supplies.....	12
G. Miscellaneous Guidelines.....	13
<b>III. CLINICAL PROCEDURES.....</b>	<b>14</b>
A. Occlusal Exam - D9430 (OCCL).....	14
B. Fixed Prosthodontics Treatment Plan & Sequencing – D9450 (FPROS) .....	16
C. Tooth Preparation.....	18
D. Final Impression .....	20
E. Post & Core Fabrication (Cast or Pre-fabricated).....	23
F. Cementation Appointment (Gold Restoration).....	25
G. Metal Try-In Appointment (PFM FPD Frameworks).....	27
H. Cementation Appointment (Porcelain Restoration).....	28
<b>IV. EVALUATION CRITERIA FOR FIXED PROSTHODONTIC PROCEDURES.....</b>	<b>30</b>
A. Preparations .....	30
B. Provisional Restorations .....	31
C. Impression.....	32
D. Delivery .....	33
<b>V. TREATMENT PLANNING GUIDELINES FOR FIXED PROSTHODONTICS.....</b>	<b>34</b>
A. Crowns .....	34

B.	<i>Replacing Missing Teeth</i> .....	36
C.	<i>Existing Restorations and Foundations (Build-ups)</i> .....	37
<b>VI. CLINIC POLICIES FOR OCCLUSAL EVALUATION AND INDIRECT RESTORATIONS.....</b>		<b>38</b>
A.	<i>Evaluation of Occlusion</i> .....	38
B.	<i>Indirect procedures (inlays, onlays, crowns, FPDs, etc.)</i> .....	39
1.	Operative Case Complete - D0003 (OPER) .....	39
2.	Occlusal Exam – D9430 (OCCL).....	40
3.	Fixed Prosthodontics Treatment Plan – D9450 (FPROS) .....	41
4.	Sequencing – “Completion” of Step D9450 (FPROS).....	42
<b>VII. PREDOCTORAL IMPLANT PROSTHODONTIC PROTOCOL .....</b>		<b>44</b>
A.	<i>Guidelines for Patient Selection</i> .....	44
B.	<i>Clinical &amp; Laboratory Protocol for Implant Restoration</i> .....	46
<b>VIII. FIXED PROSTHODONTIC LABORATORY PROCEDURES .....</b>		<b>48</b>
A.	<i>Required Items for Laboratory Cases</i> .....	48
B.	<i>Guidelines for Laboratory Submission</i> .....	49
1.	Cast Requirements .....	49
2.	Die Requirements .....	49
3.	Articulator Requirements .....	50
4.	Work Authorization .....	50
C.	<i>General Information</i> .....	51
<b>IX. CLINICAL AND LABORATORY PROTOCOL FOR RPD SURVEYED CROWNS.....</b>		<b>53</b>
<b>X. CAD/CAM RESTORATIONS .....</b>		<b>54</b>

# I. TEACHING PHILOSOPHY

---

The clinical environment is where the dental student first applies the knowledge and skills which were acquired in earlier training and preclinical courses. It is the responsibility of the clinical faculty to guide and help the student so that he may overcome the immediate problems that can occur from lack of experience or ability. Therefore, a joint effort is necessary by both student and faculty.

The department advocates a policy of minimum expectations. We believe that minimum expectations should be established so that each student is assured a well-rounded clinical experience in fixed prosthodontics. Your practice of general dentistry will contain many patients in need of fixed prosthodontics and we feel this area is very important. Also, because fixed prosthodontics is very demanding from the standpoint of technical skill, it will probably require the most effort on your part. For these reasons, we cannot leave your development in this area to chance.

In order for you to best fulfill our expectations, **you should come to the clinic prepared to relate to the procedures of the day -- mentally and physically.** Before you come to a clinic session you need to think about what is to be done, organize the equipment, instruments, materials, and laboratory work that will be required, and perhaps practice the procedures that you will perform. Accidents don't just happen! They are the result of failure in judgment or performance. We do not expect you to know everything or be able to do everything. We do expect you to have an open mind and concerned attitude regarding the proper care of your patients. We expect you to be receptive to our suggestions and guidance. We expect you to think critically and ask questions.

We believe you should treat patients with utmost care and to the best of your ability at all times. The treatment of a patient, even a single restoration, should be considered part of the comprehensive, total care of the patient's mouth. You cannot and should not separate fixed prosthodontics from other disciplines of dentistry.

## II. CLINICAL PROTOCOLS

---

### A. Patient Management & Treatment Sequence

1. Patient Services will assign patients to students. Once a patient is assigned, the student is responsible for the management of that patient. Students should keep patients informed, give adequate advance notice for scheduling appointments, counsel when treatment problems arise, and consult with instructors when necessary. **Most patient management problems come from unrealistic expectations given by the student related to treatment outcomes or time of treatment.**
2. Each junior student should have at least 3 fixed prosthodontic patients. This should provide enough potential units available so that if one patient is unable to receive treatment for any reason, another patient will be available to treat. This will allow students to make effective use of clinic time. Students should also keep treatment progressing at a reasonable rate on each patient (no delays in completing lab work or in submitting cases to the lab; no excessive periods of time between appointments for patients).
3. Patients with any required periodontal therapy must be completed before initiating fixed prosthodontic treatment. **Generally, all direct procedures should be completed prior to beginning indirect procedures.** Following completion of direct procedures, an operative faculty should certify that all required operative treatment has been acceptably completed (i.e. Operative Case Complete - D0003 (OPER)). This will be done by an intraoral exam to check for caries, recurrent caries, overhangs, etc. If indicated, new radiographs (bitewings or PA) may be prescribed. Attach *Tx Note* to this Axium step to summarize findings (e.g. all restorations WNL, etc.) and for any exceptions (e.g. watch #13M, Board lesion #4D, etc.).
4. Typically, fixed prosthodontic patients should have a full-mouth x-ray series with bitewings. Current diagnostically acceptable periapical and bitewing x-rays of teeth to be restored should be available.
5. Following completion of the direct restorations, all patients requiring indirect restorations must be scheduled in the clinic for a Fixed Prosthodontics Treatment Plan appointment - D9450 (FPROS). The Occlusal Exam - D9430 (OCCL) must be completed before this step. In most cases, it would be practical to schedule these two procedures at the same appointment.
6. All indirect procedures must be treatment planned and sequenced. This may be done initially on a Fixed Prosthodontics Treatment Plan & Sequencing form (yellow) in preparation for entering as an unapproved treatment plan in Axium. If the patient requires fewer than four indirect restorations and a diagnostic wax-up is not required, the sequencing may be determined and the treatment plan changed to "Approved" at the Fixed Prosthodontics Treatment Plan appointment. All other patients must have their

treatment sequence approved by a faculty member at a separate non-clinical “in office” sequencing” appointment. See the section on Sequencing in this manual for details about this step.

7. Internal step-transfer patients and patients referred from outside the school for limited care require completion of an Administrative Re-examination (D0006) in addition to reviewing the Occlusal Exam and establishing a new Fixed Prosthodontic Treatment Plan and Sequence of Treatment. This examination includes updating radiographs and radiographic interpretation, updating the record and removing extraneous planned treatment entries, confirming that the odontogram accurately reflects the patients dental condition, confirming that probing depths have been completed, confirming that all examination forms have been completed, confirming that a Periodic Dental Examination or Operative Case Complete Examination (D0003) and Caries Risk Assessment and treatment plan have been completed in the last 12 months and reviewing past treatment plans to ensure treatment has been followed as sequenced and appropriate referrals and consults were made. If multiple discrepancies of the above items exist in the patient’s record, it is recommended to complete them in the DXR clinic before appearing in Fixed Prosthodontics. Impressions for new casts may also be needed at this appointment if significant changes have occurred in the patient’s dental condition or no casts are available.
8. If possible, students should start their fixed clinical experience with a simple gold crown and gradually work into more complicated procedures. The following guidelines apply for progressing through the clinical requirements. This will facilitate patient treatment and optimize the learning experience for the student.

### **Juniors**

- Must complete 4 single unit crowns (any type) before initiating a FPD.
- Must not have more than 4 units in progress at one time.
- Must not have more than 2 units in progress at the same time on a patient, except when involved in a single FPD.
- Must complete one FPD before starting another FPD.

### **Seniors**

- Must not have more than 8 units in progress at any given time.
- Must not have more than 4 units in progress at the same time on a patient, except when involved in a single FPD.

### **Juniors and Seniors**

- Teeth in opposing arches should not be restored simultaneously.
- Crowning two adjacent teeth simultaneously is not recommended as this generally takes more clinical time than restoring each tooth separately. Exceptions do exist (i.e., anterior crowns).
- No bilateral restorations in the same arch unless they are done one side at a time to control occluding vertical dimension (evaluate for equilibration to CR). Exceptions to this would be when the restorations are opposing a complete denture or for survey crowns which should be made on a single working cast.
- You must complete all restorations you begin. No treatment can be left in progress.

## II. CLINICAL PROTOCOLS

---

### B. Patient Scheduling

1. If you have problems: (1) contacting an assigned patient, (2) with a patient being chronically late or breaking appointments, (3) won't pay, etc., document this in the chart. If properly documented, a patient can be inactivated by Patient Services. **Clinical time is too valuable to be wasted on broken appointments.**
2. Patients should be scheduled in the appropriate clinic section for indirect procedures. All crowns, FPDs, post & cores, and survey crowns must be done in the Fixed Prosthodontic section of Clinic.
3. Patients must be scheduled for 9:00 and 1:00, unless two patients are scheduled in one clinic period.
4. The clinic staff should be informed as soon as possible about broken appointments or cancellations. This allows prompt use of the chair by another student.

It is desirable and advisable to work with the same instructor throughout a case whenever possible. The department schedule is posted in the clinic to facilitate this process. The instructor who approves the impression will assume responsibility for supervising the case through the laboratory phases (i.e. dies, articulation, work authorization, etc.). Indirect restorations cannot be done with part-time faculty, as they are not available to coordinate the laboratory procedures.



## II. CLINICAL PROTOCOLS

---

### C. Clinic Hours

1. Clinic hours are 9:00-11:45 A.M. and 1:00-4:45 P.M. No final impressions are to be made after 11:15 or 4:15. Restorations may not be permanently cemented after 11:30 a.m. or 4:30 p.m. unless the faculty determines it is in the best interest of the patient.
2. If a chair is not used by 15 minutes after the designated appointment or the start of clinic (9:15, 1:15), the chair will be given to an alternate student.
3. No treatment can be initiated until an instructor is present in the clinic. Students should always get permission to start, no matter what the procedure (including exams, x-rays). Instructors will not leave the clinic until all patients have been dismissed.

## II. CLINICAL PROTOCOLS

---

### D. Records

1. Patients will not be treated without a CDM record. Complete records completely and accurately. Not only are these important for treatment coordination, but they also provide important medico-legal documents for the protection of the student, the patient, and the school. Cancellations, tardy visits, and telephone communications should be documented in the record.
2. The treatment plan must be established for all fixed prosthodontic procedures (all indirect procedures) prior to initiating fixed prosthodontic treatment and recorded as a note in the record.
3. Verify that proper codes are entered in the Treatment Plan. If the procedure code needs to be changed (e.g. gold to PFM, etc.), this must be done when the parent step is still in the "Planned" status (before status of any explosion codes are changed). Do not change the status of any step to "In Progress" without faculty approval.
4. The treatment record (progress notes) in the EHR must be completed at the end of each clinical period. When a restoration is completed (i.e. final cementation), make sure that the restoration is identified as "Completed" in Axium.

The patient should be informed of the fee for the restoration/treatment plan. The patient must pay the full fee prior to preparing the tooth.

## II. CLINICAL PROTOCOLS

---

### E. Fixed Prosthodontics Clinical Program

1. The College of Dental Medicine clinical experience for fixed prosthodontics includes crowns, fixed partial dentures, and implant-supported restorations. These are components of the clinical courses that occur in the 3rd and 4th years of the curriculum. The grading model and course expectations for the completion of the fixed prosthodontic experiences are described in the various course syllabi. The guidelines for assigning credit for the various indirect procedures are described below.
2. For the Junior clinical requirement, abutment teeth for the FPD cannot have been previously crowned. All FPDs are credited as three units regardless of the number of pontics. Credit will not be given for additional FPDs exceeding 2. There is no requirement that the FPDs or crowns be anterior, posterior, gold or PFM.
3. Other restorations can be credited toward the Junior single unit requirement as follows:
  - Implant crown - 1 unit credit (maximum # allowed for credit in **3<sup>rd</sup> yr** – 1 implant crown)
  - Onlay or partial veneer crown - 1 unit credit
  - Resin-bonded FPD - 1 unit
  - Inlay ( $\geq 2$  surface) - 1 unit (maximum # allowed for credit - 4 inlays)
  - Cast post & core -  $\frac{1}{2}$  unit
  - Dolder bar -  $\frac{1}{2}$  unit (in addition to abutments)
  - Porcelain veneers -  $\frac{1}{2}$  unit each (maximum # allowed for credit - 6 porcelain veneers)
4. A two-unit cantilever may not be counted toward the FPD requirement (credited as two single units). An implant supported FPD may not be credited toward the FPD requirement. No credit is given for one-surface inlays or direct crown build-ups toward the fixed prosthodontic requirements. However, these may count toward the direct requirements.
5. All restorations started by a student must be completed by that same student prior to graduation. No credit will be given for a restoration unless all steps were completed by the student (i.e. tooth preparation through cementation).

There is a fixed prosthodontic clinical competency exam in the 4<sup>th</sup> year, the crown competency exam.

## II. CLINICAL PROTOCOLS

---

### F. Equipment, Instruments, & Supplies

1. Failure to be prepared for a clinical procedure will surely compromise the quality of treatment. This preparation includes proper equipment, instruments, and supplies. Most of these items are provided in the clinic. All others are the student's responsibility.
2. An instrument cassette with all necessary instruments will be issued in the clinic. Students should replace dull burs and diamonds as necessary by requesting these instruments from the dispensary. The provisional kit and the crown adjustment kit should be checked out of the dispensary when needed. Restorations or other items should be disinfected prior to removal from the operatory.

A detailed listing of armamentarium for specific procedures is listed in the Procedure Section of this document.

## II. CLINICAL PROTOCOLS

---

### G. Miscellaneous Guidelines

1. Dress and appearance in the clinical area should be consistent with professional standards. Keep your work area neat during treatment and clean up when finished. Long hair should be restrained so as not to drape onto the patient.
2. No congregating or excessive noise in the clinic. This disturbance affects patients and operators and will not be tolerated. Only patients should be in the clinic. Patients should be advised not to bring children or other visitors into the treatment area.

**The student must obtain a starting check before beginning a procedure.** At that time the student should evaluate any potential problems which might be encountered and anticipate how to overcome them. **The student should always state what they think should be done before soliciting the instructor's opinion on any problem.** This helps the student in formulating decisions, and also gives the instructor an idea of the student's comprehension of the problem and how much supervision will be necessary.

## III. CLINICAL PROCEDURES

---

### A. Occlusal Exam - D9430 (OCCL)

#### Armamentarium:

1. Axium step - **D9430 Office visit – observation only**; with *Details* tab add *Discipline - OCCL*
2. Occlusal Exam form (blue paper form)
3. Operative Case Complete - **D0003 Department Case Complete (OPER)** has been completed & approved
4. Diagnostic casts (if previously indicated)
5. Facebow (if previously indicated), Instrument cassette

#### Goals:

1. Obtain permission to start the Occlusal Exam.
2. With patient in supine position, complete the top half of the paper form (tooth contacts, etc.).
3. Verify charting with faculty. With faculty input, complete Occlusal Diagnosis (Treatment Considerations) to determine the: 1. need for definitive occlusal therapy, 2. need for mounted casts & articulation position, and 3. articulation method for restorative treatment.
4. In Axium, open *EHR*, click *Forms* tab, click *Create a new record*, from drop-down menu select *TMD or Occlusal Exam*. Transfer the information from the paper form to the Axium form (complete all lines). Have faculty click *Approve* for this form.
5. Attach *Tx Note* to Axium step. Note should briefly describe Occlusal Diagnosis (e.g. No Occl Tx indicated; or pt needs LOA; or restorative Tx will be done on semi-adj art, etc.).
6. As indicated, “Plan” occlusion procedures in Axium (Diag. wax-up - D9450A, CIGT 9450.C, Mounted diag casts - D9950, LOA - D9961, COA - 9952, Occlusal splint - D9940, etc.). Sequence these in Phase 3 (except for D9950) & have faculty swipe to approve.
7. Initiate occlusal Tx (e.g. LOA) and /or make new diagnostic casts, as indicated from Occlusal Diagnosis.
8. Make facebow registration (with 3<sup>rd</sup> point of reference) and one protrusive record or two lateral records for setting HCG, as indicated (e.g. semi-adjustable articulator to be used).
9. Make CR IOR, as indicated (e.g., COA).
10. Make new x-rays (periapical, bitewings) as indicated for FX PROS TP.
11. Have faculty change step D9430 (OCCL) to “Complete” and swipe to approve step and attached *Tx Note*.

After patient has been dismissed:

12. If required, mount maxillary cast with facebow and articulate mandibular cast in either MI or CR, as determined by Occlusal Exam and type of treatment that is planned. Program the articulator with lateral or protrusive records.

### Comments and Tips:

1. There are 3 purposes for the Occlusal Exam. The first purpose is to establish a “baseline” of the patient’s occlusion, similar to periodontal or caries charting. This is done by charting the existing tooth contacts in MI and excursive movements as well as any CR-MI slide.
2. The second purpose is to determine the need for definitive occlusal therapy, such as occlusal adjustment or correction of occlusal plane discrepancy. This is completed on the Occlusal Diagnosis section of the form in Axiom. If a limited occlusal adjustment (LOA) is needed, this can usually be done at the same appointment. A complete occlusal adjustment (COA) requires analysis and adjustment of mounted casts followed by intraoral adjustment. Articulation of casts in CR would be indicated if the purpose of the COA is to eliminate a CR-MI slide. Depending on the amount of adjustment, new casts may be required after either of these procedures.
3. The third purpose is to determine the articulation method to be used for the fixed prosthodontic treatment. This is also identified on the Occlusal Diagnosis section. Generally, if the planned restoration only requires MI contacts, a technique which only provides for MI contacts may be used (e.g., quadrant technique, full arch casts on hinge articulator). If the planned restoration is involved in excursive guidance (protrusive or working), a semi-adjustable articulator (Whip Mix) would be indicated along with a facebow registration. Survey crowns would also require use of a semi-adjustable articulator.
4. Following the Occlusal Exam, there should be adequate time to proceed with the Fixed Prosthodontic Treatment Plan & Sequencing - **D9450 (FPROS)** (See Below). If the treatment indicated is relatively straightforward and qualifies for chair-side sequencing, the sequencing may also be completed. Then the (unapproved) treatment plan can be approved and definitive treatment initiated.

No cases involving alteration of vertical dimension should be treated in the student clinic. All restorations will be fabricated in MI. All patients must have the Occlusal Exam completed prior to initiating any cast restoration.

## III. CLINICAL PROCEDURES

---

### B. Fixed Prosthodontics Treatment Plan & Sequencing – D9450 (FPROS)

#### Armamentarium:

1. Axium step - **D9450 Case presentation-detailed**; with *Details* tab add *Discipline – FPROS*
2. Fixed Prosthodontic Treatment Plan & Sequencing form (yellow paper form)
3. Prerequisites for this step are the Operative Case Complete - D0003 (OPER) and Occlusal Exam - D9430 (OCCL).
4. Diagnostic casts, as indicated; instrument cassette

#### Goals:

1. Obtain permission to start appointment.
2. Complete Occlusal Exam, if not previously done; review with faculty (see above).
3. Obtain current x-rays (periapical, bitewings), if indicated.
4. Using Fixed Pros Tx Plan & Sequencing paper form (yellow), enter Phase 3 treatment listing all indicated fixed prosthodontics procedures, including phase, sequence, Axium code, restoration type & design, articulation, miscellaneous steps, etc. Frequently used codes are listed on back of form.
5. With faculty, review and confirm proposed fixed prosthodontics treatment plan, sequence, and other information that was entered on paper form.
6. In Axium, enter all Phase 3 treatment at *Tx Plan* tab (*Problems, Diagnosis, Detailed Plan, etc.*) with proper codes & sequence. Also enter related procedures as indicated (Dx Wax-up - D9450A, etc.). Attach *Tx Note* to D9450 (FPROS). The note will list all the planned indirect restorations to include tooth #, restoration type & design (porcelain coverage & margin design), and any other pertinent information (e.g. need for crown lengthening, etc.).
7. If “chair-side sequencing” is allowed (number of planned units <4 & diagnostic wax-up is not required), the Axium Tx Plan can be approved by the patient and faculty & the D9450 (FPROS) step “Completed” at this appointment. If “office sequencing” is required, the D9450 (FPROS) step should remain “In Progress” until Axium Tx Plan is sequenced and approved by the faculty. In this case, the patient approval and “Completion” of step D9450 (FPROS) would be done at the next appointment.
8. Have faculty change step D9450 to either I or C (as indicated) and swipe to approve “step” and attached *Tx Note*.

#### Comments and Tips:

1. The purpose of this appointment is to review and update or revise the original Phase 3 treatment plan or to create a new Phase 3 plan. Usually, many months will have passed



since the original diagnostic review and tentative Phase 3 treatment plan. Because of the time lapse, changes that have occurred, and treatment rendered (periodontal therapy, RCT, and operative treatment, etc.), it is appropriate at this time to “re-treatment plan” the patient.

2. The Occlusal Exam, if not completed at a prior visit, can usually be completed at the same appointment as the Fixed Prosthodontics Treatment Plan. In some instances, limited occlusal adjustments (LOA) may be accomplished at this appointment.
3. The review and confirmation of the fixed prosthodontic treatment plan should consider the current periodontal and endodontic status of the teeth. Teeth should be evaluated for acceptability of foundation restorations, need for post and core, crown lengthening, or molar up-righting, etc.
4. New casts are required following any significant change (i.e., extensive indirect restorations, extractions, occlusal adjustment, etc.) Casts should not be more than 6 mo. old.
5. Teeth should be evaluated for restorability after caries excavation and prior to endodontics. The patients should receive a thorough perio evaluation to include mucogingival problems, crown lengthening, pocketing, mobility, bone support, and treatability prognosis. All perio treatment should be accomplished prior to fixed prosthodontic treatment. If indicated, these teeth should be re-evaluated for fixed prosthodontic treatment after perio therapy. If crown lengthening or orthodontic extrusion is anticipated, a consultation to make this determination should be done as soon as practical. However, there are some instances where an initial crown preparation and provisionals are needed prior to periodontal therapy (i.e., fractured tooth or extensive caries that preclude placement of a direct restoration). **No decay should be present when referring the patient for periodontal or endodontic therapy.**
6. All teeth should be evaluated for adequate crown length. This is especially true for FPD and RPD abutments, endodontically treated teeth, and teeth with deep subgingival restorations. This determination can best be made by measuring the crown length on the diagnostic cast and by looking at bite wing x-rays. You may also arrange for a clinical consult when you are in the clinic for operative procedures. If surgical crown lengthening is needed, this should be accomplished well in advance of initiating the fixed restoration (6-8 weeks).

Any extensive amalgam that was not placed recently in the dental school should be evaluated for replacement. If the amalgam restores one or more cusps, it should have retentive pins or slots. A retentive feature should be used for each missing cusp and marginal ridge. The retentive features should be placed so that they will not be exposed during crown preparation. Small (i.e., shallow) to moderate amalgams without evidence of decay may not require replacement if they will be removed at the time of crown preparation. These amalgams may only have to be blocked-out on the tooth, rather than replaced. Large pin-retained restorations that would be problematic to replace may sometimes be left in place for the crown preparation. Check with an instructor about these restorations. (See Treatment Planning Guidelines for Fixed Prosthodontics in this manual).

## III. CLINICAL PROCEDURES

---

### C. Tooth Preparation

#### Armamentarium:

1. Must have an approved Treatment Plan and treatment for the session must conform to approved sequence. Confirm that restoration type & procedure code in Axiom Tx Plan are correct (gold vs. PFM vs. All-ceramic, etc).
2. Current PA radiograph
3. Mounted diagnostic casts on the articulator (if indicated)
4. Unmounted duplicate casts of diagnostic wax-up (if indicated)
5. Vacuum-formed matrix, Ion crown, or other matrix (if applicable)
6. Instrument cassette, handpieces, bur block (check block & replace missing burs or stones)
7. Provisional kit (disks, stones, acrylic bur, rubber wheels, etc.) from dispensary

#### Goals:

1. With faculty, review proposed treatment and confirm that step (Axiom code) is correct. Obtain starting check.
2. Administer local anesthetic & prepare tooth - 1-1½ hours; obtain evaluation from instructor.
3. Fabricate provisional restoration - 1 hour.
4. Obtain evaluation of provisional restoration from instructor.
5. Cement provisional with temporary cement (Tempbond) and give patient instructions in maintenance of provisional.
6. Attach *Tx Note* to step. Include anesthesia, procedure completed, and other pertinent information. Use accepted abbreviations where possible. Add procedures planned for next visit (NV).
7. Have faculty change status of preparation & provisional steps to I or C, as indicated, & swipe to approve step(s) & attached *Tx Note*.

#### Comments and Tips:

1. If the procedure code needs to be changed (e.g. gold to PFM, etc.), **this must be done when the parent step is still in the "Planned" status (before status of any explosion codes are changed)**. Do not change the status of any step to "In Progress" without faculty approval.
2. Stay with the patient for 5-10 minutes after an injection has been given. **Permission must be obtained prior to giving an injection; permission must also be granted to administer additional anesthesia.**
3. All teeth must have a provisional restoration before the patient can leave the clinic.

4. Whenever possible, you should try to complete an indirect restoration with the same instructor who supervised the preparation.
5. If the tooth being prepared is largely amalgam, consider using a #1958 metal-cutting bur for the initial reduction as it doesn't get as clogged with amalgam debris as much as a diamond bur. Vital tooth preparations should always be done with water irrigation to prevent pulpal trauma and to reduce clogging of the cutting instrument.
6. Place retraction cord prior to preparing margins if margins are subgingival to prevent damage of the free gingival margin or to prevent placing the preparation margin too far subgingival. Remove prior to fabrication of provisional.
7. Evaluate preparation resistance form carefully. Teeth with minimal resistance form (including all molars) should have resistance groove(s) placed in tooth structure to enhance resistance. Inspect preparations carefully for smooth, continuous margins without shoulders, ledges, lips, or unsupported enamel.
8. **All provisional restorations must be checked prior to cementation and after cementation. The preparations must be approved prior to the final impression.** If provisional restorations will be used for an extended period of time, consider cementing them with Durelon after placing Copalite on the tooth. These can usually be removed with hemostats; however, sometime the provisional must be slit with a bur for removal.

You should avoid having patients use provisional restorations over extended periods or vacations (Christmas, Spring Break, externship). Discuss with your instructor alternate provisional techniques or cements (e.g. IRM, Copalite/Durelon) if the provisional restoration will need to serve the patient for a longer time than normal or if preparation retention is minimal.

## III. CLINICAL PROCEDURES

---

### D. Final Impression

#### Armamentarium:

1. Custom tray or stock tray (as indicated)
2. Instrument cassette, handpieces, burs and diamond stones

#### Goals:

1. Obtain starting check and approval to begin impression procedure.
2. Administer local anesthetic. Try-in tray and paint with adhesive.
3. Have instructor check preparation for any additional design modifications.
4. Achieve adequate and atraumatic isolation, retraction and moisture control.
5. Produce an accurate elastomeric impression of the prepared tooth - 1½ hour
6. Rinse and disinfect impression with Dispatch (30 sec contact time).
7. Make interocclusal record for mounting of working cast and an alginate impression for a current opposing cast (if needed). Select porcelain shade for PFM crown.
8. Re-cement provisional restoration.
9. Attach *Tx Note* to step. Include anesthesia, procedure completed, and other pertinent information. Use accepted abbreviations where possible. Add procedures planned for next visit (NV).
10. Have faculty change impression step to either “In Progress” or “Complete”. Faculty should also “Complete” preparation, provisional, IOR, and shade selection steps, as indicated, and swipe to approve steps and attached *Tx Note*.

#### Comments and Tips:

1. As your ability and speed improves, you will be able to make your impression on the day that you prepare the tooth. However, you should still follow the sequence of goals and obtain the necessary evaluations and signatures. Under no circumstances is an impression to be made unless the preparations and provisional have been approved and the provisional is ready for cementation.
2. For a FPD, you may only have time to prepare the first abutment in a session. In this case, a single unit provisional should be made. Then at the next visit, the other tooth can be prepared and a FPD provisional fabricated. Occasionally, the second abutment is also restored with a single provisional and an indirect FPD provisional is made by the next appointment from a Snapstone cast of the preparations. In either case, a FPD provisional must be placed by the time of the final impression.
3. You should review the techniques for gingival retraction and the use of various hemostatic agents which are available in the clinic. Patients should be maintained in a supine position during retraction and impression procedures using cotton rolls and a saliva ejector to

maintain a dry field. In some situations, the Erickson Vac-Ejector (a combination mouth prop and saliva ejector) works well to provide isolation. Remember that Astringedent® is used with the dental infuser (in a wet environment) to control active bleeding. It is very bitter so confine the placement to the designated area. The cord should be soaked in Hemodent and the excess blotted prior to placement. The Hemodent acts to retract, shrink, and dry the tissue. This step is only effective in a dry field where the Hemodent won't be diluted by saliva. Maintain a dry field from the time of cord placement to impression. The cord is usually removed just prior to the impression. Cotton rolls and dry angles may be left in place, assuming they don't interfere with placement of the impression tray.

4. There is epinephrine impregnated retraction cord available for use in clinic. The brand available is Gingipak (twisted). Because of the cardiovascular effect of the epinephrine, this cord should only be used when needed. It should not be used for patients for whom epinephrine-containing anesthetic is contraindicated (cardiovascular disease). Other contraindications include hyperthyroidism, diabetes, high blood pressure, and sensitivity to epinephrine. It should only be used for retraction for impression procedures. It should not be used for retraction for tooth preparations. Because of the cumulative effect of the epinephrine, it should not be used on large numbers of teeth at the same time (e.g. 6 teeth prepared for porcelain veneers). It should be used with caution where there is thin gingival tissue in order to avoid unwanted gingival recession. If you have questions about the use of this cord, please check with your supervising faculty.
5. If the soft tissue at the crown margin is inflamed and/or bleeds easily as a result of an overhanging amalgam or crown margin, a poorly fitting provisional, or poor oral hygiene, it is often impossible to achieve an acceptable impression. In these cases it is better to make sure the provisional fits well, that there is no residual cement in the sulcus and that the patient knows how to maintain proper plaque control. The impression should be delayed for 1-2 weeks until adequate healing has taken place. The use of an OTC anti-microbial rinse (e.g., Listerine™) will improve tissue health.
6. Stock trays may be used for PVS impressions of single unit crowns or FPD preparations. Students should use the diagnostic cast to determine if a stock tray will fit the arch form and provide adequate coverage. Custom trays may be required for survey crowns. If acrylic resin tray material is used, the tray should be made at least 24 hours prior to use. Triad Tru-tray material may be used the same day. The custom tray should be fabricated with a 3 mm wax spacer, occlusal stops, a horizontal handle, and should extend 4-5 mm past the marginal gingiva in the area of the prepared teeth. The adhesive should be allowed to dry at least 10 minutes.
7. Hold the tray in position for at least the first 5 minutes and do not leave a patient alone with an impression in their mouth. After the tray is inserted, the patient should be seated upright while the impression is setting to minimize the chance of impression material running down the patient's throat.
8. Polyvinylsiloxane impressions can be poured at any time. Make a "second pour" immediately after the first cast is removed. This second cast does not need to have removable dies. It will be submitted to the lab for evaluating proximal contacts and gingival contours. It can be invaluable in the event that the "first pour" is damaged during crown

fabrication. Also do not discard the impression. It will be needed for guidance in trimming the working die and at cementation for evaluating the restoration for marginal over-extensions. Adding wax around the margins prior to pouring can facilitate accessibility to the die margins.

9. Crowns and FPDs are fabricated in MI (maximum intercuspation). In most cases for single units, the working cast may be hand-articulated to the opposing cast. However, the following situations will necessitate the use of an interocclusal record (IOR) for proper articulation of the casts:
  - a. Multiple unit restorations (FPDs)
  - b. Single units which are the most distal teeth in the arch
  - c. Flat ("monoplane") occlusal anatomy of remaining teeth
  - d. Multiple missing teeth or large edentulous spaces
  - e. Partially edentulous patients; survey crowns
  - f. Unstable MI

Any of these situations would make "hand-articulation" difficult or impossible thus incorporating significant occlusal errors in the restorations. When the casts are to be mounted in the MI position, an interocclusal record (IOR) should be made at the occluding vertical dimension. This record will consist of polyvinylsiloxane IOR material (Blu Mousse®, Regisil®, Stat BR™), softened wafer of hard wax (Delar), or Duralay® resin which is placed over the **prepared teeth only**. The patient then closes into MI. The record should capture the occlusal third of the prepared teeth and the opposing dentition. **The record must be trimmed correctly before being used to articulate the working cast, especially the side contacting the opposing diagnostic cast (made from an alginate impression).** There should be no contact of the IOR with the soft tissue areas of the cast, unless the record was purposefully made against an edentulous ridge.

10. If the patient is edentulous in the posterior of the mouth, it may be necessary to fabricate record bases and wax rims on the working casts to properly articulate these casts. This should be done before sectioning the working dies. This will require a separate appointment to make the IOR (see Section IX). Occasionally, a PVS IOR may be adequate, depending on the degree of accuracy required for the particular restoration.
11. An alginate impression must be made to obtain a current opposing cast if:
  - a. the opposing cast is more than 1 month old.
  - b. any new restorations have been placed since the cast was made.
  - c. the opposing cast is damaged or otherwise inadequate.

The final PVS impression should be brought to the clinic at the delivery appointment. It can be helpful to evaluate the casting for margin over-extensions or to evaluate the integrity of the die.

## III. CLINICAL PROCEDURES

---

### E. Post & Core Fabrication (Cast or Pre-fabricated)

#### Armamentarium:

1. Mounted diagnostic casts, matrix.
2. Instrument cassette, handpieces, burs and diamond stones.
3. Provisional armamentarium (disks, stones, acrylic bur, brush, rubber wheels, etc.).
4. Radiograph of completed root canal filling.

#### Goals

1. Obtain starting check and review proposed treatment. Confirm Axium code is correct.
2. Prepare coronal aspect of tooth for the indicated crown. Make decision about the type of post/core required based on the amount of remaining tooth structure.
3. Gain access to pulp chamber; remove filling material. Remove gutta percha from desired canal with Gates Glidden drill (or warm instrument) as directed by instructor. **NEVER USE A HIGH SPEED BUR IN THE CANAL AND DO NOT USE THE PARAPOST DRILLS TO REMOVE GUTTA PERCHA.**
4. Make PA x-ray to confirm depth of GP removal and integrity of apical seal.
5. Enlarge canal diameter, if indicated, with a Parapost drill and complete coronal preparation.
6. Obtain evaluation from instructor.

*Note: The tooth may be restored with a prefabricated post (with either an amalgam or composite core) or cast post and core. The amount of remaining tooth structure, the height of the crown, the occlusal scheme, and significance of the tooth in that occlusion will be factors in the decision. See following sections for either prefabricated P&C or cast P&C for remaining steps.*

#### Prefabricated Post & Core

1. Obtain prefabricated post (Titanium or stainless steel) corresponding to drill used.
2. Cut off post to provide 2 mm of occlusal clearance.
3. Cement post into canal using Lentulo spiral to spin RMGI cement into the canal. Occasionally Panavia 21 will be used to cement the post. In this instance, do not use the Lentulo spiral, but only apply cement to the post prior to insertion into the canal.
4. Perform dentin bonding procedures and place core material.
5. Prepare for crown; make and cement provisional restoration.

## Cast Post & Core

1. Fabricate provisional restoration with aluminum post.
2. Make impression of post space and preparation (indirect technique) or make a direct pattern.
3. Cement provisional (orifice may be sealed with Cavit or IRM).
4. Have faculty change status of step to “In Progress” and swipe to approve step and attached *Tx Note*.

### *Delivery of Cast Post & Core:*

1. Fit post and core to canal.
2. Finish preparation (all possible corrections to core should be made prior to cementation).
3. Obtain evaluations and approval to cement from instructor (pre-cementation).
4. Cement post and core using Lentulo spiral to spin RMGI cement into the canal. Only apply cement to the post prior to insertion into the canal.
5. Make a new provisional if significant changes were made to the preparation or re-use old provisional by removing post and relining.

From this point the goals for the preparation appointment will apply. The post and core status will be changed to “Complete” in Axiom. The crown step can be changed to “In Progress”, if desired.



## III. CLINICAL PROCEDURES

### F. Cementation Appointment (Gold Restoration)

#### Armamentarium:

1. Handpieces, instrument cassette
2. Crown adjustment kit (from dispensary)
3. Impression, Fit checker
4. Cotton rolls, articulating paper, ribbon, or film
5. Thickness gauge (supplemental item)
6. Gold crown finished & polished

#### Goals:

1. Evaluate and adjust, if necessary, in the following order:
  - a. proximal contacts
  - b. internal fit with Fit Checker (ask instructor whether to make adjustments in the crown or on the tooth preparation)
  - c. external adaptation (with explorer or visual)  
**(Do not adjust occlusion until instructor has verified seating.)**
  - d. occlusion (MI and eccentric)
  - e. contour (axial, inter-proximal, pontic)
2. Receive evaluation of adjustments.
3. Polish restoration (this should be done in the lab, if extensive).
4. Obtain pre-cementation evaluation from instructor.
5. Clean tooth preparation and internal surface of casting with ethanol or PIP Spray.
6. Isolate and dry tooth, if indicated.
7. Cement restoration with resin modified glass ionomer cement - maintain dry field during setting.
8. Remove excess cement after it has set at least two minutes (use floss with knot).
9. Post-cementation evaluation of occlusion and cement removal by student and then by instructor.
10. Attach *Tx Note* to step. Include anesthesia, procedure completed, cement brand, and other pertinent information. Use accepted abbreviations where possible. Add procedures planned for next visit (NV).
11. Have faculty change status of cementation step to "Complete" and swipe to approve step and attached *Tx Note*.

### Comments and Tips:

1. The student should confirm the fit of the casting to the die and the solid cast prior to the cementation appointment with the patient in the chair. Providing a sandblasted or rubber-wheel finish on proximal or occlusal contact areas will facilitate intraoral adjustment of these areas. With the indirect techniques that we use to fabricate cast restorations, we assume that the impression material and die stone produce a working die that is an accurate reproduction of the prepared tooth. Therefore, **if the casting does not fit the die, it will not fit the tooth** and unnecessary clinical time may be wasted at delivery trying to seat the casting, close margins, etc. An unacceptable product is sure to result.
2. The casting should be evaluated for optimum seating with the use of Fit-Checker. Fit Checker provides an accurate visual assessment of the internal adaptation (i.e., seating at the margins) of the casting. It also represents the space available for cement. Proper use of Fit Checker will facilitate appropriate internal adjustments that are needed as a result of casting distortion and result in a significant improvement in fit of the casting. For posterior units, the patient must use heavy biting force to seat the casting. For anterior units, as for final cementation, finger pressure must be used to produce a force in the long axis of the preparation. Any required adjustment on the occlusal surface or occlusal-axial line angles should be made in the mouth. Adjustments on the walls or near the margins are usually made inside the casting. Measure crown thickness when necessary to prevent perforation, especially for PFM units as the metal thickness under the porcelain is quite thin. Internal adjustments of any restoration should be very minor. **Do not grind on the inside of all-ceramic crowns, as this may result in a fracture.**
3. The casting should be evaluated by an instructor after the proximal contacts and internal adjustments have been made. This will insure that the margins are acceptable before time is devoted to adjusting the occlusion.

The casting must be disinfected by spraying with OPTIM (wait 30 seconds) before being taken from the operatory for polishing, sandblasting, steam cleaning, etc.

## III. CLINICAL PROCEDURES

---

### G. Metal Try-In Appointment (PFM FPD Frameworks)

#### Armamentarium:

1. Instrument cassette, handpieces, etc.
2. Impression, Fit Checker
3. Thickness gauge (supplemental item)

#### Goals:

1. Evaluate and adjust, as needed, in the following order:
  - a. proximal contacts
  - b. internal adaptation (seating) (see section above on use of Fit Checker)
  - c. external adaptation
  - d. pontic to ridge relationship
  - e. adequate clearance for porcelain
  - f. occlusion (see #2 below)
  - g. location of porcelain-metal junction, connector size and clearance for gingival papilla
  - h. metal collar
2. Remount the cast prior to returning to lab if the occlusion required substantial adjustment (porcelain cases). This may require the use of an IOR made between the framework and the opposing teeth. For FPDs with a porcelain occlusal design, verify the mounting with a PVS IOR and remount if necessary to minimize occlusal adjustment at delivery. If opposing cast or teeth were adjusted, make a new alginate impression.
3. Select or confirm the porcelain shade.
4. Receive approval of coping (framework) and shade selection.
5. Obtain e-signature for record.

## III. CLINICAL PROCEDURES

---

### H. Cementation Appointment (Porcelain Restoration)

#### Armamentarium:

1. Instrument cassette, handpieces, etc.
2. Crown adjustment kit (from dispensary)
3. Impression, Fit Checker
4. Thickness gauge, if needed (supplemental item)

#### Goals:

1. Evaluate and adjust, as needed:
  - a. proximal contacts (and tissue surface of pontic)
  - b. internal adaptation (seating) using Fit-Checker (see above section)
  - c. external adaptation (**Do not proceed until seating is verified by faculty**)
  - d. occlusion (MI and eccentric)
  - e. contour (labial, interproximal, pontic)
2. Obtain evaluation of porcelain adjustments.
3. Reglaze or polish restoration, as needed.
4. Disinfect completed restoration, and then obtain pre-cementation evaluation from instructor.

**FPDs may be cemented provisionally at this time (see comment below). Single units would be cemented with a final cement (i.e. resin-modified glass ionomer).**
5. Clean tooth preparation and internal surface of crown with ethanol or PIP Spray.
6. Isolate and dry tooth.
7. Cement restoration. Remove excess cement only after it has set completely hard (3-5 minutes for resin-modified glass ionomer).
8. Post-cementation evaluation of occlusion and cement removal by student and then by instructor
9. Attach *Tx Note* to step. Include anesthesia, procedures, cement brand, and other pertinent information. Use accepted abbreviations where possible. Add procedures planned for next visit (NV).
10. Have faculty change status of cementation step to "Complete" and swipe to approve step and attached *Tx Note*.

#### Comments and Tips:

1. Restorations should be evaluated prior to the patient appointment.

2. FPDs may be cemented provisionally for several days to 1 week (Tempbond® mixed with Vaseline (3:1) or Trial® cement). This will allow alterations if needed for occlusion, esthetics, pontic design, or soft tissue condition.

**Do not grind on the inside of all-ceramic crowns, as this may result in a fracture.**

## IV. EVALUATION CRITERIA FOR FIXED PROSTHODONTIC PROCEDURES

---

### A. Preparations

1. Occlusal/Incisal Reduction
  - Ideal - 1.5 mm for Full Gold (FG) crowns; 2.0 mm for PFM crowns
  - Unacceptable - excessive reduction or inadequate clearance
2. Facial/Lingual Reduction
  - Ideal - 1.0 mm F/L for FG Crown; 1.5 mm F for PFM Crown
  - Unacceptable - insufficient reduction for replacement or over-reduction
3. Proximal Reduction
  - Ideal - reduction for replacement
  - Unacceptable - excessive proximal reduction; proximal contact not broken
4. Retention & Resistance Form
  - Ideal - 12-16° taper of opposing walls; minimum 3 mm axial wall height
    - retentive groove(s) on molars at least 3 mm in length and 0.5-1.0 mm in depth
  - Unacceptable - over-tapered or undercut
5. Finish Lines and Surface Finish
  - Ideal - visible, smooth, continuous finish lines, placement on sound tooth structure
    - exhibit the proper configuration (chamfer, etc.)
    - proper location to achieve the desired esthetic result
    - placed in proper relation to tissue
  - Unacceptable - feather edge or shoulder, lipped margin
    - impingement on gingival attachment
    - surface finish is rough, irregular, sharp
6. Caries, Pulp Exposure, Damage to Adjacent Tissues
  - Unacceptable - caries remaining or mechanical pulp exposure
    - mutilation of soft tissues by preparing final preparation margins without retraction cord in place so that extra procedures are needed for tooth preparation (replacement of a margin) or impression
    - damage to adjacent tooth or restoration during preparation
    - damage to prepared tooth by cutting dry. The only portion to be prepared dry is where fine detail is needed (bevels, etc.).

## IV. EVALUATION CRITERIA FOR FIXED PROSTHODONTIC PROCEDURES

---

### B. Provisional Restorations

1. Occlusion - At least one contact per tooth. Evaluation of intensity of occlusion will be the same as for castings (natural teeth should contact the same with provisionals as without provisionals). Provisionals should be made without lateral guidance, if possible.
2. Marginal Adaptation – Unacceptable:
  - open, short margins
  - overhanging margins
  - soft tissue impingement
3. Proximal Contact - to be evaluated the same as castings (visible contact, verified by floss)
4. Esthetics, Contour, Occlusal Form, Pontic Form - the provisional should exhibit proper esthetics, contour, embrasures, occlusal form, pontic form, and surface finish.

## IV. EVALUATION CRITERIA FOR FIXED PROSTHODONTIC PROCEDURES

---

### C. Impression

1. Isolation and retraction – Unacceptable:
  - inadequate retraction
  - excessive force in placement of retraction cord
  - excessive use of chemical hemostatic agents
  - moisture or hemorrhage which prevents making an adequate impression
  - dry field not maintained with saliva ejector, cotton rolls, dri-angle, etc.
2. Custom Tray – Ideal: custom acrylic resin or Triad tray with occlusal stops or use of a properly fitting stock tray. Tray has adequate coverage of all teeth and soft tissue areas (retromolar pads, etc.) with 3 mm space for impression material. Tray should not be thick, bulky, or extend onto land areas of diagnostic cast.
3. Margins – Unacceptable: finish lines not visible and dry
4. Voids in Critical Areas – Unacceptable: voids in impression near the preparations, pontic areas, or occlusal surfaces which would make mounting of casts difficult.



## IV. EVALUATION CRITERIA FOR FIXED PROSTHODONTIC PROCEDURES

---

### D. Delivery

#### 1. Occlusion

- Unacceptable
- supraocclusion; infraocclusion
  - eccentric interferences
  - inadequate occlusal morphology from extensive adjustment

#### 2. Marginal Adaptation

- Unacceptable
- open margin; short margin
  - overhanging or bulky margin

#### 3. Proximal Contact

- Unacceptable
- open contact
  - excessively tight contact (casting held firmly in place to evaluate)
  - improper location of contact

#### 4. Surface Finish - The restoration should exhibit a smooth, highly polished surface.

#### 5. Esthetics, Contour, Occlusal Form, Pontic Form - If the restoration was fabricated by the lab, (e.g. porcelain crowns) the student will be evaluated on the chair-side adjustments including contouring and characterization. If the restoration was fabricated by the student, the instructor will evaluate the axial contours and occlusal form developed in the restoration.

#### 6. Cementation

- Unacceptable
- failure to use base or liner when indicated
  - inadequate isolation
  - failure of casting to be fully seated
  - failure to remove cement from tooth and margin
  - poorly mixed cement

## V. TREATMENT PLANNING GUIDELINES FOR FIXED PROSTHODONTICS

---

### A. Crowns

1. Indications
  - a. Minimal remaining clinical crown due to caries or fracture
  - b. Recurrent decay on existing large restoration
  - c. Protection of endodontically treated teeth (posterior)
  - d. Cracked teeth which are symptomatic
  - e. Internal cracks which are detected when replacing a direct restoration (vertical cracks toward pulp or horizontal cracks under cusps)
  - f. History of fractured teeth associated with heavy occlusion, bruxism, etc.
  - g. Correction of unfavorable plane of occlusion
  - h. Survey crowns for RPD
  - i. Inability to restore tooth to correct form and function with a direct restoration
  - j. Esthetics
2. All teeth with large restorations DO NOT require crowns. If the existing restoration, although extensive, is sound, clinically acceptable (caries-free, adequate marginal integrity, no unsupported enamel, maintains function, etc.) and no other indications exist to do a crown (see 1.b-i), then the tooth DOES NOT require a crown UNLESS the patient requests it for esthetic purposes or to prevent potential fracture (patient has history of cuspal fracture).
3. The patient should always be informed of the risks associated with any treatment modality. The options for a tooth with a large but sound, clinically acceptable restoration are as follows:
  - a. **No treatment**

**Risks:** Potential fracture of remaining tooth structure or restoration. (Note: This usually does not result in pulpal involvement or a non-restorable tooth)  
Recurrent caries
  - b. **Crown**

**Risks:** Pulpal trauma  
Need for new foundation  
Need for RCT and P & C if retention cannot be obtained for foundation  
Need for crown lengthening to prepare finish line apical to existing restoration  
Recurrent caries / porcelain fracture of crown

4. **The PATIENT should decide** as to his/her treatment of choice once all options and the dentist's recommendations have been presented and the risks, benefits, and costs thoroughly discussed.
5. Determining the need for crown lengthening or RCT when preparing a tooth for a crown should be done **AFTER** all decay has been removed and a finish line has been established. When possible, establishing a finish line prior to crown lengthening gives the surgeon a definite guide as to the desired position of the bone-gingival complex.
6. All posterior (premolars and molars) endodontically treated teeth in occlusion should be crowned unless there is no opposing occlusion or a complete denture in the opposing arch. Anterior endodontically treated teeth with fairly intact clinical crowns need not be crowned unless other related factors are present (cracks, heavy occlusion, bruxism, history of tooth fracture).

# V. TREATMENT PLANNING GUIDELINES FOR FIXED PROSTHODONTICS

---

## B. Replacing Missing Teeth

### 1. Indications

- a. Function
- b. Esthetics or phonetics
- c. Space maintenance (to prevent drifting, tipping, supraeruption)

If none of these indications apply, the edentulous space **need not** be restored.

### 2. Restoration of an edentulous space is done via 3 treatment modalities:

- a. Implant prosthesis
- b. Fixed prosthesis
- c. Removable prosthesis

### 3. The **PATIENT should decide** which treatment modality he/she desires after the advantages, disadvantages and risks of each one (as it relates to their situation) have been thoroughly discussed. The patient ultimately has the choice to accept or reject the treatment.

## V. TREATMENT PLANNING GUIDELINES FOR FIXED PROSTHODONTICS

---

### C. Existing Restorations and Foundations (Build-ups)

1. If a tooth with a defective restoration **is not** indicated to be crowned, then the existing restoration should be removed and replaced with a definitive direct restoration with appropriate retention. Upon removal, the clinical situation (caries, undermined cusps, internal cracks, etc.) may dictate a change in the treatment recommendation. If a crown is now indicated, this should be discussed with the patient. If the patient elects to have the tooth crowned, a foundation should be done with retention that will not be compromised during crown preparation.
2. If a tooth with a defective restoration **is** treatment planned for a crown, the existing restoration **does not need** to be removed and replaced prior to crown preparation **in all situations**. If the restoration is minimal, or the risk/benefit does not favor replacement, the tooth is prepared for a crown first. After the initial crown preparation is completed, the operator should determine the need for decay removal and replace the missing tooth structure with a core material with appropriate retention. Common examples which **do not** require prior replacement of the existing restoration are:
  - a. Non-carious defective margins; small to moderate cuspal fractures
  - b. Carious defects which are minimal (<1 mm deep) with no pulpal symptoms
  - c. Small or shallow restorations which will be removed with the crown preparation
  - d. Restorations with retentive pins in which replacement would be problematic
3. If there is no obvious retention (pins) for a large restoration and the restoration was not done at GRU CDM, or there is a question about the pulpal status of the tooth or the integrity of the restoration, then the foundation is generally best replaced at a separate appointment to provide for proper retention and to evaluate the pulpal status. The existing restoration **should be** replaced prior to the crown preparation if:
  - a. The extent of caries suggests a pulp exposure is likely
  - b. The tooth is symptomatic
  - c. There is caries and it will be more than 1-3 months before the crown preparation is initiated

Replacement of the core after crown preparation would be problematic (access, retention of matrix, etc.)

## VI. CLINIC POLICIES FOR OCCLUSAL EVALUATION AND INDIRECT RESTORATIONS

---

### A. Evaluation of Occlusion

1. All patients must receive a TMD Screening Exam and an Occlusion Screening Exam as part of the COE and Diagnostic Review. This will satisfy the standard of care that all patients need an initial clinical evaluation of their occlusion and TMJs to establish a baseline.
2. Some patients, as identified by either a positive response on the screening exam or by specific department policies (i.e. indirect restorations, RPDs), will need to have one or more additional occlusion evaluations performed. These evaluations are the Occlusal Exam and the TMD Exam.

Occlusal Exam, D9430 (OCCL), is required in the following situations:

- a. Prior to Treatment Planning Board for combination fixed/removable cases (must be scheduled in the removable prosthodontic section of Clinic 14). See guidelines for TPB for further information.
- b. Prior to beginning any indirect procedure (inlay, onlay, crown, FPD, etc.). This should usually be done after the completion of all direct procedures.

## VI. CLINIC POLICIES FOR OCCLUSAL EVALUATION AND INDIRECT RESTORTIONS

---

### **B. Indirect procedures (inlays, onlays, crowns, FPDs, etc.)**

These policies reflect the need to re-evaluate a patient's treatment needs after direct treatment and before indirect treatment. Usually many months will have elapsed since the tentative (Phase 3) treatment plan was proposed following the COE & Dx Review. Extractions, root canal therapy, or periodontal therapy may necessitate a modification in the treatment plan. In fact, the percentage of patients whose treatment plan doesn't change is quite small. These policies are designed to provide a logical and organized flow to the patient's treatment and avoid misunderstandings for patients, students, and faculty.

#### **1. Operative Case Complete - D0003 (OPER)**

Generally all direct procedures must be completed prior to beginning indirect procedures. Following completion of direct procedures, an operative faculty must certify that all required operative treatment has been acceptably completed (Operative Case Complete). This will be done by an intraoral exam to check for caries, recurrent caries, overhangs, etc. If indicated, new radiographs (bitewings or PA) may be prescribed. The Operative Case Complete code, D0003 (OPER), with an attached note must be "Completed" in the *EHR* with any exceptions identified in the note (e.g., board lesions).

## VI. CLINIC POLICIES FOR OCCLUSAL EVALUATION AND INDIRECT RESTORTIONS

---

### **B. Indirect procedures (inlays, onlays, crowns, FPDs, etc.)**

These policies reflect the need to re-evaluate a patient's treatment needs after direct treatment and before indirect treatment. Usually many months will have elapsed since the tentative (Phase 3) treatment plan was proposed following the COE & Dx Review. Extractions, root canal therapy, or periodontal therapy may necessitate a modification in the treatment plan. In fact, the percentage of patients whose treatment plan doesn't change is quite small. These policies are designed to provide a logical and organized flow to the patient's treatment and avoid misunderstandings for patients, students, and faculty.

#### **2. Occlusal Exam – D9430 (OCCL)**

Prior to beginning any indirect procedures, the Occlusal Exam must be done (this assumes the TMD/Occlusion screening exam has been completed). This exam documents the occlusal contacts and occlusal scheme, the presence or absence of a slide, and other occlusion related factors. It also is the opportunity to determine the need for an occlusal adjustment and the desired treatment position for indirect procedures. Diagnostic impressions to obtain current casts and facebow registration may be done at this time, if needed. As mentioned below, this clinical step may be accomplished at the same appointment as the FX PROS TP step. For dentate patients, the Occlusal Exam should be scheduled in the fixed prosthodontic section of Clinic 14. For patients scheduled for TPB, the Occlusal Exam should be done in the removable prosthodontic section.



## VI. CLINIC POLICIES FOR OCCLUSAL EVALUATION AND INDIRECT RESTORTIONS

---

### B. Indirect procedures (inlays, onlays, crowns, FPDs, etc.)

These policies reflect the need to re-evaluate a patient's treatment needs after direct treatment and before indirect treatment. Usually many months will have elapsed since the tentative (Phase 3) treatment plan was proposed following the COE & Dx Review. Extractions, root canal therapy, or periodontal therapy may necessitate a modification in the treatment plan. In fact, the percentage of patients whose treatment plan doesn't change is quite small. These policies are designed to provide a logical and organized flow to the patient's treatment and avoid misunderstandings for patients, students, and faculty.

### 3. Fixed Prosthodontics Treatment Plan – D9450 (FPROS)

Following completion of all direct restorations, patients requiring indirect restorations (Phase 3) must be scheduled in the fixed prosthodontic section of Clinic 14 for a Fixed Prosthodontics Treatment Plan & Sequencing appointment. The Axium code for this is **D9450 - Case presentation - detailed** with the added *Discipline* of **FPROS**. The Occlusal Exam must be completed before this step. In some cases, it would be practical to schedule these two procedures at the same appointment. The FX PROS TP appointment provides the opportunity to review the original treatment plan and confirm, revise or change it based on changes that have occurred. It will provide the opportunity to identify the need for crown lengthening, molar uprighting, etc. The findings from this step (teeth requiring restoration, restoration type and design, any changes in the treatment plan) are documented in an attached *Tx Note* to step D9450 in the *EHR*. Initiation of the indirect treatment may not begin until the treatment plan is "Sequenced" and approved in Axium. This is also the time for obtaining new casts or current x-rays, completing the Occlusal Exam and facebow transfer (if not previously done for TPB), discussion of finances, etc. in preparation for starting indirect procedures.

## VI. CLINIC POLICIES FOR OCCLUSAL EVALUATION AND INDIRECT RESTORTIONS

---

### B. Indirect procedures (inlays, onlays, crowns, FPDs, etc.)

These policies reflect the need to re-evaluate a patient's treatment needs after direct treatment and before indirect treatment. Usually many months will have elapsed since the tentative (Phase 3) treatment plan was proposed following the COE & Dx Review. Extractions, root canal therapy, or periodontal therapy may necessitate a modification in the treatment plan. In fact, the percentage of patients whose treatment plan doesn't change is quite small. These policies are designed to provide a logical and organized flow to the patient's treatment and avoid misunderstandings for patients, students, and faculty.

#### 4. Sequencing – “Completion” of Step D9450 (FPROS)

All Phase 3 procedures must be properly sequenced in the Axium Treatment Plan. This may be done initially on the Fixed Prosthodontics Treatment Plan & Sequencing paper form (yellow). An interactive version of this form is available on the clinic computer “desktop” on the H: drive. If the patient requires fewer than four indirect restorations and a diagnostic wax-up is not required, the sequenced treatment plan may be approved at the Fixed Prosthodontics Treatment Plan appointment (“chair-side sequencing”).

For all other patients, a separate non-clinical “in office” sequencing appointment must be scheduled with a designated faculty. This sequencing appointment may be scheduled with the department secretary. Sequencing must be completed by the student who will be providing the treatment.

Specifically, a non-clinical “in office” sequencing appointment is required for patients needing:

- a. Fixed partial dentures (including Resin-bonded FPDs).
- b. Four or more single castings.
- c. Indirect restorations where anterior guidance is involved or to be replaced.
- d. Opposing castings

The following must be available at the non-clinical “in office” sequencing appointment.

- A. Electronic record with current Dental and Medical History including the Occlusal Exam
- B. Radiographs – If indicated, current (post-op) bitewings and periapical x-rays (after surgery, Perio, endo, and operative) of teeth planned for crowns.
- C. Treatment Planning Board completed (if applicable).
- D. Preliminary detailed Fixed Prosthodontics Treatment Plan & Sequence form (yellow form or printed from computer desktop) completed by the student and

ready for presentation. These sequenced procedures can be entered in a proposed Phase 3 Tx Plan in Axium.

- E. Unaltered, post-equilibration diagnostic casts must be mounted on a semi-adjustable articulator (Whip Mix or Stratos) using a facebow transfer and the articulator set with appropriate records (Prot. or Lat.). Casts should generally be less than 3 months old
- F. All FPDs involving mal-positioned abutments (drifted, extruded, cross-bite etc.) must have a diagnostic wax-up depicting optimum interdigitation, pontic form, and plane of occlusion.
- G. Single units involving changes in morphologic contour or original position or correction of occlusion must have a diagnostic wax-up.

Note that sequencing for survey crowns for combination cases has a slightly different protocol (see Section IX). If a RPD is planned in combination with fixed prosthodontics, an appointment must be made with Dr. Plummer for Combination Case sequencing. This sequencing appointment follows Treatment Planning Board. In contrast to fixed prosthodontic sequencing, no further work on the patient should take place between TPB and Combination Case sequencing.

**In conclusion, all patients needing indirect restorations require the same steps, which include Operative Case Complete, Occlusal Exam, Fixed Pros Treatment Planning & Sequencing.** The steps must be done in the order described above. With careful planning, several of these steps can be accomplished at the same clinical appointment. The approved and sequenced treatment plan will then provide a “road map” for students and faculty for completion of all indirect procedures.

## VII. PREDOCTORAL IMPLANT PROSTHODONTIC PROTOCOL

---

### A. Guidelines for Patient Selection

1. Treatment Planning:
  - a. The use of an implant-supported restoration is the treatment of choice for the replacement of a missing tooth or teeth. In the pre-doctoral clinic, implant treatment will be limited to: 1) replacement of 1 or 2 missing anterior or posterior teeth, or 2) treatment with an implant-supported overdenture.
  - b. There must be adequate bone height to accept a 10 mm or longer implant as measured from the osseous ridge crest to the limiting anatomic landmark (e.g. inferior alveolar canal, maxillary sinus, mental foramen, nasal floor etc.)
  - c. There must be a minimum of 7 mm mesio-distal width between the proximal surfaces of adjacent teeth (4 mm for the implant, 1.5 mm space on either side). The edentulous ridge must have sufficient facial-lingual, facial –palatal width to allow for peri-implant circumferential bone.
  - d. Patient must have an acceptable occlusal plane and adequate interarch space (minimum of 4 mm measured from soft tissue to marginal ridge of adjacent tooth).
  - e. Patient must be in good health ASA I and ASA II and able to undergo a surgical procedure (if there are patient health concerns, consult with the surgeon).
  - f. Patient must have acceptable oral hygiene.
  - g. Exclusion criteria: 1. anterior locations with demanding esthetic needs, 2. restorations cannot be made to connect an implant to a natural tooth (e.g. FPD). 3. deficient ridges/pneumatized sinuses etc. that require augmentation/grafting at the time of implant placement. Healed stable augmented sites may be acceptable.
2. All partially edentulous patients to be considered for dental implant therapy must have appropriate and current diagnostic radiographs. The radiographs should reflect the appropriate anatomic detail needed for planning implant placement at the designated site(s), and adjacent anatomic areas as they exist at the time of the implant evaluation(s). This will include but not limited to current periapical and panoramic radiographs, lateral cephalometric radiographs, tomograms, or cone beam CT scans of the intended region(s) for restoration.
3. Patients must be examined for implant suitability by designated faculty (Abreu, B. Brackett, Chesla, Ivan, Londono, Metzler, Myers, Sananez) prior to referral to the departments of Oral and Maxillofacial Surgery (OMS), Periodontics, or Oral Rehabilitation for implant surgery. This must be documented in the patient's record. The patient will then be referred to the appropriate department for implant placement. The distribution of implant patients will be made on a rotating basis with every third patient being sent to the above mentioned departments. Assignment of implant cases will be managed by the Office of Patient Services (Student Contact: Tammy Rodriguez). Patient Services will establish the

department reservation, issue a referral request, and monitor the procedure complete status. A database will aid in tracking dental implant patients and to collect data on patient assignment, treatment dates, and implant survival rates.

4. If the department to which the patient is referred cannot examine, do the appropriate clinical work-up, and schedule for surgery within four weeks, the patient will be redirected to the department next in the rotation sequence to receive an implant patient. The treatment will be sequenced in coordination with all other indirect restorations using the designated sequencing form.
5. Immediate implant placement - If the patient elects to extract in a viable implant site prior to the usual sequencing and fixed prosthetic treatment planning i.e. during phase I or II (phase III being all fixed and removable treatment), the patient should be presented to the Department of Oral Rehabilitation for a focused examination of the extraction/implant placement site. Once approval is granted, the patient will be assigned to the designated clinic for extraction and immediate implant placement. Restoration of the site will be pending specific treatment recommendations of the Department of Oral Rehabilitation, or following the usual fixed prosthetic treatment planning and sequencing.
6. Implant surgery will be performed by or under the supervision of Drs. Stevens, Ferguson, Kao, or Salgueiro in the department of OMS; Drs. Krishna, or Stern in the Department of Periodontics; Drs. Pruett, Hamilton, Coleman or Martone in the General Practice Residency Program. Students should observe and/or assist in the surgical procedure, if possible.
7. Mounted diagnostic casts may be required. A diagnostic wax-up or tooth set-up of the intended restoration may be required for radiographic and surgical guide-stent construction. Students should interface with the surgeon to determine their preference.
8. Implants requiring a two-stage surgical technique will be returned to the restoring student dentist with a flared healing abutment in place.
9. Students should consult with a Fixed Pros faculty for ordering of the components necessary to complete the restoration. Implant components may be ordered from the 2nd floor Lab Tracking Dispensary using a supply requisition.
10. An implant-level impression utilizing a custom or stock impression tray will be completed before abutment selection or any necessary modifications to the emergence profile. An abutment selection kit is available from the 3rd floor dispensary for stock abutment selection, however a custom abutment is the usual choice.
11. Implants must be restored with a provisional restoration. This is necessary to determine the appropriate occlusal design and to evaluate the contour, emergence profile, esthetics, and oral hygiene access. After a trial period of use by the patient, a cast made from an impression of the provisional restoration must be submitted to the lab to serve as a guide for fabrication of the definitive prosthesis.

# VII. PREDOCTORAL IMPLANT PROSTHODONTICS PROTOCOL

---

## **B Clinical & Laboratory Protocol for Implant Restoration**

### *First appointment*

The clinical department that placed the implant will determine when adequate time has elapsed following 2<sup>nd</sup> stage (abutment) surgery in order to initiate the prosthodontic treatment. This must be documented with a note in the Axiom record.

- a. The implant treatment should have been sequenced like any other indirect restoration. Prior to the first appointment, obtain the appropriate size impression coping from the Lab Tracking dispensary (2<sup>nd</sup> floor).
- b. At the proper time in the sequence, schedule patient in Fixed clinic. Check out the implant prosthetic kit from dispensary.
- c. Using the hand-driver, remove the healing abutment. Place the impression coping in place and hand-tighten the screw with the hand-driver. Have faculty verify coping placement (usually requires a radiograph).
- d. Evaluate the impression tray for clearance with the top of the impression coping. Modify if needed. Make impression of impression coping and adjacent structures.
- e. Remove impression coping and replace the original healing abutment.
- f. Make an IOR and select porcelain shade, if needed, and dismiss patient.

### *Lab steps*

- a. Attach implant replica to impression coping and insert coping into impression.
- b. Place ring of GI Mask material around replica to make a soft-tissue cast.
- c. Pour impression with die stone (removable dies not needed).
- d. Separate cast from impression, remove impression coping, and articulate cast (or pour IOR if using quadrant technique).
- e. Evaluate emergence profile with supervising faculty and modify if necessary.
- f. Obtain temporary abutment(s) from the Lab Tracking dispensary (2<sup>nd</sup> floor).
- g. Block out undercuts as needed and make the provisional restoration(s).

### *Second Appointment (1)*

- a. Remove healing abutment.
- b. Adjust proximal and occlusal contacts of provisional implant restoration(s), as needed. Adjust soft tissue for emergence profile as needed. Hand tighten screw(s). Evaluate occlusion, contour, emergence profile, esthetic result, embrasure form, access for oral hygiene, etc.
- c. Make an impression of restoration and pour in cast stone.
- d. Provide OHI and allow patient to function with prosthesis for 1-2 weeks.

### *Second Appointment (2)*

- a. Call patient after wearing provisional one to two weeks and inquire about their function, satisfaction, and ability to perform oral hygiene. If appropriate, document patient's acceptance in the Axium record. If the patient is having problems or dissatisfied, this appointment will be to rectify the provisional to their satisfaction. When this is accomplished, make a new impression of the provisional.
- b. When clinical criteria are acceptable, complete lab steps.

### *Lab Steps*

- a. Consult with supervising faculty to select the appropriate abutment. Most often this will be a CAD/CAM generated titanium custom abutment. However, if a stock abutment is chosen, check out abutment selection kit from 4th floor clinic dispensary and complete a supply requisition and obtain abutment from the Lab Tracking dispensary (2<sup>nd</sup> floor).
- b. Modify stock abutment, if needed, as directed by faculty. Complete work authorization and submit case to lab with abutment to have restoration fabricated.
- c. Include cast of provisional restoration for technician to use as guide.

### *Third appointment*

- a. Check out implant prosthetic kit from clinic dispensary. Remove provisional restoration.
- b. Discard lab screw from custom abutment and replace with definitive screw if applicable. Place abutment and hand tighten.
- c. Try-in crown (adjust proximal contacts, evaluate margins, etc.). Begin adjusting occlusion.
- d. When occlusion is nearly correct and all other aspects of crown are correct, have faculty evaluate crown. Tighten the abutment screw with torque driver to 35 Ncm.
- e. Complete occlusal adjustment of crown. Verify margins, proximal contacts, occlusion, esthetic result, etc. Obtain pre-cementation evaluation by faculty.
- f. Fill abutment screw access hole as directed and cement implant crown. Remove excess cement and give oral hygiene instructions to patient.

## VIII. FIXED PROSTHODONTIC LABORATORY PROCEDURES

---

### A. Required Items for Laboratory Cases

1. Mounted working cast with removable working dies
2. Mounted opposing cast & un-mounted solid cast
3. Final impression (student's & patient's names on tray handle), Interocclusal record
4. Work authorization
5. Implants or FPD – Cast of provisional restoration that has been “tested” in mouth
6. Custom incisal guide table (when indicated)
7. Anterior restorations – Mounted cast of provisional restorations (if needed, pre-op diagnostic cast, mounted duplicate of diagnostic wax-up)



# VIII. FIXED PROSTHODONTIC LABORATORY PROCEDURES

---

## B. Guidelines for Laboratory Submission

### 1. Cast Requirements

- a. Complete arch casts are requested for all restorations, although exceptions may be necessary.
- b. Casts must be accurate, neatly trimmed, with non-porous surface free of voids and blebs, especially on occlusal surfaces. Discrepancies or soft tissue interferences should be corrected.
- c. Casts must be made from the appropriate artificial stone: working cast in Type IV die stone (Jade Stone) and opposing cast in Type III stone (Microstone).
- d. Opposing cast must be current (<1 month) reflecting any changes that have occurred.
- e. Solid cast from 2nd pour should have margins cleared and accessible.
- f. Cast of acceptable provisional restorations is required for implant restorations and FPDs. This cast is made from an impression of the provisional restoration after it has been in function in the patient's mouth for a trial period. Patient should have approved of occlusal design, contour, esthetics, pontic design, embrasure form, etc. For anterior restorations, a cast of the acceptable provisional restorations also provides the best guide.
- g. Diagnostic wax-up cast should show: a) morphology or desired changes, b) alignment in relation to adjacent teeth, c) occlusion design, and d) pontic design.
- h. Student's name must appear on the mounting stone or on the side of every cast submitted.

### 2. Die Requirements

- a. One set of dies is preferred; using multiple dies usually results in a substandard casting.
- b. The working die(s) must be independently removable from the working cast. The edentulous ridge (especially at connector sites adjacent to the abutment teeth) must be preserved when the die is separated from the cast. Complete seating of die(s) onto the working cast is mandatory (steam-clean the die/base interface, if necessary). The apical end of the dowel pin must be exposed through the base and must possess a common long axis with the coronal portion of the die. The dies must be stable (trim the first pour to a thickness of 10 mm measured from the preparation margin to the base).
- c. Individual dies must be defect free, without undercuts, and demonstrate complete and definite margins. Dies must not be weakened by extensive ditching. There must be a 6 mm vertical removal of stone below the margin that conforms to the approximate root contour. This aids in establishing the correct emergence profile,

a pattern that is waxed exactly to the margin, and provides accessibility for finishing the margin.

- d. Dies must have margins marked with non-indelible colored pencil (use the side, not point, of a red wax pencil). It should be a fine, continuous line.
- e. The lab technician will apply die blockout, if needed, and die spacer and hardener.
- f. Exceptions: working casts for cast post & cores do not need removable dies.

### **3. Articulator Requirements**

- a. Casts must be neatly mounted. If the Stratos articulator is indicated, use the protrusive or lateral records to set HCG.
- b. It is not necessary to provide the Stratos articulator to the laboratory with the case, only the mounted casts. The patient's HCG should be written on the maxillary cast. It is necessary to provide the Keystone "hinge" articulator if the case is on one of them. Record the number of the articulator on the lab Rx.
- c. A custom incisal guide table (CIGT) is required on each patient where the tooth or teeth being restored will participate in protrusive or lateral guidance.
- d. Exceptions: Working casts for inlays and cast P&C do not have to be mounted on an articulator if the opposing cast can be "hand articulated" to establish occlusal clearance when waxing. When indicated and prescribed during the Fixed Pros Tx Plan & Sequencing, the working cast may be mounted on a hinge articulator.

### **4. Work Authorization**

- a. The work authorization is to be completed by the student, then reviewed and signed by the full time faculty member who approved the final impression. Also complete the Axium lab form.
- b. The following items should receive special attention on the work authorization:
  - 1. Shade selection: description of special characterization or combination of multiple shade tabs, photos.
  - 2. PFM facial margin design: metal or porcelain & if metal collar, how wide? (e.g. 0.5 mm)
  - 3. Pontic design (modified ridge lap, etc.), porcelain coverage design
  - 4. Metal to be used (Type II, Type III, Nobel ceramic, Non-noble)
  - 5. Return stage (metal try-in, bisque bake stage, finished, etc.)
- c. Survey crowns require survey and tripodding of working cast, survey crown design specifications, and signature approval by a removable prosthodontic faculty.

## VIII. FIXED PROSTHODONTIC LABORATORY PROCEDURES

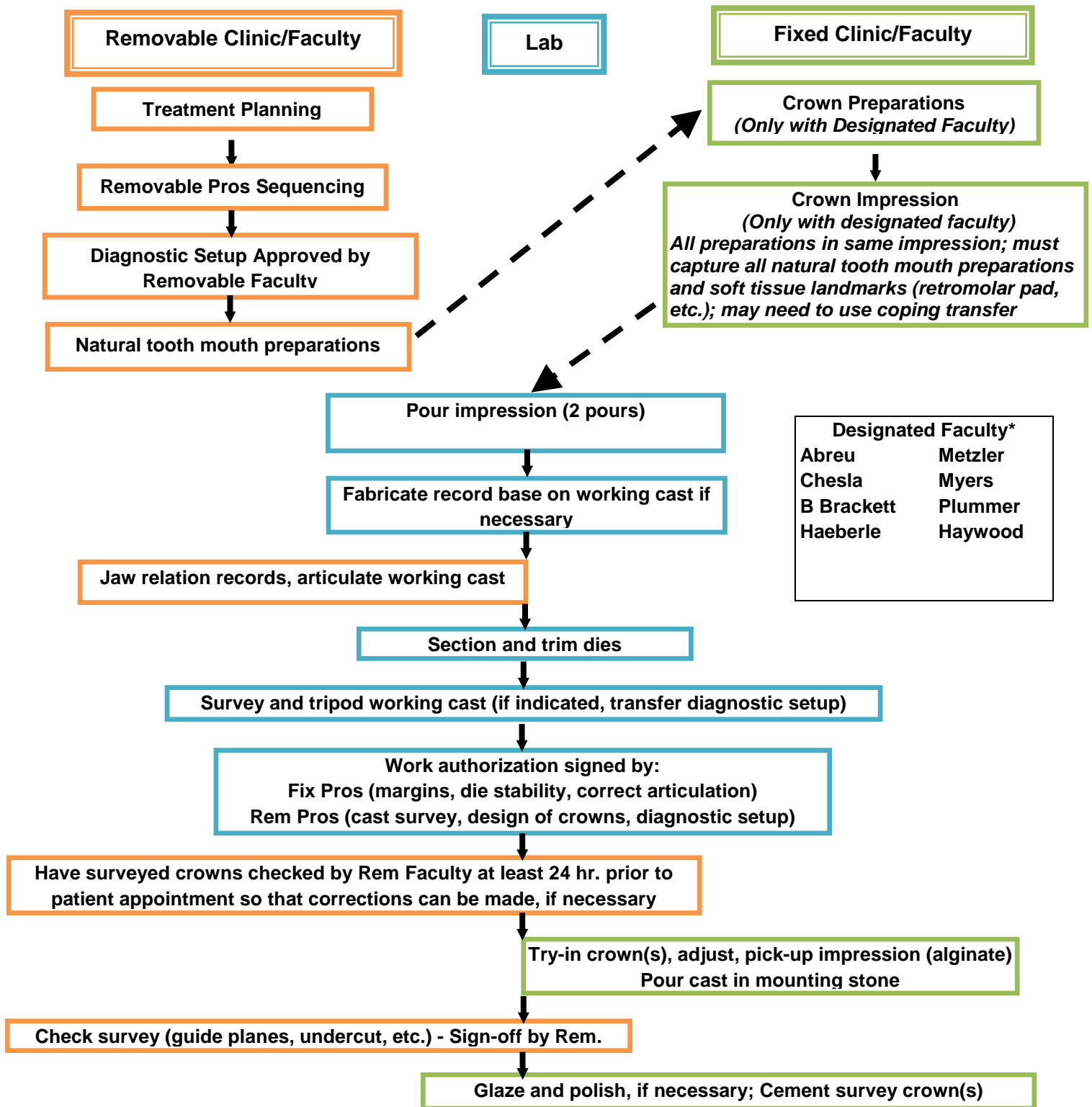
---

### C. General Information

1. Cases will be turned in for fabrication and returned to the student at the Lab Tracking dispensary (2<sup>nd</sup> floor).
2. The laboratory has the obligation to return any case that will not allow the fabrication of a quality restoration (i.e. insufficient tooth reduction, substandard dies, occlusal plane discrepancies and incorrect articulation). Rejected cases will be returned through the Lab Tracking dispensary.
3. Single unit PFMs will be returned glazed unless specified otherwise. PFM FPDs will be returned for framework try-in prior to porcelain application.
4. **Restorations should be carefully inspected prior to the try-in appointment.** Marginal adaptation, occlusal & proximal contacts, contour, esthetics, surface finish, and fit of frameworks can be evaluated. The restoration should be evaluated on both the working & solid casts. Any needed changes can be made at the direction of a faculty member **prior** to the appointment. These changes can be made by the lab technician in most cases or by the student in some cases. This step can significantly reduce chair-time at the delivery appointment as well as insure that the restoration will be successfully cemented. The restoration must be disinfected before try-in.
5. The returned work authorization must be brought to the delivery appointment. The technician will use this to provide information that may be needed for try-in and cementation (e.g., opposing tooth adjusted to provide clearance, low fusing porcelain used for restoration, etc.).
6. All clinical laboratory procedures NOT authorized to be performed by an outside lab MUST be completed by the patient's assigned student clinician. Examples of procedures in this category include:
  - a. Diagnostic wax-ups
  - b. Fabrication and articulation of fixed prosthodontic working casts
  - c. Implant surgical guides
  - d. Pre-pros surgical guides
  - e. Implant provisional restorations
7. Clinical laboratory procedures authorized to be performed by an outside lab may be completed by a student or their designee (i.e. classmate). HOWEVER, the assigned student is responsible for the quality of the work and for obtaining the required QUALITY ASSURANCE CERTIFICATION at least 24 hours before the clinical appointment. Please see the Clinical Syllabus or Manual for specific information on QA procedures. Examples of procedures in this category include:
  - a. Fabrication of Record Bases and Occlusion Rims
  - b. Fabrication of Custom Trays
8. The Associate Dean of Patient Services and the departments of Oral Rehabilitation and General Dentistry consider any breach in this policy as a serious Student Code of

Conduct violation and that both the assigned student clinician AND the student performing the unauthorized laboratory service should be held accountable for their inappropriate actions.

# IX. CLINICAL AND LABORATORY PROTOCOL FOR RPD SURVEY CROWNS





# Junior Clinic CAD/CAM Restorations

## Guidelines, Protocol and Technique



Case Selection  
Treatment Planning  
Preparation Guidelines  
Provisionalization  
Lab Work and Flow  
Delivery and Cementation  
Armamentarium

# Case Selection

The following are guidelines for selecting cases for CAD/CAM Restorations:

- 1. No Second Molar restorations**
- 2. Ability to Isolate area with a Rubber Dam**
- 3. Ideally Margins need to be in Enamel and Located Supragingivally**
- 4. Limited Shade Ranges Available**  
(Generally the lab carries A1-A3, B1-B2, C1-C2, D2)



# Treatment Planning

All E4D (CAD/CAM) Restorations need to be in Phase 3 Treatment Plans. These types of restorations fall under the same general guidelines for ANY Fixed Prosthodontic treatment.

If, while removing a restoration during a Phase 2 or Phase 3 procedure , you and your faculty decide that a CAD/CAM restoration is a better treatment option, then the following should be done:

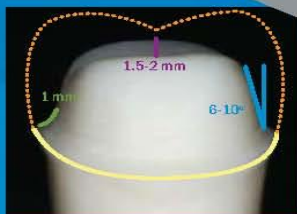
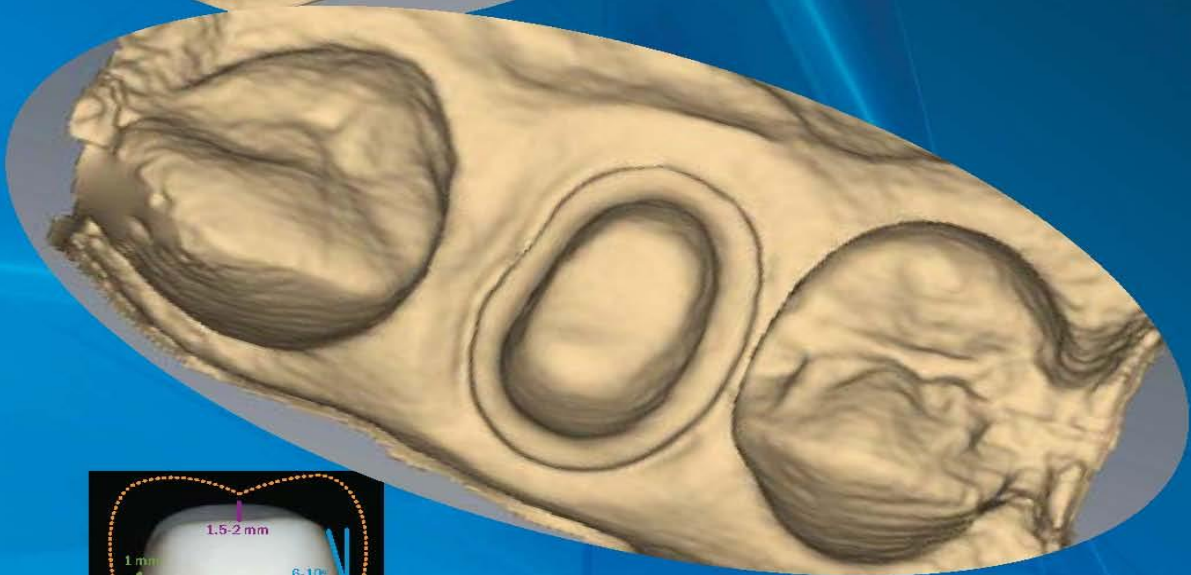
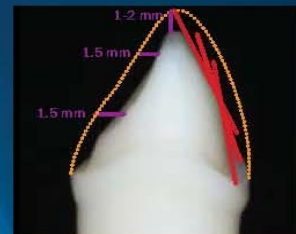
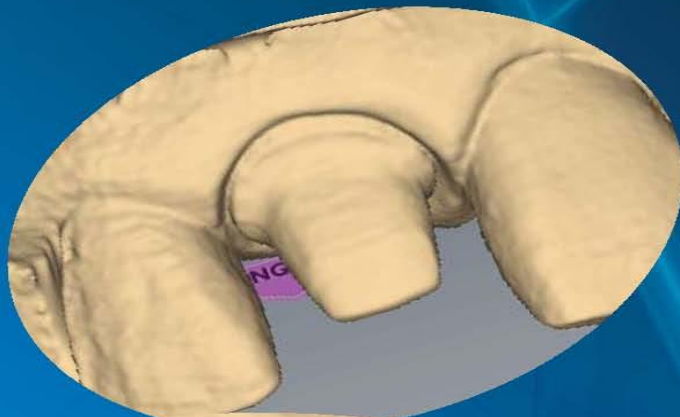
1. Inform your patient of the change in the Treatment plan and get Verbal consent for the change
2. Make a new Phase 3 plan reflecting the change
3. Provisionalize the tooth and complete any needed Phase 2 treatment and then follow the standard protocol for dealing with Phase 3 care.



# Preparation Guidelines

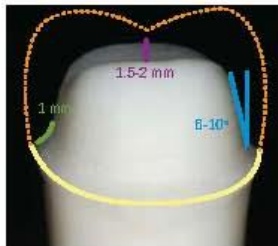
## PREPARATION GUIDELINES

PREPARATION DESIGNS AND TISSUE MANAGEMENT  
RECOMMENDED FOR E4D DENTIST® FOR OPTIMAL  
SCANNING, DESIGNING, AND MILLING



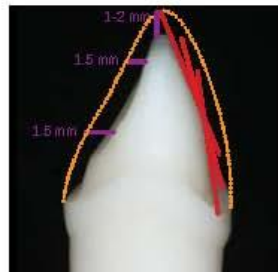
# CROWN PREPARATION GUIDELINES

## IDEAL CROWN PREPARATION



### IDEAL POSTERIOR RESTORATION

Rounded internal angles  
Reduction 1.5-2 mm and 1 mm at the margin  
Heavy chamfer, shoulder, or butt joint margins  
6-10° taper



### IDEAL ANTERIOR RESTORATION

Facial and lingual reduction 1-1.5 mm  
Incisal reduction 1-2 mm  
Reduction at the margin 1 mm  
6-10° taper  
Chamfer, shoulder margin  
Prep should follow three plane reduction based on natural anatomical shape

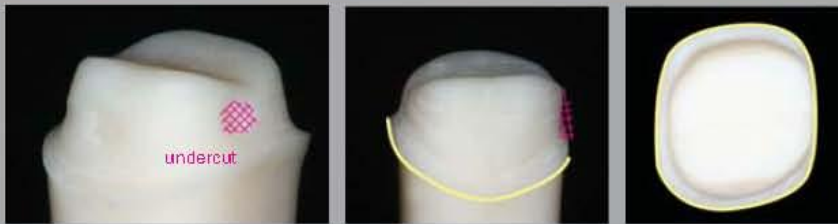
## PREPARATION ASPECTS TO AVOID



### AVOID FEATHER EDGE MARGINS

Because of possible milling complications and material limitations, feather edge margins on full coverage restorations should be avoided. If necessary, compensate by adding additional material thickness at the margin to avoid causing ragged or shy margins.

## PREPARATION ASPECTS TO AVOID ... continued



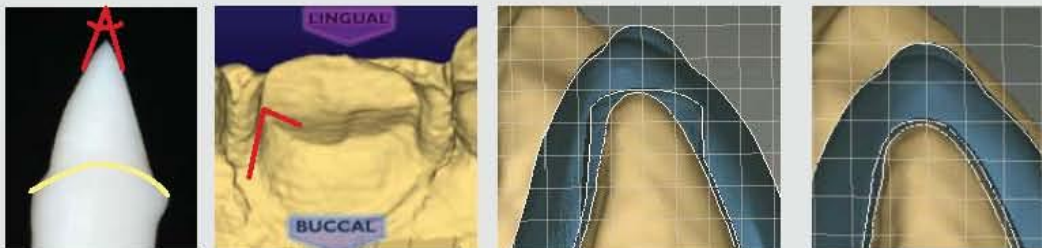
### AVOID UNDERCUTS

Presence of undercuts could cause insufficient material thickness in the areas where the undercuts were blocked.



### AVOID ANGLED PREPS

This type of prep might present challenges for Autogenesis® and also for milling. Ensure the entire margin can be seen from the occlusal.



Lower anterior Sharp angles

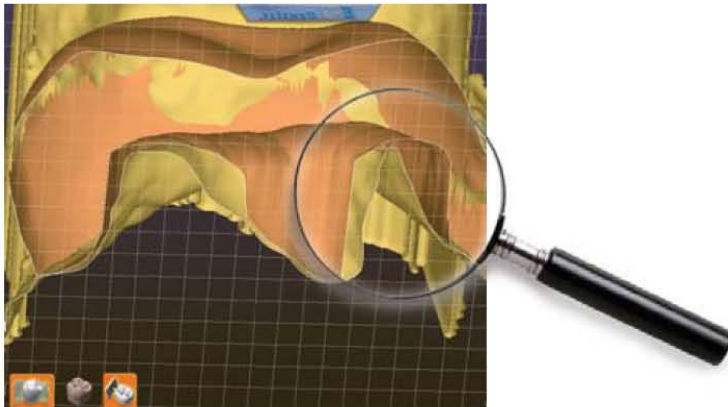
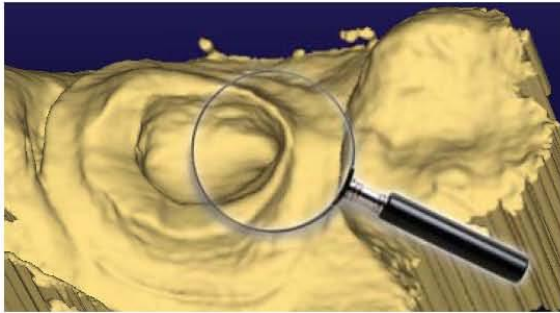
Overmilling

Detailed mode  
(conical bur)

### AVOID SHARP ANGLES

If the diameter of the bur is larger than a section of the prep, overmilling will occur. This can happen in cases like lower anterior preps or when angles in the prep are not rounded. Overmilling will be reduced when using Detailed mode (conical bur).

## PREPARATION ASPECTS TO **AVOID** ... continued

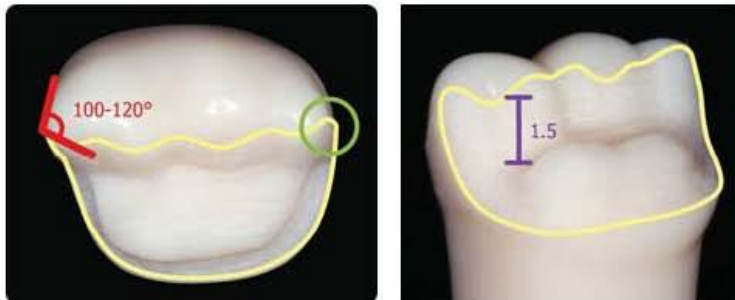


### **AVOID THIN WALL ENDO PREPS**

When treating endo preparations, avoid leaving thin walls which could cause possible fractures of these areas over time. Also make sure that the access area is not smaller than 1.5 mm to avoid material failure.

# INLAY ONLY PREPARATION GUIDELINES

## IDEAL PARTIAL PREPARATION



Margins should have sharp edges for easy identification

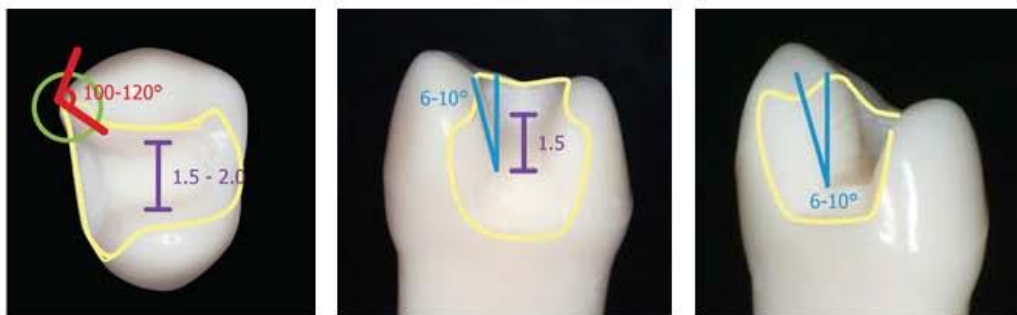
Occlusal reduction >1.5 mm

Internal axial walls 6-10°

Rounded internal line angles

Interproximal flare 100-120°

Butt joint margin



Margins should have sharp edges for easy identification

Occlusal reduction (1.5-2.0 mm)

Internal axial walls 6-10°

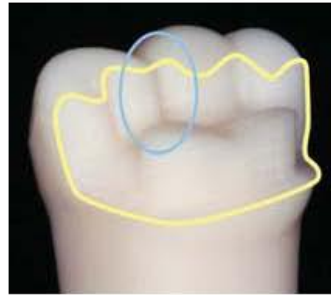
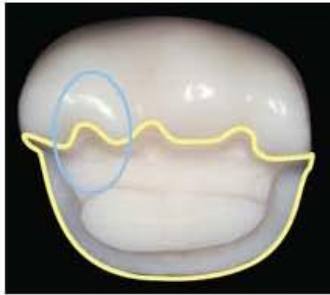
Rounded internal line angles

Interproximal flare 100-120°

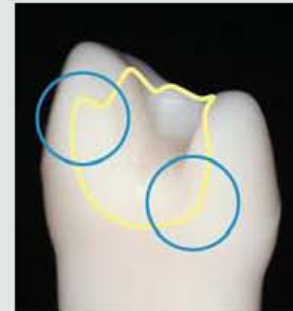
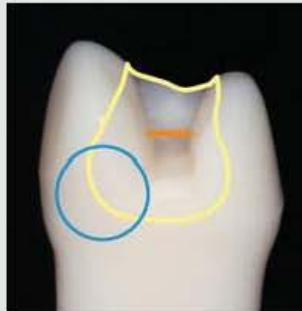
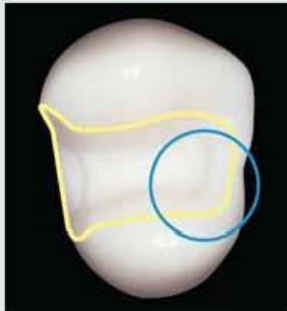
Isthmus width 1.5-2.0 mm

Isthmus depth >1.5 mm

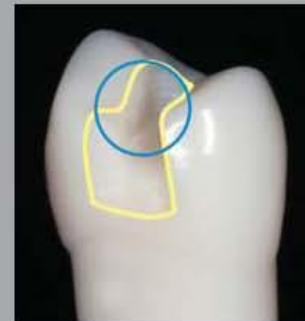
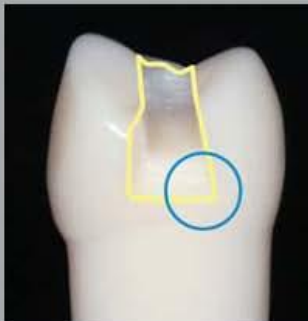
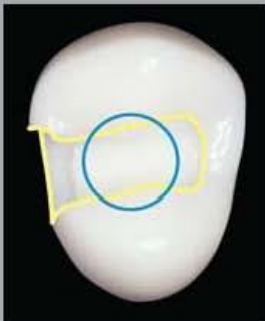
## PREPARATION ASPECTS TO AVOID



To avoid **overmilling**, occlusal margin design following existing occlusal anatomy cannot be smaller than 1 mm in diameter.



Feather edge margins will lead to **thin ceramic margins** which might mill inadequately causing **ragged or shy margins**.



Parallel walls and sharp internal line angles will cause **binding and incomplete seating**. Interproximal undercuts will cause **overmilling and open margins**. Insufficient isthmus width will cause a **weak restoration**.

# VENEER PREPARATION GUIDELINES

## IDEAL VENEER PREPARATIONS



Flat incisal edge



### VENEER PREPARATION

A medium grit, round-ended, diamond bur is used to prepare uniform thickness on the facial enamel.

**Depth cuts of 0.5 mm to 0.8 mm\***

**Incisal reduction 1.0 mm to 1.5 mm if needed**

\*Please note: For additional masking capabilities and/or layering techniques, further reduction may be necessary.



Over incisal edge



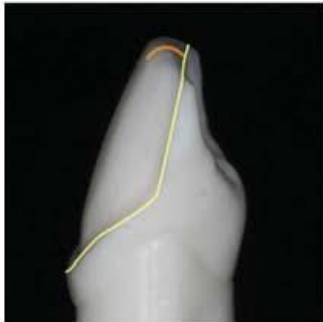
Window




### CHAMFER MARGINS

Correct preparation of the chamfer margins interproximally allows the appropriate bulk of porcelain.

## PREPARATION ASPECTS TO AVOID



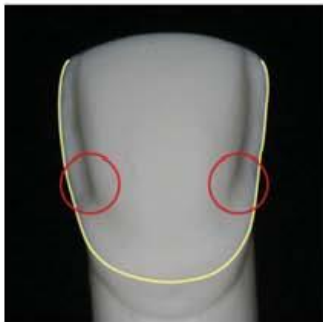
 = rounded edge

 = undercuts

 = insertion axis

Round incisal edge

This type of preparation with rounded incisal edges may cause hang-ups or chipping of the margin.



No undercuts

This type of preparation with undercuts may cause a bad proposal on Autogenesis™ due to inaccurate insertion axis.



# Provisionalization

## Non-Retentive Ceramic Provisionalization

### Technique

1. Prepare tooth following guidelines for material and tooth conservation. Make sure to round all interior line angles and margins are around 1mm in thickness. Place base as necessary (preferably using Vitrebond)
2. Immediate-dentin sealing. Notice the term dentin. After preparation is completed, acid etch dentin for 15 seconds then follow the instructions for Optibond FI confining placement to dentin only (Try to stay away from enamel margins).
3. Use **ethanol** to remove oxygen – inhibited layer, finalize prep (**Enamel margin re-finishing** needed to remove excess bonding agent)
4. Make final impression using PVS material following traditional techniques and protocols
5. **Apply Pro-V Coat (Bisco) to the entire preparation and air dry for 10-15 seconds**
6. Use a **vacuum-formed** matrix (or other matrix material) to make a bis-Acryl (Integrity) temporary. Remove temporary just before final polymerization occurs. Remove Pro-V Coat using **ethanol** *just in the area where you will be placing flowable (no more than a 2-3mm diameter)*. NOTE: If you desire you can remove all of the separating medium and reapply except in the area where flowable will be placed.
7. Make a 3mm diameter internal retention groove on the intaglio surface of the temporary. Place a small (**3 mm max**) spot of flowable composite on the intaglio surface of the temp.
8. Place restoration into the preparation and light cure for 20 seconds.
9. Remove provisional at the delivery appointment and ensure flowable composite has been removed. Use Ethanol to remove Pro-V coat and then follow manufacturers recommendation for adhesively bonding ceramic to the preparation.

# Lab Work and Flow

**The Lab Work and Flow process for a CAD/CAM restoration is very similar to a traditional Indirect restoration with a few exceptions:**

1. After your final impression make a Bite registration of the preparation in Maximum Intercuspatation (“Please close your teeth together and hold them tight”)
2. Mount case on articulator following your D9450 sequencing guidelines. Pour up final impression and make a die just of the preparation (Slug die)
3. Bring case to faculty for CAD/CAM design and milling (email them to request availability)
4. After case is milled, try restoration on the Slug die for fit and margin check. Fill out the GHSU Fixed Lab slip and turn case into Dr. Chesla for a QA check. See next page for sample Lab Script.
5. Case will be sent to Brian Rucker in the Production Lab for final sintering and glazing.
6. After receiving the case back from the Lab you may then schedule your patient for delivery

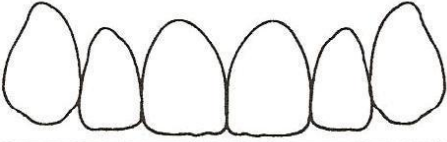










# Lab Work and Flow

MCG School of Dentistry

Lab Case #: \_\_\_\_\_

## WORK AUTHORIZATION

QA Approval: \_\_\_\_\_  
IN OUT

Patient Name & Number: <b>John Doe, 210123</b>		Student Name & Number: <b>Jane Doe, S14D01</b>	
Case Description: <b>eMax onlay #14</b>		Incoming Date: <b>Date submitted</b>	Finish Date: <b>Date needed</b>
Shade No. <b>A2</b>		Disinfection #:	
		<b>Design:</b> ANTERIOR: <input type="checkbox"/>  Metal Lingual (Metal MI Contact) <input type="checkbox"/>  Porcelain Lingual (Porc. MI Contact)	
		POSTERIOR: <input type="checkbox"/>  Metal Occlusal w/Porc. Buccal Cusp <input type="checkbox"/>  Metal Occlusal incl. Buccal Cusp	
<b>Metal:</b> <input type="checkbox"/> Type II <input type="checkbox"/> Type III <input type="checkbox"/> HN Ceramic <input type="checkbox"/> Non-noble		<input type="checkbox"/>  Metal Coping w/full Porcelain Occlusal <input type="checkbox"/>  All metal	
<b>Pontics:</b> <input type="checkbox"/>  Modified ridge lap <input type="checkbox"/>  Bullet (egg) <input type="checkbox"/>  Sanitary (hygienic)		<b>PFM Facial Margin:</b> <input type="checkbox"/> No visible metal collar <input type="checkbox"/> Metal collar _____ mm wide <input type="checkbox"/> Porcelain shoulder margin	
<b>Return Stage:</b> <input type="checkbox"/> As-cast <input type="checkbox"/> Metal Try-in <input type="checkbox"/> Bisque Bake <input checked="" type="checkbox"/> Finish			
Specific Instructions: Please correct any discrepancies to seating and then stain, glaze and sinter eMax restoration per manufacturers instructions. Return with occlusion adjusted and ready for try-in.			
Thank you!			
Student Signature: 		<b>Enclosures:</b> <input checked="" type="checkbox"/> Solid Cast <input checked="" type="checkbox"/> Impression <input checked="" type="checkbox"/> IOR <input type="checkbox"/> Diagnostic Wax-up <input type="checkbox"/> Preop Cast <input type="checkbox"/> Custom Incisal Guide Table <input type="checkbox"/> Implant Components <input type="checkbox"/> Rem Pros Faculty Approval	
Faculty Signature: _____			
FOR LAB USE ONLY:			
TECHNICIAN SIG.: _____			
<b>FOR BUSINESS OFFICE USE ONLY:</b> Charged to patient account _____ Amount issued: _____ Issued amt received by: _____ Issued by: _____ Date: _____		Payment to patient account _____ Returned button weight: _____ Returned crown weight: _____ Returned by: _____ Received by: _____ Date: _____	

# Armamentarium

## ONLY DELIVERY AND CEMENTATION

- MATERIALS NEEDED
  - DISPENSARY
    - DUO-LINK SE KIT (get from Dr. Brackett or Dr. Furness)
    - FPROS INSTRUMENT CASSETTE
    - OPER INSTRUMENT CASSETTE
    - SLOW SPEED HAND PIECE
    - HIGH SPEED HANDPIECE
    - RUBBER DAM KIT
    - CROWN DELIVERY BUR BLOCK
    - OCCLUSAL ADJUSTMENT BUR BLOCK
    - LC BLOCK OUT (BLUE)
    - MICROETCHER
  
  - OCCLUDE
  - FIT CHECKER
  - ARTICULATING PAPER
  - ACU-FILM
  - SHIMSTOCK
  - 32% PHOSPHORIC ACID ETCH
  - ASTRINGEDENT
  - VASELINE
  - 2 X AIR WATER SYRINGE
  - BARRIERS + SUCTIONS KIT
  - ALCOHOL WIPES
  - DRY ANGLES
  - RUBBER DAM + WEDGETS
  - ANESTHETIC + TIP

# Delivery and Cementation

- PROCEDURE:
  - ANESTHETIZE PATIENT
  - REMOVE ONLAY
    - Also,
      - Remove any remaining adhesive / bonding agents left on the tooth
  - ONLAY SEATING STEPS
    - ADJUST
      1. PROXIMAL CONTACTS
        - Insure that Floss does not shred
        - Adjust accordingly
      2. INTERNAL
        - Spray Occlude 1st on the intaglio surface
        - Then Place fit Checker
      3. EXTERNAL
        - With Explorer
      4. OCCLUSAL
  - PREPARATION of RESTORATION for CEMENTATION
    - CLEAN ONLAY RESTORATION with ALCOHOL WIPE
      - To remove any Organic Decontaminants
    - MICROETCH ONLAY on INTAGLIO SURFACE
      - With Microetcher
    - ETCH ONLAY on INTAGLIO SURFACE
      - With HF ETCHANT
        - RINSE + DRY
    - APPLY SILANE PRIMER onto INTAGLIO SURFACE and DRY
      - ALLOW to DWELL for 30 SECONDS
      - DRY with AIR SYRINGE for 3-5 SECONDS



# Delivery and Cementation

- TIP for ADHESIVE CEMENTATION of ONLAY
  - PLACE RESTORATION ONTO SOLID CAST
  - PLACE LC BLOCKOUT ONTO OCCLUSAL SURFACE of RESTORATION
  - PLACE SPOON EXCAVATOR INSTRUMENT (or any other instrument you wish to use) into the LC BLOCKOUT
    - INSURE the CORRECT ORIENTATION of the INSTRUMENT and RESTORATION
      - The spoon excavator will be used as a long handle to allow placement and correct delivery of onlay
  - LIGHT CURE LC BLOCKOUT with the SPOON EXCAVATOR INSTRUMENT in IT
    - Now you have a long handle for your restoration!
- PREPARING TOOTH PRIOR to CEMENTATION
  - PLACE RUBBER DAM
  - MICROETCH OCCLUSAL SURFACE
    - With Microetcher
  - RINSE + DRY ISOLATED PREPARATION
  - ETCH TOOTH with
    - 32% PHOSPHRIC ACID ETCHANT
      - 15 seconds, then Rinse thoroughly



- DISPENSE an EQUAL NUMBER of DROPS
  - 1:1 RATIO of ALL BOND SE I + ALL BOND SE II
    - Into MIXING WELL



# Delivery and Cementation

- Using a BRUSH
  - MIX UNTIL UNIFORMLY PINK



- IMMEDIATELY APPLY
  - 1-2 COATS
    - To the DRY PREPARATION
    - AGITATE EACH COAT for 5-10 SECONDS
- GENTLY but THOROUGHLY AIR DRY all SURFACES to REMOVE SOLVENT
  - SURFACE should APPEAR SHINY
  - OTHERWISE
    - REAPPLY and DRY



- LIGHT CURE for 10 SECONDS



# Delivery and Cementation

- CEMENTATION of RESTORATION
  - Fill in the INTERNAL SURFACE of the RESTORATION
    - With DUO LINK



- IMMEDIATELY SEAT the RESTORATION
  - With GENTLE, PASSIVE PRESSURE
  - 2 MINUTE WORKING TIME
- REMOVE ANY EXCESS CEMENT
- LIGHT CURE EACH SURFACE of THE RESTORATION



- CHECK RESTORATION in the MOUTH
  - CHECK
    - OCCLUSION
      - Check with Articulating paper and adjust accordingly
    - MARGINS
      - Check with Explorer
        - Margins should be smooth and indistinguishable from tooth surface
    - INTERPROXIMALLY
      - Use knots in Floss
  - ADJUST ACCORDINGLY
- POLISH RESTORATION



# Delivery and Cementation

- PROCEDURE:
  - ANESTHETIZE PATIENT
  - REMOVE ONLAY
    - Also,
      - Remove any remaining adhesive / bonding agents left on the tooth
  - ONLAY SEATING STEPS
    - ADJUST
      1. PROXIMAL CONTACTS
        - Insure that Floss does not shred
        - Adjust accordingly
      2. INTERNAL
        - Spray Occlude 1st on the intaglio surface
        - Then Place fit Checker
      3. EXTERNAL
        - With Explorer
      4. OCCLUSAL
  - PREPARATION of RESTORATION for CEMENTATION
    - CLEAN ONLAY RESTORATION with ALCOHOL WIPE
      - To remove any Organic Decontaminants
    - MICROETCH ONLAY on INTAGLIO SURFACE
      - With Microetcher
    - ETCH ONLAY on INTAGLIO SURFACE
      - With HF ETCHANT
        - RINSE + DRY
    - APPLY SILANE PRIMER onto INTAGLIO SURFACE and DRY
      - ALLOW to DWELL for 30 SECONDS
      - DRY with AIR SYRINGE for 3-5 SECONDS

