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Didactic Material for Orthodontic Banding

Sizing, Fitting, Cementing, Removing Orthodontic Bands

An orthodontic band is a thin seamless metal cylindrical ring, usually made of stainless steel, which serves to bind orthodontic attachments to a tooth. Modern bands are mostly placed on the maxillary or mandibular molars. Bands are also placed on other teeth with a surface or shape that will not accept a bonded bracket. Some orthodontists prefer placing bands on mandibular premolars as these teeth have a higher incidence of bracket bond failures during treatment. Often, a pre-welded bracket can be seated more gingivally with a band than possible with bonding.

Before brackets could be bonded directly to enamel, orthodontic bands were the standard means to attach appliances to **all** the teeth. Bands encircle the tooth and rely on both a close customized fit and a luting cement to keep them firmly in place. The luting cement fills and seals the irregular spaces between the actual band and the tooth surface. Luting cements don't typically adhere to either the tooth or band material well but some of the newer banding cements do have good adhesive characteristics.

With the advent of bondable brackets, the universal use of orthodontic bands on all teeth has decreased. Currently, despite the broad use of bonded brackets, there are a number of circumstances where bands still remain the preferred option. Bands provide increased strength and resistance to dislodging compared to bonded brackets. Bands provide a convenient platform for soldered appliances such as palatal expansion appliances, Nance holding arches and fixed lingual arches. Bands also permit easy spot welding of a myriad of attachments on both the facial and lingual aspects of the teeth.

Orthodontic Band Composition

Orthodontic bands were originally fabricated from precious metal alloys including gold. Stainless steel was later introduced as an alternative to gold alloys. In selecting an band alloy, engineers considered the properties necessary for a band to function well in the oral environment and for it to adapt easily to the varied sizes and shapes of teeth. Teeth have variable anatomy specific to each patient including tapered crown forms and compound curves requiring a very formable adaptable material. Bands were originally custom fit for each patients tooth from a ribbon of band material supplied in rolls. A short strip of the ribbon was stretched and formed around the tooth (pinched) with the overlapping ends soldered together to form a complete ring (thus the term "bands"). This method was quite slow and labor intensive. Only experienced hands could produce a well fitting band.

An orthodontic band must fit the tooth very well while in order to provide resistance against the forces produced by bite sticks, chewing, and attachments welded or soldered to the band. Bands are engineered to provide adequate strength, flexibility, the ability to accept welds and solder while maintaining resistance against oral corrosion. Bands, also, must not be a source of allergens for sensitive patients. If this list of properties is not long enough, the basic band alloy must also be inexpensive and easy to fabricate into bands.

Stainless steel is the alloy of choice which meets all of these criteria to varying degrees. There are over 50 different compositions of stainless steel utilized in industry, food service, as well as in the medical field. The composition of a stainless steel alloy can be altered to improve its characteristics by varying the levels of iron, carbon, nickel, chromium, and some trace elements. Orthodontic manufacturers have designed stainless steel alloys to provide a strong and malleable/ductile material that can adapt quickly to the majority of teeth.

Definitions

Malleability - a materials ability to be compressed into a thin sheet by hammering or rolling without forming cracks or fractures in the material. Gold provides an excellent example of malleability as gold and many of its alloys can be hammered to a continuous sheet virtually a few atoms in thickness. When comparing metal malleability, gold is the most malleable followed by silver, lead, copper, aluminum, tin, platinum, zinc, iron, and nickel.

Ductility - is similar to malleability though a distinction is made where ductile materials are able to be drawn or stretched extensively, without breaking, to form thin wires and sheets. As with malleability, gold remains the “gold standard” as it is one of the most ductile materials followed by silver, platinum, iron, nickel, copper, aluminum, zinc, tin, and lead. The stainless steel used to produce orthodontic wires must be very ductile.

Stiffness - is the resistance against temporary deformation and permanent bending. High stiffness permits using the high forces required to seat the bands during placement as well as the forces placed upon the cemented bands by orthodontic forces and mastication. Low stiffness enables close adaptation of the band's margin to the shape of the teeth. In this application we are seeking a material that is both malleable and ductile while also stiff enough to avoid deformation (crushing) when using a bite stick to seat the band.

Work Hardening - is the process of progressively increasing the stiffness and resistance toward further deformation (reduced ductility / malleability) as the metal is shaped. Bending and shaping a band makes it more resistant toward further bending and shaping**.** When a band becomes overly work hardened, one cannot shape it anymore and it may need to be discarded. This characteristic is in direct contrast to a very ductile or malleable material which can be continually reshaped without significant work hardening and resistance to further re-shaping.

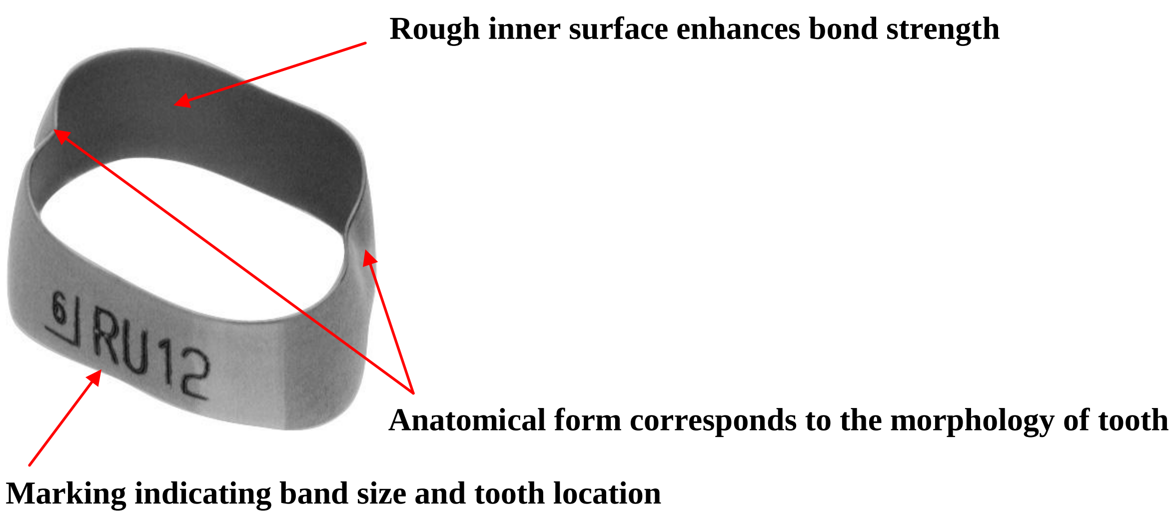
The potential for work hardening is to be minimized when designing an alloy for an orthodontic band. As a band is fitted to the tooth, continual stretching and bending the band material will result in some work hardening and increased resistance to further shaping/adaptation. This is more problematic with stainless steel than with the previously used gold alloys.

A work hardened material can become very brittle and subject to fracture. This is more apparent with orthodontic wires that are bent back and forth many times. Most broken wires are a result of repeated flexing which produces work hardening resulting in increased stiffness, and ultimately, wire fracture.

Orthodontic Band Dimensions - Bands are usually made of stainless steel in that is .005-.007 inches thick. This thickness allows the band to pass through separated tooth contacts while thick enough to maintain strength. The height of a band is, on average, .25" (¼ inch) tall. The height of the band varies to avoid impingement on the gingival tissues while offering adequate height for retention, to provide room for welded attachments and to provide strength to resist splitting from the forces of chewing and forces delivered by head gear and other devices.

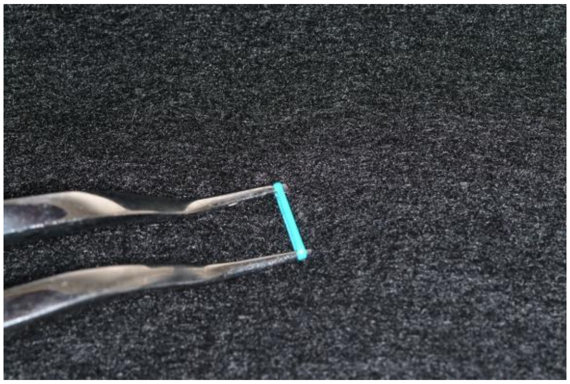
Orthodontic Band Sizes - Bands are designed to fit specific teeth. There are separate designs to fit all the various teeth in the mouth. Often, there are different shapes (mirror images) for the right and left side versions of the same tooth. Bands are designed with anatomical contours to fit the average tooth. Manufacturers offer kits of preformed bands in closely graduated band sizes (circumferences). Thus one band size will accommodate only a narrow range of tooth circumferences or perimeters. By design, band sizing takes advantage of the ductile properties (stretching) of the stainless steel to bridge the size gap between preformed band sizes. The reduced expense of using stainless steel for bands provides the option of having multiple band inventories containing different pre-welded attachment arrangements.

Modern Band Features:
1) Fine medical grade stainless steel
2) Seamless without a lapped or welded joint
3) Anatomical form corresponds to the morphology of tooth providing increased mechanical retention
4) Ease of rapid fitting/adaptation
5) Smooth surface with comfortable feel
6) Close gradation between sizes
7) Permanent laser marking for size and tooth location
8) Rough inner surface to enhances bond strength



Armamentarium for Band Placement

Separating Pliers - specialized pliers designed to stretch and place orthodontic separators.

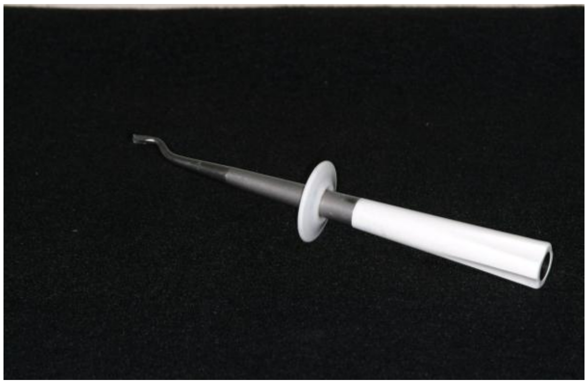



Band Removing Pliers - pliers designed with specialized tips designed to dislodge and elevate a cemented band. One tip has a protective plastic pad. This pad is normally placed on the occlusal cusp of the tooth for leverage. The plastic pad is designed to prevent damage to the tooth as the plier is squeezed. The opposite tip has a horizontal blade or ledge usually made of hardened carbide steel. It is placed under the gingival aspect of the band or bracket creating a second purchase point. Squeezing the pliers creates a controlled lifting force which dislodges the band when removing a band during trial fitting or when removing a fully seated and cemented band.


Band Pusher - Hexagonal hollow handled instrument with a solid serrated carbide tip, used with hand pressure, to guide and push bands into place and for gross contouring of the band margins.

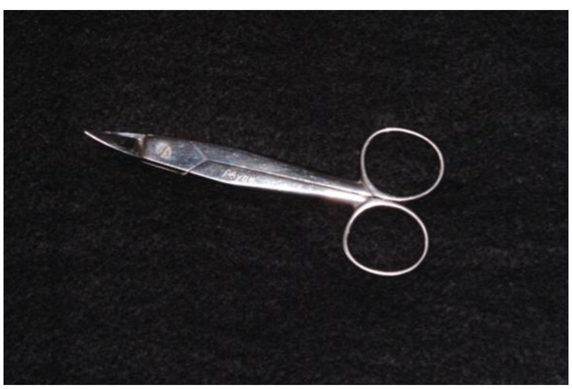

Bite Block/Stick - bite stick handles are composed of a high strength plastic that are usually autoclavable. They have an inserted serrated tungsten carbide tip. The tip design varies with triangular, round, and square configurations. The edge of the insert is used to put force on either the edge of the band material or on a pre-welded attachment. As the patient bites on the plastic portion of the stick, the serrated insert forces the band further on the tooth. Using the bite stick is the preferred method for final band seating as its force is precisely controlled using the patient's own biting force to seat the band.

Mechanical Band Seater (Thumper) - mechanical device with features similar to a band pusher with the addition of a spring activated hammer designed to progressively seat bands. The band seater replicates the seating action formerly provided with a band driver and mallet. It is most often used when the patient’s biting force is either inadequate or the orientation of force created with a bite stick is ineffective.



Scaler and Serrated Plugger - the (amalgam) plugger is a small handled version of the band pusher. By using only finger pressure, it has a reduced chance of tip slippage and enables more finite instrument control. The plugger has a serrated round or oval tip for initial seating of the band. Both the scaler edge and plugger tip can be used for final contouring of the band margins.

Crown and Bridge Scissors - when bands are seated in some cases there may be areas where the band margin seats too gingival impinging on the interproximal gingiva. Scissors can be used to trim these impinging areas creating a custom trauma free fit.



Howe Pliers - Often very effective in band seating used by holding a band firmly by the pre-welded bracket. This permits directing a heavy gingival force that can be used to shape and seat a band without crumpling the unsupported band edge.

Sizing and Fitting Bands - A well fitted band encompasses the height of contour of the tooth with the occlusal margin of the band located near the height of the marginal ridges, both mesial and distal, and is parallel to the occlusal surface. The proper vertical orientation of the band may occasionally require additional trimming of the band's occlusal margin. Fitting the band also includes closely adapting the occlusal margin of the band to the tooth's contours. Rarely, the gingival margins may need to be crimped for better conformation to the gingival tooth surface. Loose (poorly adapted) bands will lead to reduced retention, thick cement lines and to cement margin washout with subsequent enamel decalcification. Bands that are too small are also unacceptable as a small band will not fully seat which places the pre-welded bracket too occlusally on the tooth.

You should not be able to remove a well fit band easily with your fingers prior to cementing. A well fitted band usually requires partial removal with a debanding plier.

Understanding the anatomy of the tooth and the varying height of the gingiva are critical to fitting a well sized band. Tooth surfaces are not parallel or perfectly round. Teeth have heights of contour or points on the tooth that equate with the largest diameter or circumference of the tooth. This height of contour will provide a good guide while selecting the smallest band that can be stretched and adapted to the tooth.

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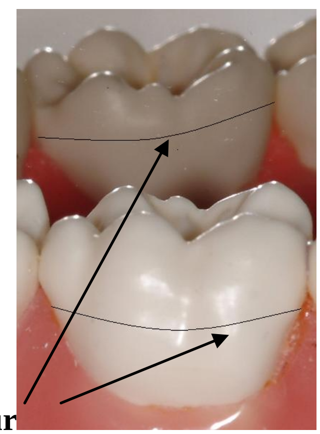


Height of contour

Once separators are removed, test the contact area with floss to determine whether the contact is sufficiently open to accommodate the thickness of the band material. Tight contacts may falsely indicate that a too large band is the correct size or prevent the fitting of the correct smaller size. If separation is inadequate, consider re-separating and rescheduling the band fitting.

Thoroughly pumice the teeth planned for bands and then rinse away all debris.

Identify any irregularities in tooth shape such as extra cusps or variations in tooth shape including the taper from the occlusal to the gingival aspect. These variations will affect the fit of the band. Initial size selection of the bands can be done with the study model. Initially, select a band which appears to be slightly <u>**larger**</u> than necessary. This will minimize unnecessary distortion of bands while trial fitting and reduces permanent distortion of unselected bands which are subsequently re-sterilized and replaced back into inventory for future use.

If a band can be seated over the tooth easily with finger pressure and seats below the level of the marginal ridge, the band is too large. If this occurs, select a smaller band and try again. A well sized band may only be seated by finger pressure up to one third of the way to its' final position. Resistance to initial finger seating is the best gauge of proper band size. Final fitting of the band requires stretching while driving the band more to the gingival first with a band pusher and then with a bite stick.

Occasionally, where the anatomy of the tooth creates challenges in fitting, one may consider using a plain band that does not have any welded attachments. The more flexible plain band can be fitted to the varied anatomy of the tooth as this band does not have the additional areas of rigidity imparted by the addition of welded attachments. The attachment will have to be welded after the band has been fully adapted and seated. Re-check the band's fit after the attachments have been welded as they may have distorted the formerly perfectly fit band.

Plain Band without Attachments

Pre-Welded Attachments - The orthodontic bands come from the manufacturer either plain or with pre-welded attachments. The factory will add a multitude of attachments by prescription as per the prescription of the ordering doctor. Some orthodontists will maintain a second inventory of plain bands for use fabricating custom appliances.

Brackets - are oriented on the buccal surface according to the orthodontist's prescription and are welded either by the manufacturer or at chair side. Molar brackets include single, double and triple tube configurations as well as those designed with various head gear tube and rectangular slot combinations.

Lingual Sheaths - can be welded on the lingual surface of maxillary and mandibular molars. The sheaths rectangular opening (tube) will accept doubled over .030 or.036 wires formed to fit securely into the sheath (tube). .030 Lingual sheaths are normally used just on lower molar bands where the larger .036 lingual sheaths can be used on either arch. The larger wires (.036) provide the extra rigidity necessary for maxillary lingual arches, trans-palatal arches as well as other auxiliaries.

Seating Lugs & Cleats - Orthodontists may prescribe seating lugs or cleats which provide a positive seat for bite sticks avoiding placement of excess force on the bendable edge of the bands when fitting. These same cleats or lugs are quite handy for loosening bands at removal time.

Buttons & Hooks - the number and location of hooks and buttons that can be placed is vast and specific to different force application needs. These attachments have pads that can be welded on an "as needed basis" to individual bands in the office using an orthodontic spot welder.

Orthodontic Cements - Band cement increases the band's resistance to dislodging by filling and sealing the void between the band and tooth surface. It also blocks the possible seepage of food, bacteria and oral fluids into a safe haven under the band preventing decalcification. Dental cements are hard, resilient materials formed by mixing powders and liquids together which harden with a chemical reaction. Other cements are delivered as a viscous material that is activated (hardened) with a light curing unit. Some cements act as a passive filler while others (adhesive cements) also actively bond to the tooth and band surfaces.

Classification of Orthodontic Cements:

Water-based Cements

Zinc Oxyphosphate Cement - was widely used for crown and bridge and band cementation for much of the last century. Although it has a high compressive strength, useful in cementing crowns, it also has the characteristic of low tensile strength. Zinc phosphate acts only as a luting agent as it does not bond directly to either tooth or band surfaces. Luting agents only act as a passive filler. Zinc phosphate cement also is slowly soluble over time. This slow loss of the cement can promote decalcification of the tooth near the margin of the band.

Zinc Polycarboxylate Cements - were introduced to orthodontics in the early 1970s as an alternative to zinc phosphate cement with the advantage of chemical adherence to enamel. Unfortunately the polycarboxylate cements also had poor tensile bond strength, increased solubility (dissolve easily), and a short working time. They are no longer used for orthodontic applications.

Glass Ionomer Cement - developed in 1972 offered considerable advantages in physical properties over previous band cements. GICs adhere to enamel and metal and had good compressive strength. Unlike zinc phosphates, polycarboxylate cements have higher tensile strength and lower solubility. GICs also better protect the teeth from micro-leakage since any bond failure usually occurs at the cement/band interface leaving the cement/tooth enamel interface sealed and protected by the intact cement. Furthermore, GICs slowly leach fluoride over a prolonged period which is thought to reduce the potential for demineralization. Despite their obvious improvements, GICs have technique sensitive steps with mixing that can affect the final physical properties of the hardened cement. Manufacturers have developed capsules for mixing which have improved the consistency of the mixing process.

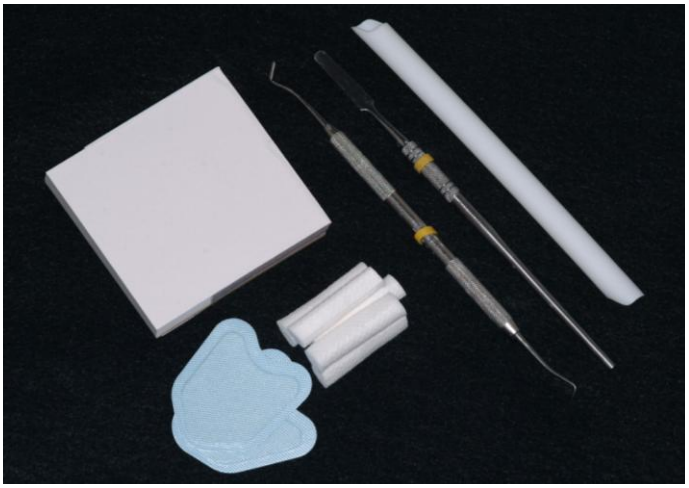
Resin-modified Glass Ionomer Cement Glass ionomer cements were modified by incorporating resin (for more strength), water-soluble initiators and activators to produce a dual cure hybrid cement that was easier to mix with a longer working time and a more controlled setting time. It is thought that the addition of the resin reduces fluoride leaching thus reducing the anti-caries effect of traditional GICs.

Resin-based Cements:

Acid-modified Composite Resin Cement - These compomer or composite cements are composed of ion-leachable glass in a polymeric matrix. They are cured through a light activated reaction not by chemical reactions commonly used by previous cements. These cements are come in both dual paste systems and single paste systems. The handling characteristics are generally good including minimal mixing and increasing working times. The mixed material can be difficult to place inside the bands. As with other cements, copomers have some negative properties as these cements, unlike the GICs, usually fail at the enamel/cement interface instead of the cement/band interface thus leading to higher risks of decalcification and white spot lesions under a band that does not appear or act "loose".

Cementation Armamentaria

Mixing slab or pad
Mixing spatula
Plastic instrument
Cotton rolls
Dry angles
Suction tip



Mixing techniques - The cement mixing technique varies considerably with the type of cement being used. For those with a water base and powder and liquid components the materials are mixed typically on a glass or Teflon coated slab with a mixing spatula. Since water based materials rely on an acid-base reaction these materials have a limited working time. To increase working time, the slab may be ***chilled*** in a refrigerator before use.

The resin cements rely on light activated polymerization started with a light curing unit. Once mixed, the material is loaded into the bands with either a spatula or a plastic instrument. The cement must fully coat the inner band surface occluso-gingivally.

Typically, resin materials require additional effort to load onto the band surface. Since their cure is light activated, assistants have the luxury of unlimited working time to load and seat the band prior to starting the cure with a curing light.

Band Preparation for Cementing - Once the bands have been fit to each tooth, they are removed with de-band pliers with care being taken to avoid damage to the gingival and subsequent bleeding. The removed bands must be stored in a logical order so that each band will be identified and cemented on the same tooth it was removed from.

Inspect the bands and sand blast the internal surface of bands as needed. Some bands have been pre-etched by the manufacturer. An etched band will have better mechanical retention at the band/cement interface especially with the resin cements which do not readily bond to the metal surfaces

Some orthodontists may request placement of masking tape over the occlusal surface of the band to encourage gingival cement flow while seating and to keep cement off the fingers, gloves and instruments.

Tooth Preparation for Banding

Have the orthodontist treat any areas of continued bleeding with a coagulating agent. Prophy and rinse the teeth thoroughly. Isolate teeth with dry angles, retractors, and cotton rolls as needed. Then, blow dry the teeth with compressed air. When using GIC cements, the teeth can be left "damp" as they do not have to be "bone dry".

Band Cementation

The bands are seated initially with finger pressure followed by full seating with band pushers and bite sticks. Once fully seated, depending on the type of cement, excess cement is removed. The tooth and band should be inspected by the orthodontist for ideal placement with any final contouring and burnishing of the band margins as needed.

After completing the above reading assignment, review the material and any questions with your course director.

<u>Module 2   Laboratory Session 1</u>   *2 Hours*

During this session, students will practice sizing, fitting and cementing orthodontic bands on typodont teeth using bands with pre-welded attachments (using plain bands is an optional extra). Students will work in pairs during these procedures. One student will be the operator while the other will assist the operator. The assisting student will observe each stage of the process for subsequent evaluation. Once the first operator is finished, the students will switch duties.

The following is an approximate step-by-step description of the procedures that should be followed during all the laboratory practice sessions.

1. Students will be provided with a typodont, a bench mount for the typodont and at least four posterior typodont teeth. In addition the student will be provided with individualized packets that will include:
    a. Assortment of band sizes which range above and below those required to fit the typodont teeth.
    b. Armamentarium for band sizing, fitting, and cementation.
    c. Banding cement

2. Each student will set up his/her armamentaria for sizing, fitting and band cementation.

3. Instructor will describe evaluation criteria for ideal band fitting and cementation. Instructor will provide ideal examples that will be passed around for viewing.

4. Student will select the appropriate band sizes, fit bands, contour the bands, prepare them for cementation and then seat and cement the orthodontic bands on the provided typodont teeth.
    a. The assisting partner observes, evaluates and records on evaluation worksheet.
    b. The student operator will also evaluate him/herself on every step of the procedure.
    c. The instructor will evaluate every banding process.

    The entire process will be repeated; using fresh new bands, and continue to be evaluated on the worksheet by the student, partner/assistant and instructor.

    Each student will fit and cement a minimum of three bands.

5. Partners then switch places, the operator becomes the evaluating assistant and the former evaluating assistant becomes the operator. The new operator will fit and cement a minimum of 3 bands as described above.

    At this point, both students will have fit and cemented at least three bands each
    Instructor will now present product evaluation form and how it is used to evaluate final sizing, fitting, and cementing orthodontic bands.

6. Using the product evaluation form, the student operator, the student assistant and instructor will grade all the cemented orthodontic bands for each other.
7.
8. Discussion of evaluation results is conducted in small groups with emphasis on techniques to speed the process and how to improve the quality of the finished product.

<u>Module 2   Laboratory Session 2</u>   *2 Hours*

Laboratory practice on typodont teeth continues but in different quadrants of the mouth and on different tooth types including molars & bicuspids. Students will become familiar with use of bite sticks in simulation, band pushers, pluggers, and spring activated band seaters. Additional time should be spent using the mechanical spring activated band seaters, as typodonts will not provide adequate pressure to shape & seat bands on the typodont.

Prior to Preclinical Practice:

> **Student partners will place orthodontic separators mesial and distal of maxillary and one mandibular molar 3-4 days prior to the start of Preclinical session 3.**

<u>Module 2 Preclinical Session 3:</u>   *4 Hours* (*Assistants working on each other in simulation*)

During this session, student partners work on each other in simulation as previously described and demonstrated by instructor. The following general procedures will occur:

Each student functioning as the operator, sizes, fits, and cements orthodontic bands on their partner/patient. Student will then switch with the operator becoming the patient and the patient becoming the operator. During the entire process, both students will evaluate every step of the process.

The following general procedures will occur for each patient:

1. Operatory will be set up following the infection control guidelines.
2. Equipment and supplies will be checked by student.
3. Student/patient will be seated and prepared for treatment.
4. Student operator will perform a patient assessment
5. Instructor will follow-up and check the procedures #1, #2, #3 & #4
6. Patient is given explanation of procedures to be performed
7. Student operator will perform the following according to the stated criteria
    a. Remove the orthodontic separators
    b. Select, fit and seat orthodontic bands to a maxillary and mandibular molars
    c. Properly contour the orthodontic band margin to the tooth
    d. Remove the band in preparation for cementation
    e. Rinse, dry and store the band
    f. Isolate and dry quadrant in preparation for band cementation
    g. Mix the cement (if needed)
    h. Load band with cement
    i. Position and seat orthodontic band completely
    j. Remove excess cement from band and tooth
    k. Request inspection by orthodontist for final positioning
    l. Perform final curing (if using a light curing cement)
    m. Remove all excess cement.
    n. Evaluate product using ideal criteria
    o. Give patient post-op instructions
    p. Dismiss patient
    q. Perform operatory clean up according to infection control guidelines.

During the procedure the following will take place:

1. The student/operator will evaluate his/her own work according to stated criteria using the worksheet and product evaluation forms.

2. The student/patient will observe and evaluate operator's performance according to criteria using the worksheet and product evaluation forms.

3. The instructor will evaluate both of the student's performance following stated criteria entering findings on the worksheet and product evaluation form.

4. Discussion of the results will be conducted on the spot by the instructor.

5. The instructor will explain the upcoming clinical examination protocol. When the student operator performs the last procedure on their student partner, the procedure will be termed and evaluated as a "mock exam" in preparation for the final clinical exam on a bona fide clinical patient.

After the student has finished with the reading materials, laboratory, and preclinical instruction the course provider will provide a written exam to test your knowledge. Use the exam results to determine areas where you need further instruction.

Written Final Examination: ***1 hour***

A comprehensive written examination on all aspects of the course will be administered. Questions will appear on the exam in either multiple choice, true/false or matching formats. These questions will be chosen from a test bank. An item analysis will be conducted to determine question validity each time the examination is administered.

<u>**Module 2 Clinical Instruction**</u> ***8 hours*** (*on a Bona Fide Active Clinical Patient*)

During this session, the instructor will demonstrate the sequence for sizing, fitting, and cementing an orthodontic band on active patients.

The following procedures will be demonstrated:

a. Remove the orthodontic separators
b. Select, fit and seat orthodontic bands to a maxillary and mandibular molar
c. Properly contour the orthodontic band margin to the tooth
d. Remove the band in preparation for cementation
e. Rinse, dry store the band
f. Isolate and dry quadrant in preparation for band cementation
g. Mix the cement (if needed)
h. Load band with cement
i. Position and seat orthodontic band completely
j. Remove excess cement from band and tooth
k. Request inspection by orthodontist for final positioning
l. Perform final curing (if using a light curing cement)
m. Remove all excess cement.
n. Evaluate product using ideal criteria
o. Give patient post-op instructions
p. Dismiss patient
q. Perform operatory clean up according to infection control guidelines.

Note: Student experience on active patients will include sizing, fitting, and cementing of orthodontic bands (after inspection by the orthodontist) on a minimum of four posterior teeth with one of the four times used for the final practical exam.

The following general procedures will occur for each patient:

1. Operatory will be set up following the infection control guidelines.
2. Equipment and supplies will be checked by student.
3. Student/patient will be seated and prepared for treatment.
4. Student operator will perform a patient assessment and check the patient's treatment plan.
5. Instructor will follow-up and check the procedures #1, #2, #3 & #4
6. Patient is given explanation of procedures to be performed
7. Student operator will perform the following according to the stated criteria
    a. Remove the orthodontic separators
    b. Select, fit and seat orthodontic bands to a maxillary and mandibular molar
    c. Properly contour the orthodontic band margin to the tooth
    d. Remove the band in preparation for cementation
    e. Rinse, dry store the band
    f. Isolate and dry quadrant in preparation for band cementation
    g. Mix the cement (if needed)
    h. Load band with cement
    i. Position and seat orthodontic band completely
    j. Remove excess cement from band and tooth
    k. Request inspection by orthodontist for final positioning
    l. Perform final curing (if using a light curing cement)
    m. Remove all excess cement.
    n. Evaluate product using ideal criteria
    o. Give patient post-op instructions

p. Dismiss patient
q. Perform operatory clean up according to infection control guidelines.

After the student operator completes the sequence of procedures, the student operator, the assistant and the instructor will evaluate the performance of the student operator using the worksheet and product evaluation

During this time period the following procedures will occur:

1. The student/operator will evaluate his/her own work according to stated criteria using the worksheet and product evaluation forms.

2. The student/assistant will assist, observe and evaluate operator's performance according to criteria using the worksheet and product evaluation forms.

3. The instructor will evaluate both students' work/performance using stated criteria using the worksheet and product evaluation forms.
Discussion on results will be conducted.