

DENTAL LABORATORY SPECIALTY

Volume 2. Fixed Prosthodontics



**381st Training Squadron
2931 Harney Road
JBSA-Fort Sam Houston, TX 78234**

Qualification Training

Package Author: MSgt Emily Jones

Training Manager: Mr. Jonathan Lacquement

Office of Primary

Responsibility: AFMOA/SGD

Certified by: CMSgt Randy Lightsey

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Volume 2, *Fixed Prosthodontics*, Qualification Training Package (QTP) contains modules on fabricating post and cores, single unit metal and metal-ceramic restorations, metal-ceramic Fixed Dental Prostheses (FDPs), all-ceramic restorations, dental implants, Computer-Aided Design (CAD) procedures, Computer-Aided Manufacturing (CAM) procedures, and 3D printed restorations. This QTP is designed to enhance 5 and 7-skill levels on-the-job training (OJT) of dental laboratory personnel. Training references listed in each module may be used to compliment training. All QTPs are intended to be used by trainees, trainers, supervisors, and task certifiers. Before initiating any training you should review your responsibilities as a supervisor/trainer for conducting OJT per AFI 36-2651, Chapter 6, *Air Force On-The-Job Training Administration*.

QTPs are instructional packages designed to help you conduct and evaluate your field training. Once you begin upgrade training you are required to use the QTPs. QTPs provide continuity to the trainee's upgrade training and are divided into the following volumes: 1) *General Dental Laboratory Experience*; 2) *Fixed Prosthodontics*; 3) *Treatment and Orthodontic Appliances and Removable Dental Prostheses*; and 4) *Dental Laboratory Administration*. The QTP modules were designed to assist you in preparing for and conducting training. Each module segments the major tasks into teachable elements. Your goal is to provide enough training and guidance so trainees can do all task related steps, without assistance and produce an appliance or prosthesis that meets local requirements and fabrication standards for speed and accuracy. QTPs also aid OJT task certifiers in evaluating the trainee's demonstrated performance. **If you have local training requirements not covered by a QTP module you *should* develop "steps in performance" and "performance checklists" that support and standardize those tasks.**

When *you* are satisfied the trainee meets standards, as prescribed in the QTP performance checklist, *you* must document each task completion in the QTP tab. If a person is being recertified on a task that is supported by a QTP, you must use that module to complete the recertification process.

Typically, you will manage each module by first, training the tasks and then, evaluating performance. **Your local steps in performance may vary from the method listed in the QTP module. If this is the case, you are authorized to make changes to the first half of each module, (i.e. steps in task performance); however, the "performance checklist" is considered a *standard* and cannot be altered.** You may train each QTP volume/module in any sequence; however, when conducting training use an organized and methodical approach. This will reduce your training time and enhance your efforts.

For effective use of this QTP, conduct training in the following manner:

1. Review the procedures in each module with the trainee.
2. Direct the trainee to review the training references listed to prepare for task performance.
3. Review the steps in task performance with the trainee, allowing enough time to adequately train each step (some modules may take longer to teach).
4. Evaluate the trainee's work at each critical step using the performance checklist
5. Evaluate the trainee's performance and provide feedback on any area for improvement.
6. Finally, when the trainee has successfully completed the task you must document the STS. If the trainee does not accomplish the module, conduct follow-up instruction until the trainee successfully completes the task.

The QTP project goal of the 381st Training Squadron, Joint Base San Antonio-Fort Sam Houston TX, is to publish a useable document for trainers and trainees. **You are encouraged to write-in changes or revisions to the QTPs. A corrections/improvements form is located on the last page of each QTP volume.** You may choose to call in your recommendations to DSN/Commercial 420-1950 or (210) 808-1950 or email the author at emily.e.jones.mil@mail.mil.

The inclusion of names of any specific commercial product, commodity, or service in this publication is for informational purposes only and does not imply endorsement by the Air Force.

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MODULE 1: FABRICATE POST AND CORE

STS TASK REFERENCE(S):

3.4 Fabricate Post and Core

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*

AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate a post and core. In waxing the pattern, emphasize the need for the post to completely fill the canal to the apical tip. Explain how to wax-up a properly countered core to simulate a crown preparation. Ensure adequate space for subsequent crown fabrication. Have the trainee fabricate post and core and suggest ways to improve performance, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Air Abrasive Unit	Disinfectant Solution	Separating Medium
Bench Lathe	Disclosing Medium	Sprues/Plastic
Bunsen Burner	Distilled Water	Sprue Former
Burnout Oven	Duralay Endo Pins	Torch
Burs	Graduated Cylinder	Ultrasonic Cleaner
Casting Alloy	Handpiece	Vacuum Mixer
Casting Investment	Inlay Wax	Vibrator
Carving Instruments	Investment Ring	Wax/Plastic
Cutting Disc	Mixing Bowl	Waxing Instruments
Casting Machine	Rubber Points/Wheels	

STEPS IN TASK PERFORMANCE:

1. Inspect cast for voids and nodules, remove upon dentist's approval
2. Have prescribing dentist identify margins (if necessary)
3. Apply separating medium to interior of preparation and entire area that will be waxed
4. Cut notches in plastic sprue to aid in retention of wax
5. Trim tip of plastic sprue to fit into root canal to extend to bottom of preparation
6. Fill apical end of canal with soft wax
7. Warm sprue slightly (no melting) and insert completely in wax
8. Allow wax to cool and remove wax post
9. Re-accomplish waxing step if pattern has voids or breaks
10. Replace pattern in previous position
11. Build up core of pattern with inlay wax to stimulate contour of an ideal crown preparation
12. Refine margins of pattern using preferred waxing instrument
13. Sprue post and core pattern on incisal or occlusal surface
14. Invest pattern, with no ring liner and/or add 1 or 2 cc more water to reduce expansion
15. Cast pattern with requested metal
16. Divest and deoxidize casting
17. Remove nodules using burs or stones

MODULE 1: FABRICATE POST AND CORE

STEPS IN TASK PERFORMANCE (CONTINUED):

18. Check casting fit using disclosing medium and gently seating casting into preparation
19. Relieve spots disclosed by medium, repeat until casting seats into preparation and margins are closed
20. Desprue casting
21. Recontour the sprue attachment area
22. Finish core area using stones and rubber wheel
23. Air abrade entire casting
24. Place casting in ultrasonic cleaner for 2 to 3 minutes
25. Disinfect restoration

MODULE 1: FABRICATE POST AND CORE

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate post and cores and satisfactorily perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE POST AND CORE		
DID THE TRAINEE...?	YES	NO
1. Inspect the cast to ensure it is free of voids and nodules		
2. Apply die separator over entire area to be waxed		
3. Fill the canal to the apical end with wax		
4. Wax post and core to correct contours		
5. Sprue post and core pattern on incisal or occlusal surface		
6. Invest pattern to produce acceptable mold expansion		
7. Cast pattern producing an accurate, dense casting		
8. Fit casting without damaging master cast		
9. Contour to correct shape, finish to smooth surface, and air abrade entire casting		
10. Disinfect restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting in the training record.

MODULE 2: FABRICATE SINGLE UNIT METAL RESTORATIONS

STS TASK REFERENCE(S):

3.6 Fabricate Single Unit Metal Restorations

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate a single unit metal restoration. Explain the following:

- how proper sprue diameter and placement can decrease porosity in the casting
- how the amount of alloy needed for the casting is based on the weight of the wax pattern and the specific gravity of the alloy
- the need to balance the casting arm and ensure the mold is damp prior to burnout
- why separate crucibles are used for different types of alloys
- what to look for on the internal surface of the casting using a microscope
- the importance of margins, contacts, contours, and occlusion of the restoration

After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Air Hose	Die Sealer	Investment	Sticky Wax
Air Abrasive	Die Spacer	Knife	Striker
Articulating Paper	Dipping Pot	Microscope	Tongs
Blockout Material	Distilled Water	Millimeter Ruler	Steam or Ultrasonic
Burnout Furnace	Disinfectant	Pen/Pencil	Cleaner
Carving Instruments	Electronic Scale	Polishing Medium	Vacuum Mixer
Casts – Articulated	Electric Waxer	Rouge	Vacuum Mixing Bowl
Casting Alloy	Finishing Burs,	Rubber Dam	Vibrator
Casting Flux	Stones, and Wheels	Safety Goggles	Wax Gauge
Casting Machine	Graduated Cylinder	Separating Disc	Waxing Instrument
Casting Ring	Handpiece or Lathe	Shimstock	Wax Pencil
Casting Torch	Heatless Stone	Small Artist Brush	Wax Powder
Debubbler	Indicating Medium	Spatula	
Die Lubricant	Inlay Wax	Sprue Former	

STEPS IN TASK PERFORMANCE:

- Prepare die for waxing
 - Inspect die for undercuts or nodules in margin design, remove/correct imperfections or return to dentist for removal
 - Verify mounting and check for proper contact of existing teeth
 - Adjust articulator settings to correspond with wear facets and/or prescribed guidance
 - Blockout any undercuts with blockout material

MODULE 2: FABRICATE SINGLE UNIT METAL RESTORATIONS

STEPS IN TASK PERFORMANCE (CONTINUED):

- e. Mark thin red line on margins using wax pencil
- f. Apply die sealer and allow to dry
- g. Apply die spacer following manufacturer's recommendations
- h. Do not apply spacer within 1.0 mm of margins
- i. Apply additional coats of die spacer, if required and allow to dry
- j. Apply die lubricant to die, proximal contacts, and opposing teeth
- 2. Wax pattern
 - a. Apply hot inlay wax to dies in rapid manner to prevent voids in wax copings, dipping pot technique can also be used
 - b. Trim wax from margin area using blunt carving instrument
 - c. Remove wax patterns using rubber dam
 - d. Inspect patterns for voids on internal surface and remake copings if required
 - e. Replace patterns on dies and reseal margins with inlay wax
 - f. Close articulator and check patterns for occlusal interference
 - g. Overbuild the occlusal surface and gently, but quickly, close articulator again to create a centric occlusal contact in the softened wax
 - h. Carve the wax back to proper anatomical and functional contouring
 - i. Use the instrument in a palm grip to make long strokes
 - j. Use a pen grip and finger rest for creating fine details
 - k. See training references for specific anatomic and functional contouring
 - l. Check lateral excursions for clearance and proper cusp tip replacement
 - m. Apply wax powder to occlusal surface, disclose interferences, and remove excess wax
 - n. Wax secondary anatomy using adjacent teeth as guides
 - o. Refine axial contours and verify "A,B,C" contacts, using powdered wax or articulating paper
 - p. Adjust lateral and protrusive excursions
 - q. Verify correct proximal contact position
 - r. Remove wax patterns using rubber dam and reapply die lubricant
 - s. Replace patterns on dies and refine margins
 - t. Use magnification to verify accuracy of margins
 - u. Clean patterns using preferred method
- 3. Sprue and invest wax pattern
 - a. Inspect wax patterns on dies for suitability
 - b. Determine required size of sprue leads
 - c. Determine initial weight of sprue base using electronic scale before sprues are attached
 - d. Document weight of sprue base
 - e. Sticky-wax sprue leads to thickest part of patterns at 45° angle to the axial surface of the pattern
 - f. Sticky-wax sprue leads to incisal edge of patterns for anterior units
 - g. Seal sprue leads to patterns using inlay wax
 - h. Trim sprue lead lengths to approximately 6.0 mm for direct and 3.0 mm for indirect method
 - i. Remove patterns from dies

MODULE 2: FABRICATE SINGLE UNIT METAL RESTORATIONS

STEPS IN TASK PERFORMANCE (CONTINUED):

- j. Sticky wax opposite end of sprue leads to sprue base
 - a. Position patterns outside of the thermal zone of the investment
 - b. Seal sprue leads to sprue base using inlay wax
 - c. Place sprue base assembly on electronic scale
 - d. Document weight of pattern and sprue base assembly
 - e. Compute difference of the weights to determine weight of wax patterns
 - f. Determine the amount of alloy needed, for casting, by multiplying the wax pattern weight times the alloy's specific gravity
 - g. Secure ring liner 3.0 mm below edge of casting ring
 - h. Place orientation dot on sprue base
 - i. Apply debubbler to all surfaces of wax patterns and dry thoroughly
 - j. Place casting ring on sprue base
 - k. Vacuum mix investment IAW manufacturer's instructions
 - l. Paint-on investment inside wax patterns using brush
 - m. Attach lined casting ring to sprue base
 - n. Fill casting ring with investment
 - o. Allow investment to set IAW manufacturer's instructions
- 4. Burnout and cast restoration
 - a. Ensure burnout furnace is at room temperature
 - b. Ensure molds are moist prior to burnout
 - c. Remove glaze from top of investment
 - d. Balance casting arm, if necessary
 - e. Place casting rings in back and center of furnace with orientation dot to the right
 - f. Program furnace per manufacturer's instructions to ensure complete burnout
 - g. Ensure proper cradle is in place
 - h. Place appropriate crucible in machine
 - i. Wind broken-arm casting machine
 - j. Preheat crucible using furnace or torch
 - k. Ensure at least 50 percent new alloy is added to recycled alloy
 - l. Place alloy in crucible and melt using torch
 - m. Apply casting flux, if required
 - n. Remove casting ring from furnace and place in cradle
 - o. Release broken arm mechanism when metal reaches proper temperature
 - p. Remove casting ring after arm completely stops spinning
- 5. Divest casting
 - a. Cool ring IAW the alloy's manufacturer's instructions
 - b. Divest and deoxidize casting using air abrasive unit
 - c. Inspect casting for completeness
- 6. Adjust casting
 - a. Inspect castings for completeness
 - b. Inspect internal surface of casting under magnification for nodules, voids, and residual investment
 - c. Remove positive defects using a bur

MODULE 2: FABRICATE SINGLE UNIT METAL RESTORATIONS

STEPS IN TASK PERFORMANCE (CONTINUED):

- d. Apply disclosing medium to identify interferences on the intaglio surface of crown
- e. Carefully seat castings on dies and evaluate fit, do not abrade the dies
- f. Inspect interior of casting for high spots
- g. Grind indicated high spot areas
- h. Repeat fitting process until casting is fully seated
- i. Confirm accuracy of margins
- j. Carefully clean disclosing medium from die using soft brush, soap, water and air abrasive unit
- k. Clean indicating medium from casting using steam cleaner
- l. Desprue casting using separating disc, avoiding cutting into crown
- m. Contour sprue stump using heatless stone or bur
- n. Seat restorations on working cast
- o. Adjust proximal contacts independently using articulating paper, stones, and rubber wheels
- p. Repeat adjusting proximal contacts until restorations seat on solid cast
- q. Verify proximal contacts with shimstock
- r. Adjust centric and eccentric occlusion of restorations on working cast
- s. Maintain proper contours
- 7. Finish and polish restoration
 - a. Matte finish restorations using stones, avoiding previously adjusted areas
 - b. Rubber all restoration surfaces
 - c. Polish restorations using buffing bar compound (BBC) or equivalent, soft bristle brushes, and rag or felt wheel.
 - d. Final polish restorations, using rouge, soft bristle brush, and rag or felt wheels
 - e. Clean restorations using steam or ultrasonic cleaner
 - f. Check for proximal and occlusal contacts with shimstock
 - g. Check fit of casting to ensure accurate margins
 - h. Disinfect restoration IAW manufacturer's instructions

MODULE 2: FABRICATE SINGLE UNIT METAL RESTORATIONS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to wax patterns and satisfactorily perform all the parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE SINGLE UNIT METAL RESTORATION		
DID THE TRAINEE...?	YES	NO
1. Properly inspect, blockout, mark, seal, and space the die(s) for waxing		
2. Accurately create wax pattern to proper contour, correct occlusion, and adapted margins		
3. Correctly sprue and invest pattern		
4. Properly burnout mold and cast restoration while adhering to all safety precautions		
5. Divest and deoxidize casting without damaging casting		
6. Adjust casting to properly fit die and achieve appropriate contacts while maintaining proper emergence profile and height of contour		
7. Finish and polish restoration to a higher luster while maintaining desired contacts and margin integrity		
8. Clean and disinfect restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 3: FABRICATE SINGLE UNIT METAL-CERAMIC RESTORATIONS

STS TASK REFERENCE(S):

3.7 Fabricate Single Unit Metal-Ceramic Restorations

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate a single unit-metal ceramic restoration. Explain the following:

- a. the importance of checking metal thickness frequently
- b. how contamination degrades the porcelain-to-metal bond
- c. the importance of harmonizing the occlusal relationship between restorations and natural dentition
- d. the need to select porcelain that is compatible with underlying substructure
- e. how having the dentine porcelain slightly moist prevents entrapment of air bubbles between the dentine and enamel layers.
- f. the need to inspect the internal surfaces of the crown for sintered porcelain particles
- g. how the color wheel applies to staining when small adjustments are needed to produce the correct shade.

After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Air Abrasive	Disinfectant	Millimeter Ruler	Small Artist Brush
Articulating Paper	Distilled Water	Opaque Liquid	Spatula
Blockout Material	Electronic Scale	Opaque Modifiers	Sponge
Bunsen Burner	Electric Waxer	Opaque Porcelain	Sprue Former
Burnout Furnace	Enamel Porcelain	Pen/Pencil	Staining Kit
Carving Instruments	Facial Tissue	Porcelain Finishing	Staining Palate
Casting Alloy	Finishing Burs,	Accessories	Staining Liquid
Casting Flux	Stones, and Wheels	Porcelain Furnace	Sticky Wax
Casting Machine	Glass Slab and Rod	Porcelain Instrument	Striker
Casting Ring	Graduated Cylinder	Kit	Tongs
Casting Torch	Hemostats	Porcelain Separator	Steam/Ultrasonic
Ceramic Stones	Handpiece or Lathe	Porcelain Staining	Cleaner
Debubbler	Heatless Stone	Medium	Vacuum Mixer
Dentine Porcelain	Indicating Medium	Polishing Medium	Vacuum Mixing Bowl
Diamond Burs	Inlay Wax	Rubber Dam	Vibrator
Diamond Wheels	Investment	Sagger Tray	Wax Gauge
Die Lubricant	Knife	Safety Goggles	Waxing Instrument
Die Sealer	Margin Porcelain	Separating Disc	Wax Pencil
Die Spacer	Metal Gauge	Shade Guide	Wax Powder
Dipping Pot	Microscope	Shimstock	

STEPS IN TASK PERFORMANCE:

1. Cut back wax pattern
 - a. Wax-up prosthesis to full contour
 - b. Fabricate putty matrix of full contour wax-up
 - c. Scribe cutback design on patterns using carving instruments
 - d. Measure thickness of wax patterns using wax gauge
 - e. Ensure full contour wax-up are at least 1.2 mm thick
 - f. Consult dentist if wax pattern is below minimum thickness
 - g. Make depth cuts in patterns using discoid instrument
 - h. Remove and smooth out wax from within areas using carving instrument
 - i. Ensure all internal sharp angles or edges are removed
 - j. Ensure cutback area measures at least 0.5 mm, may be thinner depending on alloy used
 - k. Ensured finish lines are sharp at porcelain to metal junction
 - l. Remove wax patterns using rubber dam and apply die lubricant
 - m. Replace patterns on dies and refine margins
 - n. Use microscope to verify accuracy of margins
 - o. Clean patterns
2. Sprue and invest wax pattern
 - a. Inspect wax patterns on dies for suitability
 - b. Determine required size of sprue leads
 - c. Determine initial weight of sprue base using electronic scale before sprues are attached
 - d. Document weight of sprue base
 - e. Sticky-wax sprue leads to thickest part of patterns at 45° angle
 - f. Sticky-wax sprue leads to incisal edge of patterns for anterior units
 - g. Seal sprue leads to patterns using inlay wax
 - h. Trim sprue lead lengths to approximately 6.0 mm for direct and 3.0 mm for indirect method
 - i. Remove patterns from dies
 - j. Sticky wax opposite end of sprue leads to sprue base
 - k. Position patterns outside of the thermal zone of the investment
 - l. Seal sprue leads to sprue base using inlay wax
 - m. Place sprue base assembly on electronic scale
 - n. Document weight of pattern and sprue base assembly
 - o. Compute difference of the weights to determine weight of wax patterns
 - p. Determine the amount of alloy needed, for casting, by multiplying the wax pattern weight times the alloy's specific gravity
 - q. Secure ring liner 3.0 mm below edge of casting ring
 - r. Place orientation dot on sprue base
 - s. Place casting ring on sprue base
 - t. Apply debubbler to all surfaces of wax patterns and dry thoroughly
 - u. Vacuum mix investment IAW manufacturer's instructions
 - v. Use Paint-on technique, place investment inside wax patterns using brush
 - w. Attach lined casting ring to sprue base
 - x. Fill casting ring with investment
 - y. Allow investment to set IAW manufacturer's instructions

MODULE 3: FABRICATE SINGLE UNIT METAL-CERAMIC RESTORATIONS

STEPS IN TASK PERFORMANCE (CONTINUED):

3. Burn out and cast substructure
 - a. Ensure burnout furnace is at room temperature
 - b. Ensure molds are moist prior to burnout
 - c. Remove glaze from top of investment
 - d. Balance casting arm, if necessary
 - e. Place casting rings in back and center of furnace with orientation dot to the right
 - f. Program furnace per manufacturer's instructions to ensure complete burnout
 - g. Ensure proper cradle is in place
 - h. Place appropriate crucible in machine
 - i. Wind broken-arm casting machine (if using broken arm)
 - j. Preheat crucible using furnace or torch
 - k. Ensure at least 50 percent new alloy is added to recycled alloy
 - l. Place alloy in crucible and melt using torch
 - m. Apply casting flux, if required
 - n. Remove casting ring from furnace and place in cradle
 - o. Release broken arm mechanism when metal reaches proper temperature
 - p. Remove casting ring after arm completely stops spinning
4. Divest casting
 - a. Cool ring IAW the alloy's manufacturer's instructions
 - b. Divest and deoxidize casting using air abrasive unit
 - c. Inspect casting for completeness
5. Adjust metal-ceramic casting
 - a. De-sprue substructure using separating disc
 - b. Seat restorations on dies and cast
 - c. Verify margins are closed using microscope
 - d. Re-contour sprue stump
 - e. Adjust occlusion using articulating paper and stones
 - f. Verify occlusal contacts with shim stock
 - g. Finish axial surfaces with a stone
 - h. Adjust eccentric contacts
 - i. Remove any undesirable interferences using stones
 - j. Evaluate cutback design, ensuring proper porcelain placement
 - k. Measure metal thickness of porcelain-bearing areas
 - l. Reduce porcelain-bearing areas to minimum thickness, where required
 - m. Reduce width of metal collar to minimum design measurements
 - n. Sharpen finish lines
 - o. Produce satin finish on porcelain-bearing areas, in a single direction, using stones
 - p. Air abrade with aluminum oxide
 - q. Clean substructure
6. Finish and prepare substructure for veneering
 - a. Evaluate cut back design, ensuring proper porcelain placement
 - b. Measure metal thickness of porcelain-bearing areas

MODULE 3: FABRICATE SINGLE UNIT METAL-CERAMIC RESTORATIONS

STEPS IN TASK PERFORMANCE (CONTINUED):

- c. Reduce porcelain-bearing areas to minimum thickness, where required
 - d. Reduce width of metal collar to minimum
 - e. Sharpen finish lines
 - f. Produce satin finish on porcelain-bearing areas, in a single direction, using stones
 - g. Air abrade with aluminum oxide
 - h. Clean substructure
- 7. Oxidize prepared casting
 - a. Hold substructure with hemostats
 - b. Air abrade substructure to remove contaminants
 - c. Clean substructure using steam or ultrasonic cleaner and let dry
 - d. Place substructure on sagger tray using hemostats
 - e. Place sagger tray on furnace firing tray/stand using tongs
 - f. Oxidize substructure IAW alloy manufacturer's instructions
 - g. Remove substructure from furnace using tongs
 - h. Remove excess surface oxides IAW alloy manufacturer's directions, if required
- 8. Apply opaque porcelain
 - a. Wet Porcelain bearing surface with opaque liquid
 - b. Mix opaque liquid and opaque porcelain for washcoat application
 - c. Apply washcoat layer of opaque on porcelain bearing surface
 - d. Fire opaque in furnace IAW porcelain manufacturer's directions
 - e. Remove substructure from furnace and let cool at room temperature
 - f. Mix opaque liquid and opaque porcelain to creamy consistency
 - g. Apply second layer of opaque, using glass rod or porcelain brush
 - h. Cover all porcelain bearing surfaces leaving no metal shadows
 - i. Dry opaque and place substructure on sagger tray
 - j. Fire in furnace IAW porcelain manufacturer's directions
 - k. Remove substructure from furnace using tongs
 - l. Ensure there are no visible gray shadows
 - m. Repeat opaque application and firing, if required, to correct gray shadows
 - n. Apply opaque modifiers, if require
 - o. Examine opaque for visible cracks/defects
 - p. Ensure opaque thickness does not exceed 0.2 mm
 - q. Ensure opaque has an eggshell-like surface texture
- 9. Apply shoulder porcelain
 - a. Apply porcelain separator to master die and seat substructures
 - b. Mix margin porcelain to paste-like consistency on glass slab
 - c. Apply margin porcelain to cervical area using porcelain brush
 - d. Condense porcelain by gently vibrating die; tap or serrate
 - e. Blot excess moisture from facial of margin using a tissue
 - f. Smooth porcelain towards margin using whipping brush
 - g. Remove excess moisture and overextensions
 - h. Press on substructure in a downward motion and remove with margin intact

MODULE 3: FABRICATE SINGLE UNIT METAL-CERAMIC RESTORATIONS

STEPS IN TASK PERFORMANCE (CONTINUED):

- i. Place substructure on sagger tray and fire IAW porcelain manufacturer's instructions
- j. Remove substructure from furnace and let cool to room temperature
- k. Using microscope, inspect inside of substructure for porcelain particles and remove them
- l. Mark facial margin on die using wax pencil and reapply porcelain separator
- m. Replace substructure on die and repeat porcelain margin application procedure to correct discrepancies
- n. Remove substructure from die with porcelain margin intact
- o. Place substructure on sagger tray and fire IAW porcelain manufacturer's instructions
- p. Remove substructure from furnace and let cool to room temperature
- q. Finish porcelain margin using diamonds, stones, etc.
- 10. Apply dentine and enamel porcelain
 - a. Mix dentine porcelain
 - b. Apply dentine porcelain in small increments to surface of restorations
 - c. Slightly overbuild contours of tooth with dentine porcelain
 - d. Condense porcelain buildup using facial tissue
 - e. Ensure porcelain buildup is kept moist throughout entire application procedure
 - f. Cutback dentine porcelain buildup for enamel porcelain
 - g. Moisten cutback area before adding enamel porcelain to ensure proper blend
 - h. Mix and apply enamel porcelain in small increments to cutback areas
 - i. Slightly overbuild contours of tooth with enamel porcelain
 - j. Blot restorations periodically with facial tissue and remove restorations from cast
 - k. Attach hemostats to restorations
 - l. Add dentine or enamel porcelain to interproximal contact areas, as needed
 - m. Condense porcelain buildup slightly by alternating vibration and tissue blotting
 - n. Place restorations on sagger tray and fire IAW porcelain manufacturer's instructions
 - o. Remove restorations from furnace and let cool to room temperature
- 11. Fire porcelain buildups
 - a. Ensure porcelain applications are complete
 - b. Inspect the underside of the metal framework and remove loose particles of porcelain
 - c. Carefully place the restoration on sagger tray
 - d. Properly place the restoration on firing table of the porcelain furnace
 - e. Ensure the correct firing program is entered for firing sequence
 - f. Allow the fired porcelain to cool before removing from firing table
 - g. Inspect the restoration to verify complete firing has occurred
- 12. Contour fired porcelain
 - a. Verify restoration fits on die(s)
 - b. Adjust proximal and ridge contacts of restorations using articulating paper
 - c. Ensure restorations seat on a solid cast and verify contacts using shimstock

MODULE 3: FABRICATE SINGLE UNIT METAL-CERAMIC RESTORATIONS

STEPS IN TASK PERFORMANCE (CONTINUED):

- d. Adjust centric and eccentric occlusal contacts to desired occlusal scheme
 - e. Reduce bulk to establish overall contour, i.e. length, width, and thickness
 - f. Adjust length to harmonize with both centric and eccentric contacts
 - g. Contour facial surface, frequently checking the thickness of the veneer
 - h. Shape the interproximal, to produce natural embrasures
 - i. Contour proximal surfaces to shape embrasures and imitate contours of teeth on the contralateral side
 - j. Check facial profile and alignment profile
 - k. Mark line angles of restorations and natural dentition to use as guides in contouring
 - l. Contour veneer surfaces so all line angles match teeth on the contralateral side
 - m. Carve anatomy, i.e. developmental grooves and secondary anatomy
 - n. Carve surface detail and texture veneer to match adjacent teeth
13. Surface stain and color correct veneer
- a. If a try-in was accomplished, disinfect restorations before staining
 - b. Brake glazed porcelain surface using air abrasive unit
 - c. Accentuate surface texture to offset application of stain
 - d. Clean restorations using steam or ultrasonic cleaner
 - e. Mix stain with appropriate staining liquid to a thin, fluid consistency
 - f. Hold restorations with hemostat and apply stain with small artist brush
 - g. Verify that the color matches the requested shade
 - h. Dry restorations under warm muffle
 - i. Remove excess stain from metal areas
 - j. Place restorations on sagger tray and fire IAW porcelain manufacturer's instructions
 - k. Remove sagger tray from furnace and bench cool restorations
 - l. Inspect restorations for desire color match
 - m. If color match is not achieved, re-accomplish complete procedure
14. Glaze porcelain restoration
- a. If a try-in was accomplished, disinfect restorations before glazing
 - b. Brake glazed porcelain surface using air abrasive unit
 - c. Accentuate surface texture to offset application of glaze
 - d. Clean restorations using steam or ultrasonic cleaner
 - e. Apply glaze evenly
 - f. Place on sagger tray and place on muffle of oven
 - g. Select appropriate program
 - h. Disinfect the restoration

MODULE 3: FABRICATE SINGLE UNIT METAL-CERAMIC RESTORATIONS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate a single unit metal-ceramic restoration and satisfactorily perform all parts of the task without assistance. Evaluate the trainee's performance using this checklist.

FABRICATE SINGLE UNIT METAL-CERAMIC RESTORATIONS		
DID THE TRAINEE...?	YES	NO
1. Properly design a cut back wax pattern		
2. Correctly sprue to the thickest part and invest pattern		
3. Properly burnout mold and cast restoration while adhering to all safety precautions		
4. Divest and deoxidize casting without damaging casting		
5. Adjust substructure to properly fit die and achieve appropriate contacts while maintaining proper emergence profile and height of contour		
6. Reduce porcelain bearing surfaces to proper thickness (0.2-0.3 mm where required) free of sharp angles, holes, and contaminants		
7. Oxidize and deoxidize substructure without distortion or damage IAW the alloy's manufacturer's instructions		
8. Properly and uniformly apply opaque while not exceeding 0.2 mm in thickness		
9. Sufficiently build dentine porcelain and use the correct program to fire the porcelain		
10. Contour the restoration to harmonize with existing natural dentition		
11. Achieve desired color match using stains provided		
12. Use the correct glaze program to fire porcelain		
13. Finish and polish metal to a higher luster while maintaining desired contacts and margin integrity		
14. Clean and disinfect restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 4: FABRICATE FIXED DENTAL PROSTHESES (FDP)

STS TASK REFERENCE(S):

- 3.8 Fabricate fixed dental prostheses (FDP)

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate an FDP. Explain the following:

- the effects of a poorly designed connector on the FDP's flexural strength
- how width and depth affect a connector's strength
- how to compensate for the length of the restoration
- how pontic design affects patient comfort, oral hygiene, esthetics, and function
- the different types of pontics and their application
- how the pontic must not have any excursive contacts
- how the indirect spruing method is preferred casting FDPs

After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Air Abrasive	Die Lubricant	Microscope	Spatula
Articulating Paper	Dipping Pot	Millimeter Ruler	Sprue Former
Blockout Material	Distilled Water	Pen/Pencil	Sticky Wax
Burnout Furnace	Disinfectant	Preformed Sprues	Striker
Carving Instruments	Electronic Scale	Polishing Medium	Tongs
Casts – Articulated	Electric Waxer	Rouge	Vacuum Mixer
Casting Alloy	Finishing Burs	Rubber Dam	Vacuum Mixing Bowl
Casting Flux	Graduated Cylinder	Safety Goggles	Vibrator
Casting Machine	Handpiece or Lathe	Separating Disc	Wax Gauge
Casting Ring	Heatless Stone	Shimstock	Wax Pencil
Casting Torch	Indicating Medium	Steam or Ultrasonic	Wax Powder
Debubbler	Inlay Wax	Cleaner	Waxing Instrument
Die Sealer	Investment	Small Artist Brush	
Die Spacer	Knife	Stones/Wheels	

STEPS IN TASK PERFORMANCE:

- Prepare die for waxing
 - Inspect die for undercuts or nodules in margin design, remove/correct imperfections or return to dentist for removal
 - Check for adequate reduction
 - Verify mounting and check for proper contact of existing teeth
 - Adjust articulator settings to correspond with wear facets and/or prescribed guidance
 - Blockout any undercuts with blockout material

MODULE 4: FABRICATE FIXED DENTAL PROSTHESES (FDP)

STEPS IN TASK PERFORMANCE (CONTINUED):

- f. Mark thin red line on margins using wax pencil
 - k. Apply die sealer and allow to dry
 - l. Apply die spacer following manufacturer's recommendations
 - m. Do not apply spacer within 1.0 mm of margins
 - n. Apply additional coats of die spacer, if required and allow to dry
 - o. Apply die lubricant to die, proximal contacts, and opposing teeth
- 2. Wax retainers and pontic
 - a. Apply hot inlay to dies in rapid manner to prevent voids in wax copings
 - b. Trim wax from margin area using blunt carving instrument
 - c. Remove wax copings using rubber dam
 - d. Inspect copings for voids on internal surface and remake if required
 - e. Replace copings on dies and reseal margins with inlay wax
 - f. Close articulator and check copings for occlusal interference
 - g. Overbuild the occlusal surface and gently, but quickly, close articulator again to create a centric occlusal contact on the softened wax
 - h. Carve the wax back to proper anatomical and functional contours
 - i. Use the instrument in a palm grip to make forceful long strokes
 - j. Use a pen grip and fingers rest for creating fine details
 - k. See training references for specific anatomic and functional counterering
 - l. Check lateral excursions for clearance and proper cusp tip placement
 - m. Disclose interferences, and remove excess wax
 - n. Wax secondary anatomy using existing teeth as guides
 - o. Refine axial contours and verify "A, B, C" contacts
 - p. Adjust lateral and protrusive excursion
 - q. Verify correct proximal contact position
 - r. Wax the pontic using the same techniques you would for waxing a retainer, with the exception of excursive contacts
 - s. When complete, refine the retainer's margins
 - t. Attach the pontic to the retainer that's most stable on the die, this establishes your initial connector
 - u. Remove the die, retainer, and pontic from the cast and shape the gingival third of the pontic
 - v. Complete the one connector you have already established
 - w. Replace the pattern on the original cast, or a solid cast, and wax the remaining connector
 - x. Use magnifications to verify accuracy of margins
 - y. Clean pattern using preferred method
- 3. Sprue and invest wax pattern (indirect method)
 - a. Inspect wax pattern on dies for suitability
 - b. Determine required size of "feed" and "lead" sprues and runner bar
 - c. Determine initial weight of sprue base using electronic scale before sprues are attached
 - d. Document weight of sprue base
 - e. Sticky-wax "feed" sprues to thickest part of patterns at a 45° angle to the axial surface of the pattern

MODULE 4: FABRICATE FIXED DENTAL PROSTHESES (FDP)

STEPS IN TASK PERFORMANCE (CONTINUED):

- f. For anterior units, sticky-wax “feed” sprues to incisal edge of patterns
 - g. Seal “feed” sprues to pattern using inlay wax
 - h. Trim “feed” sprue lengths to approximately 3.0 mm for indirect method
 - i. Attach “lead” sprue(s) to runner bar
 - j. Attach “feed” sprues from pattern to runner bar
 - k. Remove pattern from dies
 - l. Sticky wax opposite end of “lead” sprue(s) to sprue base
 - m. Position pattern outside of the thermal zone of the investment
 - n. Seal “lead” sprue(s) to sprue base using inlay wax
 - o. Place sprue base assembly on electronic scale
 - p. Document weight of pattern and sprue base assembly
 - q. Compute difference of the weights to determine weight of wax pattern
 - r. Determine the amount of alloy needed, for casting, by multiplying the wax pattern weight times the alloy’s specific gravity
 - s. Place orientation dot on sprue base in line with runner bar
 - t. Place casting ring on sprue base (ensure there is 6mm clearance between the top of pattern and the rim of the casting ring)
 - u. Apply debubbler to all surfaces of wax pattern and dry thoroughly
 - v. Vacuum mix investment IAW manufacturer’s instructions
 - w. If using Paint-on technique, use a fine brush and mild vibration to flow investment over entire pattern’s surface. (Don’t touch brush to pattern)
 - x. Attach lined casting ring to sprue base
 - y. Fill casting ring with investment
 - z. Allow investment to set IAW manufacturer’s instructions
4. Burnout and cast restoration
- a. Ensure burnout furnace is at room temperature
 - b. Ensure molds are moist prior to burnout
 - c. Remove glaze from top of investment
 - d. Balance casting arm, if necessary
 - e. Place casting rings in back and center of furnace with orientation dot to the right
 - f. Program furnace per manufacturer’s instructions to ensure complete burnout
 - g. Ensure proper cradle is in place
 - h. Place appropriate crucible in machine
 - i. Wind broken-arm casting machine
 - j. Preheat crucible using furnace or torch
 - k. Ensure at least 50 percent new alloy is added to recycled alloy
 - l. Place alloy in crucible and melt using torch
 - m. Apply casting flux, if require
 - n. Remove casting ring from furnace and place in cradle, the thinnest section (usually facial) of the pattern should trail as the casting arm spins
 - o. Release broken arm mechanism when metal reaches proper temperature
 - p. Remove casting ring after arm completely stops spinning

MODULE 4: FABRICATE FIXED DENTAL PROSTHESES (FDP)

STEPS IN TASK PERFORMANCE (CONTINUED):

5. Divest casting
 - a. Cool ring IAW the alloy's manufacturer's instructions
 - b. Divest and deoxidize casting using air abrasive unit
 - c. Inspect casting for completeness
6. Adjust casting
 - a. Inspect castings for completeness
 - b. Inspect internal surface of casting under magnification for nodules, voids, and residual investment
 - c. Remove positive defects using a bur
 - d. Apply disclosing medium to identify interferences on the intaglio surface of crown
 - e. Carefully seat casting on dies and evaluate fit, do not abrade the dies
 - f. Inspect interior of casting for high spots
 - g. Grind indicated high spot areas
 - h. Repeat fitting process until casting is fully seated
 - i. Confirm accuracy of margins
 - j. Carefully clean disclosing medium from die using soft brush, soap, water and air abrasive unit
 - k. Clean indicating medium from casting using steam cleaner
 - l. Desprue casting using separating disc
 - m. Contour sprue stumps using heatless stone or bur
 - n. Seat restoration on working cast
 - o. Adjust proximal contacts independently using articulating paper, stones, and rubber wheels
 - p. Repeat adjusting proximal contacts until restoration seats on solid cast
 - q. Verify proximal contacts with shimstock
 - r. Adjust centric and eccentric occlusion of restoration on working cast
 - s. Maintain proper contours
7. Finish and polish restoration
 - i. Matte finish restorations using stones, avoiding previously adjusted areas
 - j. Rubber all restoration surfaces
 - k. Polish restorations using buffing bar compound (BBC) or equivalent, soft bristle brushes, and rag or felt wheel.
 - l. Final polish restorations, using rouge, soft bristle brush, and rag or felt wheels
 - m. Clean restorations using steam or ultrasonic cleaner
 - n. Check for proximal and occlusal contacts with shimstock
 - o. Check fit of casting to ensure accurate margins and no "rocking"
 - p. Disinfect restoration IAW manufacturer's instructions

MODULE 4: FABRICATE FIXED DENTAL PROSTHESES (FDP)

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to wax patterns and satisfactorily perform all the parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE FDP		
DID THE TRAINEE...?	YES	NO
9. Properly inspect, blockout, mark, seal, and space the dies for waxing		
10. Accurately create wax retainers and pontic to proper contour/design, correct occlusion, adapted margins, and appropriate connector thickness		
11. Correctly sprue and invest pattern		
12. Properly burnout mold and cast restoration while adhering to all safety precautions		
13. Divest and deoxidize casting without damaging casting		
14. Adjust casting to properly fit dies with no "rock" and achieve appropriate contacts while maintaining proper emergence profile and height of contour		
15. Finish and polish restoration to a higher luster while maintaining desired contacts and margin integrity		
16. Clean and disinfect restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 5: FABRICATE METAL-CERAMIC FDP

STS TASK REFERENCE(S):

3.9 Fabricate metal-ceramic FDP

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate a single unit-metal ceramic restoration. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Air Abrasive Unit	Points and Wheels	Casting Investment
Alloy	Handpiece	Dental Instruments
Assorted	Inlay Wax	Gas/Oxygen Torch
Burs/Stones	Microscope	Debubbler
Burnout Furnace	Porcelain Furnace	Metal Gauge
Carving	Ring Liner	Polishing
Instruments	Soft Bristle Brushes	Compound
Casting Rings	Sprue Wax	Separating Medium
Dental Porcelain	Wax Gauge	Rubber Dam
Die Hardener	Articulator	Sprue Base
Die Spacer	Electronic Scale	Vibrator
	Bunsen Burner	Wax Powder

STEPS IN TASK PERFORMANCE:

1. Inspect die preparation for undercuts and adequate reduction
2. Blockout undercuts, mark margins, and apply die hardener/spacer
3. Apply separating medium to die and adjacent/opposing teeth
4. Apply hot inlay wax to die to form a coping
5. Remove wax pattern and inspect internal surface to voids
6. Replace wax pattern on die and reseal with inlay wax
7. Place wax pattern on cast and reduce any occlusal interferences
8. Apply wax to form lower 2/3 tooth contour of abutments and pontic
9. Wax occlusal morphology
10. Apply wax powder to occlusal of pattern and check for prescribed occlusal contacts
11. Apply inlay wax to fill in deficient contours, smooth and refine entire pattern
12. Draw cutback design on pattern using carving instrument
13. Cutback porcelain bearing areas
14. Apply wax to margins and refine marginal adaptation using microscope
15. Determine required size of sprue leads
16. Construct runner bar assembly using sprue wax or preformed patterns

MODULE 5: FABRICATE METAL-CERAMIC FDP

STEPS IN TASK PERFORMANCE (CONTINUED):

17. Sticky wax sprue leads to the pattern at a 45-degree angle
18. Seal sprue leads to runner bar using inlay wax
19. Sticky-wax feeder sprue leads to sprue base
20. Seal sprue leads to runner bar using inlay wax
21. Remove pattern from die and weigh
22. Determine the amount of alloy needed, for casting, by multiplying the wax pattern weight times the alloy's specific gravity
23. Invest, burnout, and cast the pattern
24. Desprue substructure and seat substructure on removable dies
25. Finish the substructure
26. Hold substructure with hemostats and blast in air abrasive unit
27. Remove residue using steam or ultrasonic cleaner
28. Place substructure on sagger tray and fire substructure IAW the alloy's manufacturer's instructions
29. Air abrade unit and clean, if required by manufacturer
30. Apply and fire opaque porcelain
31. Apply and fire dentine and enamel porcelain
32. Contour the fired restoration
33. Reapply, fire, and contour porcelain correction
34. Apply stain and glaze to the restoration
35. Polish the non-porcelain bearing surfaces
36. Clean and disinfect the finished restoration

MODULE 5: FABRICATE METAL-CERAMIC FDP

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate a metal-ceramic FDP and satisfactorily perform all parts of the tasks without assistance. Ensure proper precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE METAL-CERAMIC FDP		
DID THE TRAINEE...?	YES	NO
1. Inspect the casts and mounting to ensure adequate reduction		
2. Wax the pattern to full contour, establishing proper anatomic form and occlusion		
3. Cut back the wax-up, providing adequate space for the porcelain veneer		
4. Sprue the wax pattern using the indirect technique		
5. Invest, burnout, and cast the substructure IAW manufacturer's directions		
6. Recover and finish the substructure to a satin finish on the porcelain bearing areas		
7. Oxidize the substructure IAW the alloy's manufacturer's instructions		
8. Apply and fire opaque porcelain, ensuring complete coverage of the underlying metal		
9. Apply dentine and enamel porcelain to anatomic features of the surrounding dentition		
10. Contour the fired porcelain, reproducing the anatomic features of the surrounding dentition		
11. Color correct restoration to match prescribed shade and fire to a glaze		
12. Polish the non-porcelain bearing surfaces to a higher luster		
13. Clean and disinfect the restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 6: SOLDER FIXED RESTORATIONS – PRE-SOLDER

STS TASK REFERENCE(S):

3.11.1 Pre-solder

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to pre-solder. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Air Abrasive Unit	Solder
Burs	Soldering Stand
Ceramic Bound Stones	Striker
Furnace or Oven	Tongs
Hemostats	
Oxygen Torch with Soldering Tip	
Steam Cleaner	

STEPS IN TASK PERFORMANCE:

1. Heat soak invested assembly IAW manufacturer's instructions
2. Ensure the torch has appropriate soldering tip
3. Adjust the flame until the inner cone is about 15 mm long, there should be little to no hissing
4. Remove assembly from oven and place on soldering stand
5. Immediately direct the flame around the base of investment, to raise temperature
6. Direct flame to the casting until they show a slight orange color
7. Hold the torch in one hand and the presolder in the other
8. Place the end of the solder strip onto the joint
9. Ensure the solder melts and flows down into the joint area
10. Remove the solder strip, but keep the flame on the assembly
11. Move the flame to the reverse side and draw the solder through the joint
12. Let the investment and substructure bench cool to room temperature
13. Divest and clean substructure using air abrasive unit
14. Grind solder area to desire contour using stones
15. Fit substructure on cast and adjust to occlusion

MODULE 6: SOLDER FIXED RESTORATIONS – PRE-SOLDER

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must satisfactorily perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

SOLDER FIXED RESTORATIONS – PRE-SOLDER		
DID THE TRAINEE...?	YES	NO
1. Burnout the investment assembly		
2. Adjust the soldering torch and heat the investment patty evenly		
3. Accurately produce a solder joint which completely fills the joint area and is free of porosity		
4. Divest without abrading or damaging substructure		
5. Finish solder area to desire contour		
6. Verify fit of substructure on cast		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 7: SOLDER FIXED RESTORATIONS – CONTACTS

STS TASK REFERENCE(S):

3.11.2 Contacts

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*

AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*

EVALUATION INSTRUCTIONS:

Demonstrate how to prepare and solder a contact. Describe how to select the appropriate solder. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Bunsen Burner	Goggles	Soldering Investment
Deoxidizing	Graduated Cylinder	Soldering Stand
Agent/Abrasive	Handpiece	Spatula
Distilled Water	Lathe	Striker
Finishing and Polishing	Mixing Bowl	Tongs
Burs, Points, and Wheels	Polishing Compound	Torch with Soldering Tip
Flux	Solder	Tweezers

STEPS IN TASK PERFORMANCE:

1. Single unit metal restoration
 - a. Prepare proximal areas using clean rubber wheels and points
 - b. Confine the solder to the desired area with graphite or another anti-flux
 - c. Adjust Bunsen Burner to maximize the temperature of the reducing portion of the flame
 - d. Select the solder and cut a piece larger than the contact area
 - e. Hold the crown with a pair of soldering tweezers
 - f. Warm the crown over the flame and apply flux
 - g. Dip the solder into the flux
 - h. Position the contact area being soldered horizontally and add the solder
 - i. Hold the crown with solder in the reducing zone of the flame
 - j. Heat the crown until it turns red and the solder begins to flow
 - k. Quench the crown
2. FDP
 - a. Prepare proximal areas using clean rubber wheels and points
 - b. Confine the solder to the desired area with graphite or another anti-flux
 - c. With a FDP it is recommended that you invest the retainers to prevent possibly warping the FDP when heating
 - d. Select the solder and cut a piece slightly larger than the contact area
 - e. Preheat solder patty at 900° F in the burnout furnace for 30 minutes
 - f. Dip the solder segment into the flux
 - g. Remove patty from oven and place on soldering stand

MODULE 7: SOLDER FIXED RESTORATIONS – CONTACTS

STEPS IN TASK PERFORMANCE (CONTINUED):

- h. Apply flux and solder to solder area
- i. Evenly heat crown using reducing portion of torch flame
- j. Direct flame to surrounding solder area
- k. Once the solder has flowed remove flame immediately
- l. Let solder patty bench cool before removing FDP

MODULE 7: SOLDER FIXED RESTORATIONS – CONTACTS

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to solder crowns and FDPs while satisfactorily performing all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

SOLDER FIXED RESTORATIONS – CONTACTS		
DID THE TRAINEE...?	YES	NO
1. Prepare the solder area		
2. Select the appropriate solder		
3. Apply flux		
4. Use reducing zone of flame		
5. Accurately solder a proximal contact		
6. Reestablish the proximal contact		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 8: FABRICATE SURVEYED CROWN

STS TASK REFERENCE(S):

3.12 Fabricate Surveyed Crown

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate a surveyed crown. Ensure you have a tripoded design cast prior to waxing the pattern or have the dentist establish the survey table tilt. Have the trainee fabricate a surveyed crown and suggest ways to improve performance. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Air Abrasive Unit	Rubber Dam
Burs	Soft Bristle Brushes
Bunsen Burner	Sprue Wax
Casting Rings	Burnout Furnace
Casting Torch	Points and Wheels
Dental Instruments	Polishing Compound
Dental Surveyor	Separating Medium
Die Hardener	Sprue Base
Die Spacer	Survey Table w/Instruments
Handpiece	Undercut Gauge
Inlay Wax	Vibrator
Investment	Wax Pencil (Red & Blue)
Microscope	Wax Powder

STEPS IN TASK PERFORMANCE:

1. Check bite for adequate reduction
2. Inspect the preparation for undercuts or distorted areas
3. Block out any undercuts, mark margins and apply die hardener/spacer
4. Apply separating medium to pattern area and opposing teeth
5. Apply hot inlay wax to die to form coping
6. Remove wax pattern and inspect internal surface for voids
7. Replace wax pattern on die and reseal with inlay wax
8. Place wax pattern on articulator and reduce any occlusal interferences
9. Apply wax to form lower 2/3 tooth contour of abutments and pontic
10. See training references for specific anatomic and functional contouring
11. Apply wax powder to occlusal of pattern and check for prescribed contact pattern
12. Apply inlay wax to fill in deficient contours, smooth and refine entire pattern
13. Remove master cast and position on survey table
14. Adjust survey table to prescribed tilt using tripod marks
15. Lock table in place to maintain established tilt

MODULE 8: FABRICATE SURVEYED CROWN

STEPS IN TASK PERFORMANCE (CONTINUED):

16. Use undercut gauge to determine the location of the desired undercut, per the dentist's instructions
17. Carve guide planes at required locations
18. Adjust contours to ensure survey lines are compatible with proposed clasp assemblies
19. Carve rests in prescribed locations
20. Smooth and refine entire pattern
21. Sprue, invest, burnout and cast
22. Finish and polish the restoration ensuring all previously established features are unaltered
23. Clean and disinfect the finished restoration

MODULE 8: FABRICATE SURVEYED CROWN

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate a surveyed crown and satisfactorily perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE SURVEYED CROWN		
DID THE TRAINEE...?	YES	NO
1. Inspect cast and mounting to ensure adequate reduction		
2. Wax pattern to full contour, establishing proper anatomic form and occlusion		
3. Place the cast on survey table, establishing the prescribed path of insertion		
4. Establish survey lines and retentive undercuts in appropriate locations for proposed clasp assemblies		
5. Place guide planes and rests in prescribed locations		
6. Sprue, invest, burnout and cast IAW manufacturer's directions		
7. Finish and polish the restoration without altering the previously established axial contours		
8. Clean and disinfect the finished restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 9: FABRICATE IMPLANT PROSTHESES - SOFT TISSUE MASTER CAST

STS TASK REFERENCE(S):

3.15.1 Soft tissue master cast

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 3, *General Laboratory Procedures and Orthodontic Appliances*
AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to pour soft tissue master casts. Demonstrate seating of impression coping and implant analog in final impression, soft tissue application, and bead and box pouring method. Describe how overflow impression material on the seating surfaces of the copings can indicate copings not being properly seated. Emphasize the need to accurately seat impression copings and implant analog. Explain the need to use separating medium when applying soft tissue material. Have the trainee construct a soft tissue master cast and suggest ways to improve performance. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Bard Parker Knife	Permanent Ink Marker
Boxing Wax	Rope Wax
Cast Trimmer	Soft Tissue Material
Die Stone	Spatula
Impression Coping	Surface Tension Reducing Agent
Laboratory Analog	Vacuum Mixer
	Vibrator

STEPS IN TASK PERFORMANCE:

1. Disinfect impression IAW manufacturer's guidelines
2. Read DD Form 2322
3. Inspect the impression copings for stability in the impression material
4. Trim periphery of impression material if needed to remove any undercuts
5. Attach and seat impression coping and laboratory analog (closed tray)
Note: If fabricating a screw retained crown, impression coping will be in the custom impression tray, use open tray technique.
6. Place a light layer of wax around impression coping and analog junction; prevents material from flowing into junction
7. Apply separating medium
8. Apply soft tissue material around each of the abutments, leaving the end exposed for stone to be poured around it for retention
9. Bead and box the impression
10. Apply surface tension reducing agent

MODULE 9: FABRICATE IMPLANT PROSTHESES - SOFT TISSUE MASTER CAST

STEPS IN TASK PERFORMANCE (CONTINUED):

11. Vacuum mix the die stone per manufacturer's instructions and pour the impression without using excess vibration
12. Allow die stone to set
13. Remove cast from impression without damaging cast
14. Trim sides of cast using cast trimmer and smooth edges
15. Remove analog screw (guide pin) and inspect soft tissue material for voids and inspect seating surface of implant analog
16. Dry cast and mark with patient and dentist name on heel of cast using permanent marker
17. Remove excess tissue material from seating surface of implant analog if needed
18. Review DD Form 2322 to ensure case was completed according to dentist request
19. Return cast to dentist to trim tissue

MODULE 9: FABRICATE IMPLANT PROSTHESES - SOFT TISSUE MASTER CAST

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to construct soft tissue master cast and perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE IMPLANT PROSTHESES - SOFT TISSUE MASTER CAST		
DID THE TRAINEE...?	YES	NO
7. Disinfect impression		
8. Read DD Form 2322		
9. Attach and seat impression coping and implant analog (closed tray technique)		
10. Adequately apply separating medium		
11. Apply soft tissue material around each of the abutments, leaving the end of each abutment analog exposed for stone to be poured around it for retention		
12. Properly Bead and Box impression, apply surface tension reducer, and pour bubble free impression		
13. Remove impression without damaging cast and trim appropriately		
14. Remove analog screw (guide pin) and verify no voids in soft tissue or material on surface of implant analog		
15. Print patient and dentist name on heel of casts		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 10: FABRICATE IMPLANT PROSTHESES - IMPLANT CUSTOM ABUTMENT

STS TASK REFERENCE(S):

3.15.2 Implant custom abutment

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 3, *General Laboratory Procedures and Treatment Appliances*

AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate an implant custom abutment. Explain the following:

- a. How to evaluate the casts and occlusion for accuracy to determine if mounting is needed.
- b. The importance of evaluating the implant angle as it may indicate a change in design.

After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Abutment	Implant Hex Drivers
Abutment/Laboratory Screw	Implant Tool Holder
Articulator	Investment
Articulating Paper	Lab Putty
Bard Parker	Separating Disc
Bunsen Burner/Electric Waxed	Separating Medium
Cotton Tip Applicator	Steam Cleaner
Casting Ring	Shim Stock
Handpiece	Sticky Wax

STEPS IN TASK PERFORMANCE:

1. Steam clean the analog in master cast
2. Slice a small thin window on the lingual of the soft tissue material with a bard parker. This is used to verify fit and accuracy of abutment to analog relationship
3. Place implant abutment into position slightly rotating in order to orient correctly to analogs (making sure it's fully seated)
4. Use abutment/laboratory screw (not clinical/gold screw) and lightly tighten with correct hex driver
5. Using a hot bard parker blade or mounted separating disc, cut the waxing sleeve to the desired length. 2mm reduction is desired for a full porcelain occlusal and 1mm for crowns with metal occlusal

Note: A custom abutment must extend a minimum of 2mm apical to the gingival crest in order to provide sufficient retention – if space is insufficient a screw retained implant crown is recommended

MODULE 10: FABRICATE IMPLANT PROSTHESES - SOFT TISSUE MASTER CAST

STEPS IN TASK PERFORMANCE (CONTINUED):

6. Apply a light coat of separating medium to all stone areas on master cast around implant being careful to stay away from the implant fixture and soft tissue material
Note: The abutment will not be removed from the master cast once waxing has started until all contours are complete above the gingiva crest
7. Wax around the waxing sleeve using a thin application of sticky wax, staying away from the gingival crest
8. Wax around the gingival crest 360 degrees with inlay wax allowing the hot wax to flow down to the metal collar capturing the contour of the gingiva crest
9. Wax to full contour being careful not to get wax inside the screw access hole
10. Cutback pattern establishing a gingival to occlusion taper from at or just below the occlusion with no more than a 7 degree axial angle and a reduction of 2 mm on the occlusal surface, maintain the sulcus for retention, stability, and space
 - a. For porcelain margins the facial prep will be designed to extend sub gingival as a 90 degree metal-ceramic junction approximately 1mm or as prescribed on DD Form 2322
 - b. For custom abutments with a metal collar create a beveled margin approximately 1mm wide
Note: When esthetics is not a concern the cemented junction where the crown and custom abutment are joined is more hygienic if placed supra gingival
11. Using a hex driver, remove the waxed abutment from the master cast and screw onto implant holder
12. Carefully cover the occlusal edge of the abutment platform/metal collar using sticky wax (sticky wax acts as a binder between your wax and the abutment platform/metal collar)
13. Flow inlay wax from the abutment platform/metal collar to the wax adapted from the soft tissue
14. Without incorporating any concave surfaces, shape the wax and smooth the contours while carefully shaping the sticky wax area covering the abutment platform/metal collar so that only the most occlusal aspect of the abutment platform/metal collar is covered with sticky wax
15. Using a cotton tip applicator clean the metal collar with ammonia
16. Attach sprue at a 45 degree angle to the axial wall near the most bulky part of the abutment
17. Remove screw and separate from implant holder
18. Inspect the screw seat and access hole area closely and clean with ammonia if necessary
19. Place the sprued abutment onto the investment ring base to where the investment can be observed emerging thru the abutment access hole when the ring is filled slowly
20. Reverse water and special liquid ratios to prevent expansion around the platform
21. Cast using less casting pressure IAW manufacturer's instructions
22. Redefine the screw access hole with a reamer or round bur, if necessary
23. Divest the casting using aluminum oxide; do not sandblast the implant, doing so will cause a poor fit between the abutment and implant

MODULE 10: FABRICATE IMPLANT PROSTHESES - IMPLANT CUSTOM ABUTMENT

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate a custom abutment and perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE IMPLANT PROSTHESES - IMPLANT CUSTOM ABUTMENT		
DID THE TRAINEE...?	YES	NO
1. Verify abutment was fully seated on analog		
2. Appropriately reduce waxing sleeve prior to waxing		
3. Cutback pattern to appropriate measurements		
4. Design a subgingival surface without creating concave surfaces		
5. Correctly sprue to the thickest part and invest pattern		
6. Properly burnout mold and cast restoration while adhering to all safety precautions and manufacturer's instructions		
7. Divest and deoxidize casting without damaging implant platform		
8. Finish abutment while maintaining desired contours		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 11: FABRICATE IMPLANT PROSTHESES - IMPLANT ABUTMENT SUPPORTED RESTORATION

STS TASK REFERENCE(S):

3.15.3 Implant abutment supported restoration

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 3, *General Laboratory Procedures and Treatment Appliances*

AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate an implant abutment supported restoration. Have the trainee construct an implant abutment supported restoration and suggest ways to improve performance. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Abutment	Implant Hex Drivers
Abutment/Laboratory Screw	Implant Tool Holder
Articulator	Investment
Articulating Paper	Lab Putty
Bard Parker	Separating Disc
Bunsen Burner/Electric Waxer	Separating Medium
Cotton Tip Applicator	Steam Cleaner
Casting Ring	Shim Stock
Handpiece	Sticky Wax

STEPS IN TASK PERFORMANCE:

1. Place abutment in master cast
2. Fill the screw access hole with wax or putty
3. Apply die spacer following manufacturer's recommendations
4. Do not apply spacer within 1.0 mm of margins
5. Apply die lubricant to abutment, proximal contacts and opposing teeth
6. Wax pattern to create contours that mimic natural dentition without incorporating eccentric contacts, maintain marginal integrity (cut back if fabricating metal-ceramic restoration)
7. Remove pattern from abutment, sprue and invest pattern
8. Burnout mold and cast restoration
9. Divest and deoxidize casting without damaging casting
10. Adjust casting to properly fit abutment
11. Establish appropriate contacts while maintaining proper emergence profile and height of contour

MODULE 11: FABRICATE IMPLANT PROSTHESES - IMPLANT ABUTMENT SUPPORTED RESTORATION

STEPS IN TASK PERFORMANCE (CONTINUED):

12. When fabricating a metal-ceramic restoration
 - a. Finish and prepare substructure for veneering
 - b. Oxidize prepared casting
 - c. Apply opaque porcelain
 - d. Apply shoulder porcelain
 - e. Apply dentine and enamel porcelain
 - f. Fire porcelain buildups
 - g. Contour fired porcelain
 - h. Surface stain and color correct veneer
 - i. Glaze porcelain restoration
13. Remove putty or wax from screw access hole
14. Finish and polish restoration to a higher luster while maintaining desired contacts and margin integrity
15. Clean and disinfect restoration

MODULE 11: FABRICATE IMPLANT PROSTHESES - IMPLANT ABUTMENT SUPPORTED RESTORATION

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate an implant abutment supported restoration and perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE IMPLANT PROSTHESES - IMPLANT ABUTMENT SUPPORTED RESTORATION		
DID THE TRAINEE...	YES	NO
1. Verify abutment is fully seated on analog		
2. Accurately create wax pattern to proper contour, correct occlusion, and adapted margins (cut back if fabricating a metal-ceramic restoration)		
3. Correctly sprue to the thickest part and invest pattern		
4. Properly burnout mold and cast restoration while adhering to all safety precautions and manufacturer's instructions		
5. Divest and deoxidize casting without damaging casting		
6. Adjust casting/substructure to properly fit abutment and achieve appropriate contacts while maintaining proper emergence profile and height of contour (properly prepare porcelain bearing surface if fabricating a metal-ceramic restoration)		
7. If fabricating a metal-ceramic restoration: contour or build the restoration to harmonize with existing natural dentition, correctly color match and glaze		
8. Finish and polish metal to a higher luster while maintaining desired contacts and margin integrity		
9. Clean and disinfect restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 12: FABRICATE IMPLANT PROSTHESES - SCREW RETAINED IMPLANT CROWN

STS TASK REFERENCE(S):

3.15.4 Screw retained implant crown

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 3, *General Laboratory Procedures and Treatment Appliances*

AFPAM 47-103V2, *Dental Laboratory Technology-Fixed and Special Prosthodontics*

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate a screw retained implant crown. Emphasize the importance of not having eccentric contact. Have the trainee construct a screw retained implant crown and suggest ways to improve performance. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Abutment	Handpiece
Abutment/Laboratory Screw	Implant Hex Drivers
Alloy	Implant Tool Holder
Articulator	Investment
Articulating Paper	Lab Putty
Bard Parker	Separating Disc
Bunsen Burner/Electric Waxed	Separating Medium
Cotton Tip Applicator	Steam Cleaner
Casting Machine	Shim Stock
Casting Ring	Sticky Wax

STEPS IN TASK PERFORMANCE:

1. Trim soft tissue material to allow for a smooth convex surface that accommodates proper contours and ease of cleaning
2. Trim the abutment waxing sleeve, at least 1 mm in the middle from the opposing dentition if applying porcelain
3. Apply a thin coat of sticky wax to the sleeve and extend to the occlusal margin of the abutment platform, being careful not to contaminate the bottom of the platform
4. Apply separator to the soft tissue and adjacent teeth
5. Insert abutment and lightly tighten the abutment/laboratory screw (do not use the clinical/gold screw), and visually verify that the abutment is seated completely on the analog
6. Wax pattern to create contours that mimic natural dentition without incorporating eccentric contacts, maintain marginal integrity (cut back if fabricating metal-ceramic restoration)
7. Using a hex driver, remove the waxed implant from the master cast and screw onto implant holder

MODULE 12: FABRICATE IMPLANT PROSTHESES - SCREW RETAINED IMPLANT CROWN

STEPS IN TASK PERFORMANCE (CONTINUED):

8. Carefully cover the occlusal edge of the abutment platform/metal collar using sticky wax (sticky wax acts as a binder between your wax and the abutment platform/metal collar)
9. Flow inlay wax from the abutment platform/metal collar to the wax adapted from the soft tissue
10. Without incorporating any concave surfaces, shape the wax and smooth the contours while carefully shaping the sticky wax area covering the abutment platform/metal collar so that only the most occlusal aspect of the abutment platform/metal collar is covered with sticky wax
11. Using a cotton tip applicator clean the metal collar with ammonia
12. Attach sprue at a 45 degree angle to the axial wall near the most bulky part of the abutment
13. Remove screw and separate from implant holder
14. Inspect the screw seat and access hole area closely and clean with ammonia if necessary
15. Place the sprued abutment onto the investment ring base to where the investment can be observed emerging thru the abutment access hole when the ring is filled slowly
16. Reverse water and special liquid ratios to prevent expansion around the platform
17. Cast using less casting pressure IAW manufacturer's instructions
18. Divest using aluminum oxide, do not sandblast the implant, doing so will cause a poor fit between the abutment and the implant
19. Redefine the screw hole with a reamer or round bur, if necessary
20. Establish appropriate contacts while maintaining proper emergence profile and height of contour
21. When fabricating a metal-ceramic restoration
 - a. Finish and prepare implant for veneering
 - b. Oxidize implant, place on sagger tray such that implant interface does not get damaged
 - c. Apply opaque porcelain
 - d. Apply shoulder porcelain
 - e. Apply dentine and enamel porcelain
 - f. Fire porcelain buildups
 - g. Contour fired porcelain
 - h. Surface stain and color correct veneer
 - i. Glaze porcelain restoration
22. Finish and polish restoration to a higher luster while maintaining desired contacts and margin integrity
23. Clean and disinfect restoration

MODULE 12: FABRICATE IMPLANT PROSTHESES - SCREW RETAINED IMPLANT CROWN

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate a screw retained implant crown and perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE IMPLANT PROSTHESES - SCREW RETAINED IMPLANT CROWN		
DID THE TRAINEE...?	YES	NO
1. Verify abutment was fully seated on analog		
2. Accurately create wax pattern to proper contour, correct occlusion, and adapted margins		
3. Correctly sprue to the thickest part and invest pattern		
4. Properly burnout mold and cast restoration while adhering to all safety precautions and manufacturer's instructions		
5. Divest and deoxidize casting without damaging casting and abutment platform		
6. Adjust casting/substructure to achieve appropriate contacts while maintaining proper emergence profile and height of contour (properly prepare porcelain bearing surface if fabricating a metal-ceramic restoration)		
7. Contour or build the restoration to harmonize with existing natural dentition (correctly color match and glaze if fabricating a metal-ceramic restoration)		
8. Finish and polish metal to a higher luster while maintaining desired contacts and margin integrity		
9. Clean and disinfect restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 13: FABRICATE CAD/CAM RESTORATION - DESIGN FIXED RESTORATION

STS TASK REFERENCE(S):

3.16.1 Design fixed restoration

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to design a fixed restoration utilizing CAD software. Throughout this process, stress the importance of a properly designed restoration that meets form, function and esthetic requirements. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

CAD Computer Station
CAD Software
CAD Scanner
Cast Models

Digital Files
Mounting Table

STEPS IN TASK PERFORMANCE:

1. Open design software and follow program prompts for new case setup
2. If initiated with chairside unit, import working case file and proceed to step 7
3. If initiated with laboratory unit, create case/enter information from DD Form 2322
4. Input case administration, select case specifics (e.g. tooth number, restoration, material, tooth morphology and mold genre)
5. Verify information is correct and follow program prompts
6. Scan casts IAW manufacturer's instructions
7. Import and verify scan for accuracy (e.g., margins, bite, anomalies, etc.)
8. Set model axis/alignment (if applicable)
9. Trim the cast (if applicable)
10. Identify and mark the margin of the preparation
11. Set insertion axis
12. Verify parameters
13. Initiate CAD proposal and verify proposed restoration's long axis, axial contours, cusp height, marginal ridge height, and contacts
14. Utilize program tools to make required adjustments and correct any surface imperfections
15. Save the restoration file (i.e., .stl or .cam)

MODULE 13: FABRICATE CAD/CAM RESTORATION - DESIGN FIXED RESTORATION

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to design a fixed restoration and satisfactorily perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE CAD/CAM RESTORATION - DESIGN FIXED RESTORATION		
DID THE TRAINEE...?	YES	NO
1. Appropriately enter case into workflow		
2. Correctly scan/import casts and verify accuracy		
3. Accurately mark the margin of the preparation		
4. Set insertion axis		
5. Establish ideal contours/contacts		
6. Maintain minimum thickness		
7. Effectively correct surface imperfections		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 14: FABRICATE CAD/CAM RESTORATION - DESIGN IMPLANT

STS TASK REFERENCE(S):

3.16.2 Design implant

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to design an implant utilizing CAD software. Explain how a titanium base interfaces with the implant fixture, laboratory analog, and implant supported restoration. Describe how this influences the fabrication and thus the durability, esthetics, and accuracy of restoration fit. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

3D Scanner	Digital Files	Implant
CAD Computer Station	Mounting Table	Connection/Titanium
CAD Software	Scan Body	Base
Cast Models	Scan Spray	

STEPS IN TASK PERFORMANCE:

1. Open design software and follow program prompts for new case setup
2. If initiated with chairside unit, import working case file and proceed to step 7
3. If initiated with laboratory unit, create case/enter information from DD Form 2322
4. Input case administration, select case specifics (e.g., tooth number, restoration, implant connection, titanium base manufacturer, titanium base type, scanbody type, and/or material)
5. Verify case details and follow program prompts
6. Scan casts IAW manufacturer's instructions (e.g., working cast, opposing cast, bite relation, soft tissue)
7. Import and verify the scan for accuracy (e.g., margins, bite, anomalies, etc.)
8. Set model axis/alignment (if applicable)
9. Trim the model (if applicable)
10. Identify scanbody/scanflag
11. Identify gingival contours/emergence line
12. Set restoration axis
13. Verify parameters (if applicable)
14. Initiate CAD proposal and verify proposed restoration's long axis, axial contours, cusp height, marginal ridge height, and contacts
15. Utilize program tools to make required adjustments
16. Split restoration (if applicable)
17. Utilize program tools to make required adjustments and correct any surface imperfections on abutment and/or restoration
18. Save the restoration file (i.e., .stl or .cam)

MODULE 14: FABRICATE CAD/CAM RESTORATION - DESIGN IMPLANT

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to design an implant and satisfactorily perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE CAD/CAM RESTORATION - DESIGN IMPLANT		
DID THE TRAINEE...?	YES	NO
1. Appropriately enter case into workflow		
2. Correctly scan/import casts and verify accuracy		
3. Identify scanbody/scanflag		
4. Accurately identify gingival contours/emergence line		
5. Set insertion axis		
6. Establish ideal contours/contacts		
7. Correct surface imperfections		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 15: FABRICATE CAD/CAM RESTORATION – FABRICATE FIXED RESTORATION

STS TASK REFERENCE(S):

3.16.3 Fabricate fixed restoration

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate a fixed restoration utilizing CAM software and equipment. Throughout this process, stress the importance of a properly designed restoration that meet form, function and esthetic requirements. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Bead Pan	Carbide Burs
CAM Material Block	Digital Files
CAM Milling Unit	Diamond Burs
CAM Sintering Unit	Mounting Table
CAM Milling Burs	Soft Brush
Cast Models	

STEPS IN TASK PERFORMANCE:

1. Open CAM software and follow program prompts for new job setup
2. Import restoration file (i.e., .stl or .cam) IAW manufacturer's instructions
3. Select appropriate block material
4. Select appropriate block size
5. Position restoration sprue to minimize interference with contour, contact, and margin
6. Load block IAW manufacturer's instructions
7. Initiate milling
8. If milling castable material
 - a. Remove block and pattern once milling is complete
 - b. Desprue pattern from block and recontour sprue stump
 - c. Verify contacts, contours, and margins on master cast and make corrections as needed
 - d. Sprue and invest pattern
 - e. Burnout and cast pattern
 - f. Divest casting
 - g. Adjusting casting
 - h. Finish and polish restoration
9. If fabricating an all-ceramic (lithium disilicate) restoration
 - a. Remove block and restoration once milling is complete
 - b. Desprue restoration from block and recontour sprue stump
 - c. Crystalize lithium disilicate restoration IAW manufacturer's instructions
 - d. Remove crystalized restoration

MODULE 15: FABRICATE CAD/CAM RESTORATION – FABRICATE FIXED RESTORATION

STEPS IN TASK PERFORMANCE (CONTINUED):

- e. Adjust restoration until seated and margins are closed on cast
 - f. Reestablish contacts and anatomy, if necessary
 - g. Stain and glaze restoration
 - h. Verify shade
10. If fabricating an all-ceramic (zirconium) restoration
- a. Remove block and restoration once milling is complete
 - b. Desprue restoration from block and recontour sprue stump
 - c. Remove visible dust with brush and compressed air
 - If applicable, soak the restoration in infiltration liquid IAW manufacturer's instructions
 - d. Place restoration margins up on the sintering tray
 - e. Sinter IAW manufacturer's instructions
 - f. Remove sintered restoration
 - g. Adjust restoration until seated and margins are closed on cast
 - h. Reestablish contacts and anatomy, if necessary
 - i. Stain and glaze restoration
 - j. Verify shade
11. Disinfect restoration

MODULE 15: FABRICATE CAD/CAM RESTORATION - FIXED RESTORATION

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to design a fixed restoration and satisfactorily perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

DESIGN FIXED RESTORATION		
DID THE TRAINEE...?	YES	NO
1. Appropriately enter case into workflow		
2. Import file and verify accuracy		
3. Select appropriate block material		
4. Position restoration sprue to minimize interference with contour, contact, and margin		
5. Mill the restoration		
6. Desprue pattern from block and recontour sprue stump		
7. If applicable, crystalize/sinter restoration IAW manufacturer's instructions		
8. Establish contacts, contours, and margins on master cast and make corrections as needed		
9. Finish and polish/Stain and glaze restoration		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 16: FABRICATE CAD/CAM RESTORATION – FABRICATE IMPLANT

STS TASK REFERENCE(S):

3.16.4 Fabricate implant

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 3, *General Laboratory Procedures and Orthodontic Appliances*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to fabricate an implant restoration utilizing CAM software and equipment. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Bead Pan	CAM Milling Burs	Digital Files
CAM Material Block	Cast Models	Mounting Table
CAM Milling Unit	Carbide Burs	Soft Brush
CAM Sintering Unit	Diamond Burs	Titanium Base Platform

STEPS IN TASK PERFORMANCE:

1. Open CAM software and follow program prompts for new job setup
2. Import implant restoration or abutment file (i.e., .stl or .cam) IAW manufacturer's instructions
3. Select appropriate block material
4. Select appropriate block size
5. Position sprue to minimize interference with contour, contact, and margin
6. Load block IAW manufacturer's instructions
7. Initiate milling
8. Remove block and implant restoration or abutment once milling is complete
9. Desprue implant restoration or abutment from block and recontour sprue stump
10. If fabricating an all-ceramic (lithium disilicate) implant restoration or abutment
 - a. Crystallize lithium disilicate implant restoration or abutment IAW manufacturer's instructions
11. If fabricating an all-ceramic (zirconium) implant restoration or abutment
 - a. Remove visible dust with brush and compressed air
 - b. If applicable, soak or paint the restoration with infiltration liquid IAW manufacturer's instructions
 - c. Sinter IAW manufacturer's instructions
12. Ensure implant restoration or abutment is fully seated on titanium base platform
13. Reestablish contacts and anatomy, if applicable
14. Stain and glaze implant restoration or abutment
15. Verify shade
16. Disinfect implant restoration or abutment

MODULE 16: FABRICATE CAD/CAM RESTORATION – FABRICATE IMPLANT

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to fabricate an implant restoration utilizing CAM software and equipment and satisfactorily perform all parts of the task without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

FABRICATE CAD/CAM RESTORATION – FABRICATE IMPLANT		
DID THE TRAINEE...?	YES	NO
10. Appropriately enter case into workflow		
11. Import file and verify accuracy		
12. Correctly position sprue to minimize interference with contour, contact, and margin		
13. Mill implant restoration or abutment		
14. Crystalize/Sinter implant restoration or abutment IAW manufacturer's instructions		
15. Ensure implant restoration or abutment is fully seated on TiBase platform		
16. Establish ideal contours/contacts/anatomy		
17. If applicable, stain and glaze and verify shade		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should certify performance by appropriately documenting the training record.

MODULE 17: DIGITAL MODELING - CREATE MODEL

STS TASK REFERENCE(S):

7.1.1 Create model

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

The following is an example: Demonstrate how to create a maxillary and/or mandibular diagnostic model utilizing CAD/CAM software. Throughout this process, stress the importance of a properly fabricated digital model. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Physical Stone Model	CAD/CAM Software/PC
Chairside Scan (alternate method)	CAD/CAM Model Module
Dental Scanning Unit	

STEPS IN TASK PERFORMANCE:

1. Begin with fully fabricated and disinfected dental stone model
2. Open the CAD/CAM software
3. Select the type of workflow: restoration, splint appliance, or model
4. Attach model to Dental Scanning Unit
5. Within the CAD/CAM software, initiate the scanning process
6. Assess digital scan for optical voids
7. Capture additional images to ensure voids are fully populated
8. If necessary, import chairside scan, "*.stl" file into the CAD/CAM software
9. Edit virtual model using the cut tool to minimize file size
10. Check occlusion. If the contact marks do not match the physical model, go to step 5
11. Set model axis to align midline and place of occlusion
12. Open CAD/CAM Model Module
13. Mark the boundaries of the digital scan identifying the useful data- all tissue and dentition
14. Select appropriate model base height
15. Utilizing the tools in the CAD/CAM software tools, create a raised or imprinted name on the model such as: "Patientlastname/Doctorlastname"
16. Save the designed model in the designated file/folder directory

NOTE: Reference Module 19: Export Digital File upon completion of this module.

MODULE 17: DIGITAL MODELING - CREATE MODEL

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to satisfactorily create a model and perform all steps without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

DIGITAL MODELING - CREATE MODEL		
DID THE TRAINEE...?	YES	NO
1. Select the type of workflow. Scan cast or import “*.stl” scan from chairside unit		
2. Edit virtual model using the cut tool to minimize file size		
3. Check occlusion and properly align the model		
4. Mark the boundaries of the digital scan		
5. Design a digital model with appropriate base height		
6. Design a digital model with appropriate name		
7. Save digital model		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should acknowledge performance by appropriately documenting the training record.

MODULE 18: DIGITAL MODELING - CREATE DIGITAL RESTORATION

STS TASK REFERENCE(S):

7.1.2 Create digital restoration

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to create a digital restoration utilizing CAD/CAM software. Throughout this process, stress the importance of a properly designed restoration that meet form, function and esthetic requirements. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Fully Fabricated Digital Model
CAD/CAM Software/PC

STEPS IN TASK PERFORMANCE:

1. Begin with previously scanned maxillary, mandibular and buccal scans
2. Ensure maxillary and mandibular scans are occluded correctly utilizing the buccal scan
3. Establish the model axis with regard to midline and occlusal plane
4. Section the active arch with respect to the preparation yielding an individual die
5. Identify and mark the margin of the preparation
6. Establish the insertion axis of the preparation that will yield the least amount of undercut
7. Adjust restoration parameters with respect to the material of the final restoration
8. Select tooth morphology and mold genre that will be harmonious with existing dentition
9. Initiate CAD proposal for the desired restoration
10. Position the restoration on the preparation in harmony with the natural dentition
11. Utilizing CAD software tools, make adjustments to the restoration's form to yield ideal proximal and occlusal contacts
12. Make adjustments to the restoration to ensure minimum thickness of material (minimum thickness will be set in your parameters)
13. Assess restoration and correct any surface imperfections such as concavities, especially in the cervical third, to establish ideal sanitation requirements

NOTE: Reference Module 19: Export Digital File upon completion of this module.

MODULE 18: DIGITAL MODELING - CREATE DIGITAL RESTORATION

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to satisfactorily create a digital restoration and perform all steps without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

DIGITAL MODELING - CREATE DIGITAL RESTORATION		
DID THE TRAINEE...?	YES	NO
1. Assess occlusion		
2. Set model axis		
3. Section the active arch and isolate die		
4. Identify and mark the margin of the preparation		
5. Set insertion axis		
6. Set appropriate material parameters		
7. Select appropriate tooth morphology		
8. Position restoration harmoniously with natural dentition		
9. Establish ideal occlusal and proximal contacts		
10. Maintain at least the minimum thickness of the material		
11. Smooth restoration contours to eliminate concavities		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should acknowledge performance by appropriately documenting the training record.

MODULE 19: DIGITAL MODELING - EXPORT DIGITAL FILE

STS TASK REFERENCE(S):

7.1.3 Export digital file

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to export a digital file using CAD/CAM software. Throughout this process, stress the importance of a properly exported digital file. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Fully Designed
Restoration/Appliance

CAD/CAM Software/PC

STEPS IN TASK PERFORMANCE:

1. Open the CAD/CAM software and access the fully designed restoration/appliance
2. Click the button labeled "Export to folder" or on "File" then "Export Data"
3. Select correct folder location in the file directory
4. If necessary, create a new file with the following naming format:
"PatientlastnameDoctorlastname"
5. Click the button "Save as type" and select "*.stl"
6. Rename file with the following naming format:
PatientlastnameDoctorlastnameApplianceType
7. Click the button "Save"
8. Verify the file was properly exported by opening the exported file

NOTE: File type may vary depending on the type of restoration, prosthesis or workflow.

MODULE 19: DIGITAL MODELING - EXPORT DIGITAL FILE

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to satisfactorily export a digital restoration/appliance and perform all steps without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

DIGITAL MODELING - CREATE MODEL		
DID THE TRAINEE...?	YES	NO
1. Open the correct restoration/appliance		
2. Select the correct file/folder location in the directory		
3. Name the folder/file in the correct format		
4. Verify the file was properly exported		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should acknowledge performance by appropriately documenting the training record.

MODULE 20: DIGITAL MODELING - PLAN DIGITAL IMPLANT

STS TASK REFERENCE(S):

7.2 Plan digital implant

TRAINING REFERENCE(S):

Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to plan a digital implant using computer aided design software.

Demonstrate how to properly align digital model(s) to a cone beam computed tomography (CBCT) scan, detect the nerve(s), add a virtual tooth, and add a virtual implant.

Throughout this process, stress the importance of accurate model/restoration alignment.

After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Implant Planning Software/PC
Scanned Models in "*.stl" Format

CBCT of the Patient with Open VDO
Manufacturer Implant Dimensions

STEPS IN TASK PERFORMANCE:

1. Open the implant planning software and start a new project
2. Import the CBCT as "*.dicom" files into the implant planning software
3. Import the scanned model into the implant planning software
4. Properly orient/align model to match the location of the CBCT scan
5. Verify accurate model orientation and overlay across entire arch
6. Add a virtual tooth at the ideal location of the final restoration
7. If necessary, use the detect nerve feature to locate and mark any nerves
8. Add virtual implant using manufacturer implant dimensions
9. Add custom abutment with a 2 mm diameter and 15 mm height to serve as the location for the access hole
10. Tentatively place implant 9mm below the occlusal plane
11. Center implant along the bone ridge
12. Angle implant to match existing roots and allow for equal amounts of bone support
13. Ensure implant location does not encroach on a nerve or sinus cavity
14. Verify guide tube settings/dimensions, access hole
15. Save the project
16. Notify provider/dentist/surgeon the project is ready for review/approval
17. Design surgical guide using implant planning software tools

NOTE: Reference Module 18: Export Digital File upon completion of this module.

MODULE 20: DIGITAL MODELING - PLAN DIGITAL IMPLANT

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to satisfactorily plan a digital implant and perform all steps without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

DIGITAL MODELING - CREATE MODEL		
DID THE TRAINEE...?	YES	NO
1. Import "*.dicom" files into the implant planning software		
2. Import scanned model(s) into the implant planning software		
3. Accurately orient model and overlay across entire arch		
4. Virtual tooth added at the ideal location		
5. All nerves detected properly		
6. Use correct manufacturer implant dimensions		
7. Implant centered and angled along the bone ridge		
8. Use correct guide tube dimensions		
9. Save project		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should acknowledge performance by appropriately documenting the training record.

MODULE 21: DIGITAL MODELING - PRINT 3D OBJECT

STS TASK REFERENCE(S):

7.3 Print 3D object

TRAINING REFERENCE(S):

CDC Z4Y052, Vol. 5, *Fixed Prosthodontics and Computer Aided Technology*
Manufacturer's Instructions

EVALUATION INSTRUCTIONS:

Demonstrate how to nest and construct printed, 3D objects. Demonstrate importing the "*.stl" file in the nesting software. Have the trainee nest the object and suggest ways to improve performance. Throughout this process, stress the importance of a properly nested object. After ensuring the trainee has received sufficient practice, evaluate his/her abilities using the performance checklist.

PERFORMANCE RESOURCES:

Nesting Software	Isopropyl Alcohol (IPA)
3D Printer	Resin
Curing Unit	Personal Protective Equipment (PPE)
Washing Unit	

STEPS IN TASK PERFORMANCE:

1. Open nesting software
2. Open ".stl" file in nesting software
3. Orient object IAW manufacturer's instructions
4. Place supports on object
5. Ensure printability of object (no cups or minima)
6. Upload object to 3D printer
7. Put on PPE
8. Load resin into 3D printer
9. Commence printing IAW manufacturer's instructions
10. Allow object to print completely
11. Remove object from 3D printer
12. Wipe down any uncured resin using IPA
13. Place object in washing unit
14. Wash object IAW manufacturer's instructions
15. Remove object from washing unit
16. Place object in curing unit
17. Cure object IAW manufacturer's instructions
18. Remove object from curing unit
19. Remove supports from the object
20. Finish/polish supports/object as needed

MODULE 21: DIGITAL MODELING - PRINT 3D OBJECT

PERFORMANCE CHECKLIST

INSTRUCTIONS:

The trainee must be able to satisfactorily print a 3D object and perform all steps without assistance. Ensure proper safety precautions are followed. Evaluate the trainee's performance using this checklist.

DIGITAL MODELING - PRINT 3D OBJECT		
DID THE TRAINEE...?	YES	NO
1. Open the correct “.stl” file		
2. Nest the file in the optimal position with supports IAW manufacturer's instructions, ensuring there are no cups or minima		
3. Load the appropriate resin		
4. Correctly start the 3D printer		
5. Allow the object to print completely		
6. Wash the object IAW manufacturer's instructions		
7. Cure the Object IAW manufacturer's instructions		
8. Remove and finish/polish all supports		

FEEDBACK:

Use this checklist as a source of information; discuss the trainee's performance indicating strengths and weaknesses, suggested improvements, etc. If the trainee performed all steps of the task satisfactorily, both the trainer and the trainee should acknowledge performance by appropriately documenting the training record.

Quality Training Package (QTP) Corrections/Improvements Form

Volume #	Module(s) #

The QTP project goal of the 381st Training Squadron, Joint Base San Antonio-Fort Sam Houston TX, is to publish a useable document for trainers and trainees. Utilize this form to suggest changes or revisions to this QTP volume. If necessary, submit additional forms for each module. Email the form to emily.e.jones.mil@mail.mil.

Your Contact Information:

Name (Last, First, MI):	Rank:	Base:
Email Address:		Phone #:

Item Suggestion(s):

Item	Reference within Document (e.g., page #, paragraph, sentence, etc.)	Recommended Changes
STS Task		
Training References		
Evaluation Instructions		
Performance Resources		
Steps in Task Performance		
Performance Checklist		
Feedback		

Additional Suggestions (e.g., overall formatting, images, title page design, introduction, table of contents, feedback form, etc.):

Digital Signature: