5280 PROSTHETICS

Puck Fabrication Guide

for Internal Elevated Vacuum Systems

Detailed Fabrication Videos at www.5280Prosthetics.com

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Standard Puck Mods & Model Prep

CRITICAL STEPS FOR SUCCESS:

1) Nothing should contact the molding dummy in the Red Zone (nylons, build ups, foam etc. This is the surface in which the puck will seal against).

2) The plastic pull must be perfect around the dummy side wall. It is important to get excellent vacuum during the socket forming process.

3) The interior of the void must be glass smooth. Nylon imprints in your plastic can cause a vacuum leak.

4) The socket must be fabricated such that the dummy can be removed (and the Puck installed).

Model Preparation

1) Fill the negative model with the pipe in the correct alignment to capture the socket flexion and AB/ADduction and rotation.

NOTE (2): **To maximize the amount of vacuum to the dummy (prior to filling the mold) place surgical tubing or long party straw along your pipe such that it exits out both ends of the negative impression.**

TIP(3): If an extra thick distal pad is desired cut the negative cast on the band saw and splint the negative impression back together with a 3/8" block in between the sections to lengthen the socket chamber.

4) Rectify positive model with preferred standard vacuum reductions and modification technique.

OR (Strongly Recommended)

Use the DP pressure casting method / modification for a great fitting socket with minimal reductions to your positive model. See the full video at: www.5280prosthetics.com

Total Contact Options (Choose one)

Option 1 (Recommended): Bond the molding dummy directly to the plaster model for a single wall socket. A total contact pad is injected at time of patient fitting. The distal pad creates a soft distal surface improving patient comfort. (See page 13)

Option 2) Bond the molding dummy to the flexible inner liner. The flexible inner liner provides total contact and allows for significant offset alignment. Follow the steps below except the Dummy will be bonded to Flexible Inner.

Attaching the Molding Dummy

5) Place the molding dummy and model in the vertical jig. Determine optimal AP and ML placement. Any reasonable amount of off-set can be accommodated for by the distal pad or flexible inner liner.

6) Bond the molding dummy in place in the proper alignment (Use Coyote glue 4747).

7) Apply Tape to the dummy to keep the sealing surface clean and protect the dummy during the plastering process.

8) Fill the transition between the dummy and model with plaster or similar medium.

Remove tape after plaster application and smoothing.

Note: **Ensure transition buildup is smooth and cosmetic. The transition must allow for removal.**

9) Ensure there is nothing contacting the molding dummy on the RED ZONE. Especially from the scribed line on the dummy to the proximal end (side opposite the four hole pattern). Any material in this area could affect the seal (nylon, seams, etc.).

10) Model is now ready for fabrication. Proceed to ThermoFAB or LaminationFAB Sections.

OUTER SOCKET MUST BE PLASTIC OR PETG TO BE AIR TIGHT.

For Detailed Fabrication Videos visit www.5280prosthetics.com

Check Sockets & ThermoPlastic Fabrication

1) Install socket cap screws into the Thermo Dummy. For a thicker distal end back out the cap screws evenly.

2) Reflect and tie a vacuum nylon (PaceLine Feather Stretch) at the base of the molding Dummy and reflect over model. The nylon should NOT be placed on the dummy. Nylons can create an imprint in the plastic and cause a vacuum leak.

NOTE: **Keep the RED ZONE free of nylons, plaster and tape. This is the sealing area the plastic must form directly to the dummy to create a SMOOTH sealing surface.**

3) Blister Form OR-FIT Trans Stiff Thermoplastic socket by twisting the plastic in the frame as it is pulled down over the dummy and model.

Wrap the plastic directly against the molding dummy. No nylons, tape or plaster should be on the side wall of the molding dummy.

NOTE: **Check socket material MUST be OR-Fit Trans Stiff (Curbell Plastics) or Thermolyn Stiff (OttoBock). DO NOT USE PETG, Vivak, Durplex (THESE MATERIALS CAN CRACK CAUSING A SAFETY HAZARD TO THE PATIENT.)**

4) Use a flat disk to compress the distal end of the pulled plastic. Work the Plastic around the cap screws to ensure there is no gapping around the screws.

5) Examine the plastic pull to ensure it is in perfect contact with the molding dummy body (especially in the sealing area). This is the sealing surface for the Puck and must be glass smooth.

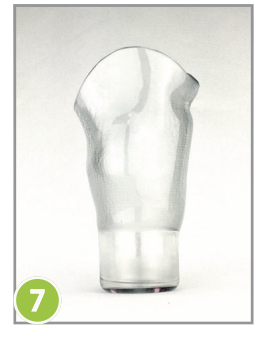
NOTE: **Repull the socket if this criteria has not been met.**

6) Grind the plastic down to the socket cap screws. Keep distal surface parallel to the dummy surface.

The Exterior distal surface should be parallel to the interior distal surface to eliminate stress to the attachment screws.

7) Break out Plaster model and remove the molding dummy.

NOTE: **Use Long Screws to push Dummy out if necessary.**



8) Drill a 3/8" Center Hole in the bottom of the socket. Ensure there are no burrs or plastic that protrude inward that will prevent the Puck from fully seating.

The Center hole is where air is exported out of the socket and where the Puck can read the differential air pressure (to regulate vacuum levels).

9) Drill Out Charge Plug/ Valve Opening (AirPuck™, SmartPuck™, MagPuck™, VaporPuck™).

Mark and drill the side hole with a 3/4" plastic bit. Split the difference between adjacent cap screws and draw a bisection line up the side of the socket in the molding dummy void. Measure up 3/8" from the base of the molding dummy (distal end). Place the hole medial. The Hole MUST be below the seal and above the socket floor.

Repeat this process on the opposite side for the VaporPuck™ valve installation.

10) The socket is now ready for patient fitting.

Install the distal injection tool to inject a custom distal pad.

OR

Install the appropriate puck if the distal pad has been fabricated previously.

Laminated Socket Fabrication

WARNING: DO NOT USE CARBON FIBER with the SmartPuck™ USE Coyote Composite, Synthex, NSP.

1) Reflect and tie a vacuum nylon (PaceLine Feather Stretch) at the base of the molding Dummy. The nylon should NOT be placed on the dummy. Nylons can create an imprint in the plastic and cause a vacuum leak.

NOTE: Keep the RED ZONE free of nylons, plaster and tape. This is the sealing area the plastic must form directly to the dummy to create a SMOOTH sealing surface.

2) Begin by pulling a 3/16" PETG inner socket (hot PVA) in a 16"x16" frame. Twist the plastic as the socket is pulled to help wrap the plastic around the dummy.

Plastic must be pulled so there is perfect contact around the molding dummy body. This is the sealing surface. **It is critical the plastic conforms tightly to the side wall of the dummy and is glass smooth on the interior. PETG is required for an AirTight socket.**

3) Scratch up the outer surface of the PETG liner to facilitate a good resin bond. DO NOT PUNCTURE PETG LINER- This will cause a vacuum leak.

4) Burn out (w/ hot awl) the five holes located on the bottom of the dummy.

NOTE: Holes should only be as wide as given thread. to help prevent resin from getting under PETG. PETG should be under cap screws ensuring the bottom socket thickness is at least 1/4". (Cap screws should not sit directly on the dummy).

5) Fill all holes and voids with Dow Corning electrical insulating compound #4 or machine wax (generously). This will prevent resin from getting under PETG and in the dummy.

6) Install socket cap screws into the Dummy. Fill cap screw heads with machine wax.

For a thicker distal end: Back out the cap screws evenly to increase desired thickness.

7) Locate the proper location for the Charge Plug / AirPuck™ Valve Fab Dot (Circular) . This will create a grind through hole for the charger / AirPuck™ Valve.

If installing the Vapor Puck you will need to place the Rectangular Fab Dot as well to create a hole for the Vapor Valve system on the opposite side of the socket.

NOTE: **Alternatively...Holes for the charger / valves can be drilled out after fabrication if desired. Keep the holes bellow the Puck seal.**

8) Draw a line bisecting the the four hole euro pattern in the bottom of the socket. Extend lines up sides of dummy by 1".

The FabDots should be placed medial (and lateral if using a VaporPuck).

9) Apply the fabrication dots to the PETG.
Affix each Fabrication Dot by centering the dot on the line up the side of the Puck. The Fab Dot should be placed as distal as possible BUT above the distal socket thickness of the PETG. Typically measure up 1/4' from the bottom of the socket.

10) Thread in the center Post. Lubricate the post with machine wax. (Model shown with both FabDots for VaporPuck setup. Other systems like the SmartPuck ONLY require the circular FabDot).

11) Layup Model. Tie material to center post. Try to use one tie to avoid extra bulk.

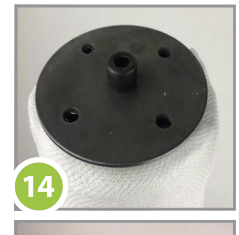
NOTE: **DO NOT use carbon fiber if using the SmartPuck™. Carbon will block the Bluetooth signal.**

12) Cut holes in layup to expose the four cap screws.

13) Carefully remove the center post

14) Place the center post through the lamination plate. Lubricate threads and reinstall the center post and lamination plate into the dummy.

Ensure there is adequate material for distal socket thickness.



15) The socket is ready for lamination.

FOR FASTER FABRICATION: The socket can be fabricated by simply grinding to the cap screws and the center hole drilled out after the socket is completed.

16) Laminate Socket.

17) Remove lamination plate.

18) Grind down to the cap screws on the distal end of the socket (if the lamination plate was not used).

NOTE: **The exterior bottom surface of the socket must be parallel to the interior bottom surface of the socket. This will eliminate shear forces to the attachment screws.**

19) Break out plaster model & remove molding dummy.

20) Grind the side of the lamination to expose the Fab Dots.

21) Remove the Fab Dots.

22) Use a dremel to remove the remaining PETG underneath where the Fab Dot was installed.

NOTE: **Widen the hole as needed. Ensure the hole does not extend upward into the sealing area.**

23) The socket is now ready for patient fitting.

Install the distal injection tool to inject a custom distal pad.

OR

Install the appropriate puck if the distal pad has been fabricated previously.

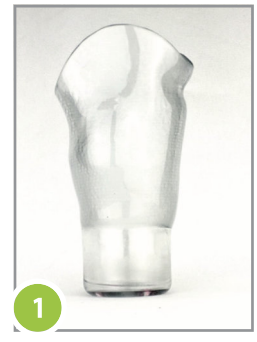
Methods for Total Contact In the Distal End of Socket

Option 1
Injecting a Custom Distal Pad

Strongly recommended for SmartPuck™

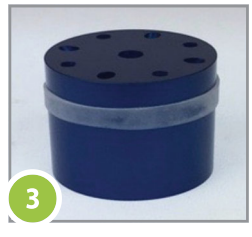
1) Fabricate socket to completion such that it is ready to be fit on the patient.

NOTE (2): There must be 5 holes drilled in the bottom of the socket. 4 hole Euro pattern & one 3/8" center hole. This is the hole in which silicone is injected into the socket. The bottom of the socket should be flat and level.



2) . Five Hole Pattern is required to inject silicone and for proper Puck function.

3) Apply a rubber band to the body of the tool & apply light lubricant to rubber band to insert tool into socket.



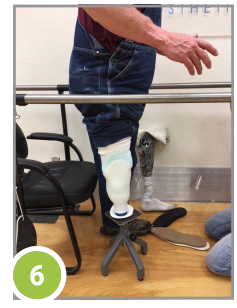
4) Insert the taller portion of the injection tool into the socket. 9 Hole pattern facing up.

5) Secure the injection port to the bottom of the socket by securing it to the internal module with the two 6mm screws included.

NOTE: **Only two of the four holes are threaded. This is to allow for easy cleaning of the unit.**

NOTE: **The injection port should face anterior. The center hole in the injection port should align with the center hole in the socket. Tighten securely.**

6) Test fit the socket to ensure the correct sock ply is used such that the patients limb is not too deep in the socket and is in the correct orientation. The distal end of the socket is now ready to be injected.



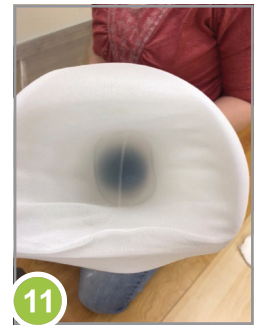
7) Place a Saran Wrap™ barrier over the patient's limb, liner and socks.

8) Apply a vacuum nylon over the covered residual limb. Orientate the seam anterior/posterior. An orientation mark can also be placed on the nylon (this mark & nylon will become imbedded in the silicone pad).

9) In the parallel bars have the patient bear weight (50/50) in the socket with the socket supported by a limb stand with a pelite pad or other soft material as an anti-slip agent.

10) Inject Renew Silicone 5 or similar (1 minute set silicone) until the void in the socket is completely filled. Have the patient stand on the socket squarely so the silicone does not drain out of the air escape holes in the bottom of the socket. Allow silicone to cure (4-5 minutes).

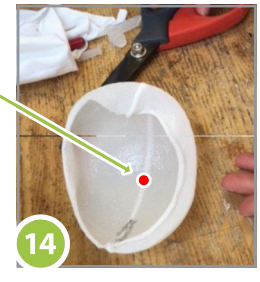
11) Remove socket after silicone has set up. Mark the anterior alignment of the pad.



12) Disassemble the distal end injection

13) Remove and trim the distal end pad.

14) Punch a 1/2" CENTER HOLE in the pad to allow vacuum to pass through the silicone.



See www.5280 Prosthetics.com for instructional videos on injecting a distal pad.

Option 2
Flexible Inner Liner

1) Pull inner socket out of desired material.

2) Follow steps 5-10 in the Model Prep Section of this manual (Attaching the molding dummy).

The Molding Dummy setup is identical over a flexible inner liner.

TIP: **Consider using a PVA to help separate the socket materials. Ensure the PVA bag & vacuum wicks are not on the molding dummy.**

For alternative methods, contact 5280 Prosthetics.

Transferring Alignment

IMPORTANT: To transfer alignment or to convert a check socket to a laminated socket THE PUCK MUST BE REMOVED from the socket and replaced with the Combo Molding Dummy.

1) Place the Socket with alignable components the in vertical jig. Mark and remove the external hardware connecting the socket (this will be reinstalled once the Puck is replaced with the molding dummy).

2) Remove the Puck from the socket by installing long screws into the Puck through the socket.

3) Place the socket on the floor and apply full body weight on the socket. The Puck will unseat slowly. This process can take 30 seconds.

DO NOT TRY TO BANG OR BEAT THE PUCK OUT OF SOCKET. This will damage Puck and void warranty.

4) Tape off the center hole in the Dummy.

5) Lubricate the dummy. Use 30mm screws to pull the dummy all the way back down into the socket.

6) Reinstall the connecting hardware to the socket place Socket back in vertical jig.

7) Fill the check socket in the vertical jig.

It is not necessary to fill the socket with the Distal end pad in place. Leave the interior of the socket flat to avoid having to redo the plaster transition between the dummy and the model. The same distal pad that was made in check socket can be used in definitive.

NOTE: **If the alignment is OFF by a significant margin it may be advisable to fill the socket with the distal pad in place (on top of the molding dummy). If the alignment position of the Puck is moved significantly it will be necessary to reinject the distal pad.**

8) Once the plaster has set remove the model from the jig. Cut off old test socket and place the model back in the vertical jig.

9) Remove the molding Dummy and attach it to the original connector & components in the vertical jig.

10) Place the Dummy back in the vertical jig. Neutral out Molding Dummy & components.

11) Bond Molding Dummy to the plaster model in the vertical jig. (Space Dummy away from model to create a thicker distal end pad).

12) Tape Dummy and fill the transition between the dummy and the model.
(**SEE MODEL SETUP GUIDE, Page 5**)

ZeroPuck™ Socket Fabrication

ZeroPuck™ Basics

1) There MUST be a vacuum hole or passage way through the model (under the dummy) to get good vacuum around the seal /o-ring area.

2) Recommended placement for the ZeroPuck™ is Distal /Medial or Lateral for Transfemoral sockets and Posterior for Transtibial sockets. However, placement location is the prosthetists discretion.

3) There are a variety of ways to design a prosthetic socket with the ZeroPuck™. This manual will detail how to fabricate a single wall socket designed to be worn with an internal sealing liner (liner or sock with a sealing mechanism). Please visit www.5280prosthetics.com for fabrication videos on how to fabricate two stage TF sockets and other designs.

4) A flat spot to seat the ZeroPuck on the model can be created (1) during the casting process by pushing the molding dummy into the negative impression during the casting process OR (2) after the negative impression has been filled.

Check Sockets....

5) Typically we DO NOT recommend forming the ZeroPuck into the check socket. The check socket can be fit with a threaded elbow into the socket material and utilize a inline one way valve and brake bleed pump to evaluate the liner, seal and socket fit.

6) If desired the ZeroPuck can be integrated into the check socket.

Follow the instructions as detailed. USE OR-FIT Trans Stiff TM (Curbell Plastic ™) or Thermolyn Stiff TM (Otto Bock™) plastic for the check socket material. These materials will conform around the molding dummy and sealing surface during the forming process. PETG, Durplex, Vivak will not conform and the Puck will not seal the socket.

ZeroPuck™ Fabrication... Getting Started

1) Prior to filling the negative impression, place a vacuum tube or party straw through the cast such that it exits out where the Puck will be placed on the model. **IT IS CRITICAL TO HAVE A VACUUM SOURCE UNDER THE ZERO MOLDING DUMMY.**

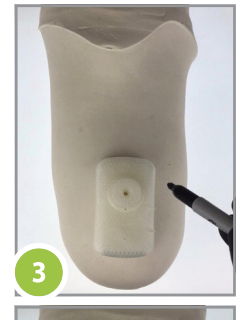
TIP: 17" Mammoth Bendy Straws from www.barproducts.com work well for a disposable in cast vacuum tube.

2) Position the Dummy in the distal / medial or lateral region of the socket. ZeroPuck placement on the model is at the prosthetists discretion.

Orient the Dummy such that the valve post & sealing nut are proximal (longer end of the Puck body points downward).

CRITICAL : The molding dummy must be located below the area where the liner seal will reside.

3) Trace the outline of the dummy onto the model.

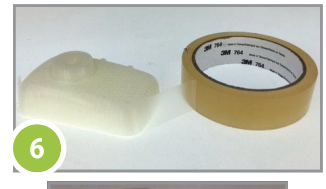


4) Ensure the vacuum passage way in the cast is located underneath where the dummy will be placed.

CRITICAL: There must be a vacuum source/ passage way under the dummy to ensure the plastic conforms to the dummy and seal area.

5) Flatten the model surface enough to get the dummy to sit relatively flat. (Small gaps on the corners will be filled in later).

6) Apply Tape to the side wall of the dummy. This will keep the dummy clean during the plastering process.



7) Screw or spot glue (don't seal off vacuum source) the Dummy and forming post into the model in the desired location. Orientation should be vertical with the longer side of the dummy positioned on the distal aspect of the model.

8) Use plaster to transition the edges of the dummy & blend it seamlessly with the model. Be careful not to recess the puck.

CRITICAL: **Keep the ENTIRE edge of the dummy free of any plaster. This will allow the plastic to form directly to the edge of the dummy. Excess plaster will cause a gap.**

9) Remove the tape from the dummy. This will produce a clean edge for the plastic to form to.

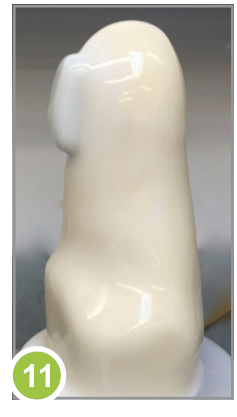
10) Model is ready for fabrication.

11) Blister form Flexible inner socket.

CRITICAL : **The plastic must vacuum form perfectly around the dummy and ESPECIALLY around the base of the post. This is where the sealing o-ring sits.**

Re-Pull socket if this criterial is not met.

12) Apply PVA bag over flexible inner liner.



13) Laminate the socket with the preferred method and materials. When using a ZeroPuck SP (Smart) consider using an alternate to Carbon Fiber such as Coyote Composite, Synthex, NSP.

Typically a window is cut in the frame of the laminated socket for the ZeroPuck. This allows the BlueTooth to function correctly in a carbon socket.

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14) Grind down to the top of the dummy post area of the dummy. **GRIND TO THE TOP SURFACE OF THE DUMMY POST ONLY. DO NOT GRIND FURTHER THAN THE TOP SURFACE OF THE POST.**

KEEP THE PLASTIC LEVEL WITH THE SURFACE OF THE MOLDING DUMMY POST. THIS IS CRITICAL FOR GETTING A VACUUM TIGHT SOCKET!

15) Remove Screw and Dummy Post. Check the continuity between the pulled plastic and the interior of the molding dummy body. The transition should be seamless.

NOTE: **Any gap between the dummy and plastic pull could cause a vacuum leak.**

16) Break out Plaster model.

17) Grind out a window for the Puck and inner socket in the laminated socket. This will improve BlueTooth connectivity.

18) The socket is now ready for Puck installation and patient fitting.

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