

HOW TO MAKE A TRANSTIBIAL SILICONE SOCKET INTERFACE



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Start with an existing liner or create one of your own. This example is 5mm pelite with an extra 3mm added over the tibial crest and the fibula head



Invert the liner and add strips of wet plaster bandage to reinforce the liner. The plaster bandage should extend 6 inches beyond the trim line. The plaster strips that extend beyond the trim lines should be pressed together to form as smooth a transition as possible.

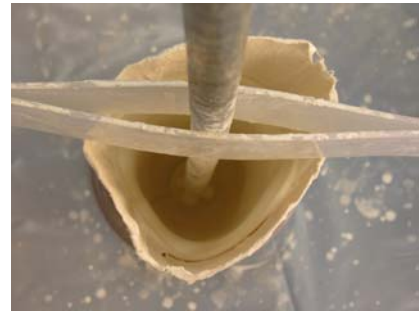


Trim and level the top of the plaster bandage extension
It is important that you leave the 6 inch extension of the plaster bandage



Suspend the pipe so it does not touch the bottom.
(Leave a space of at least one half of an inch)
Use powder as a parting agent before filling the cast.





Fill the mold. Use the material of your choice (i.e. Plaster, Hyderostone or Hydracal.)



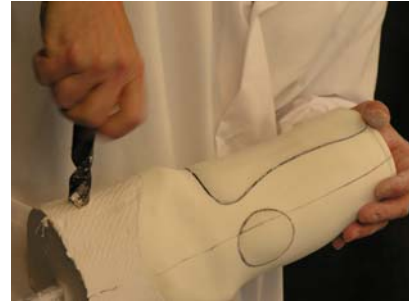
Remove the plaster bandage. When removing the plaster bandage be careful not to disturb the liner



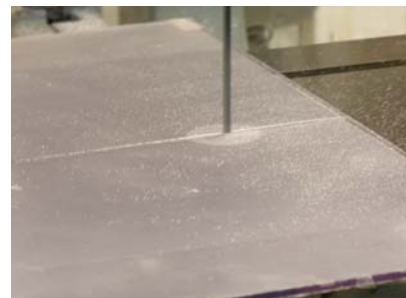
Smooth the top of the exposed plaster to eliminate the rough edges



Make registration dimples in the cast with a large drill bit. This helps to align the outer mold halves to the inner model. Place two depressions on the anterior and two on the posterior sides of the model.



You need to cut enough plastic so you will be able to “sandwich” the liner and mold you have just created



Leave the protective cover on both sides of the plastic and place in oven. Allow the plastic to soften to the correct forming temperature. The plastic should be able to form a tight seal when pressed together. This will help to form crisp edges and reduce the amount and thickness of the flash that needs to be removed from the cured liner.



Draw the seam line on to the mold of the model to visualize easy removal of the two plastic mold halves.

Do not use any stocking for wicking suction as it makes removal of the protective layer very difficult.



Each person should hold a piece of plastic so that it can be brought together on either side of the liner mold. There should be an equal amount of plastic on all sides of the mold. There always seems to be enough time to get this done. You will have a large seam to deal with later if the plastic is not at the correct forming temperature.



Try and follow the target seam line as close as possible. Keep the two pieces of plastic as smooth and flat as possible as the plastic cools



The plastic should have cooled enough to hold its shape. Seam looks flat and pretty straight.



THE FOLLOWING STEPS SHOULD ALWAYS BE DONE BEFORE THE MOLD IS OPENED THE FIRST TIME

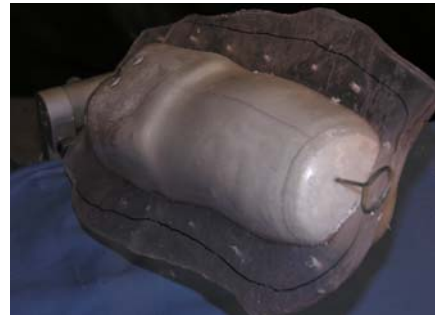
To insure an accurate reproduction of the liner model it is necessary to drill a small hole through the outer mold, the liner, and into the cast. This becomes less important as the model becomes shorter, lessening the chance of distal movement of the inner model. If the distal moves, the resulting liner will be thicker on one side and thinner than planned on the other.



Drill a series of holes through both sides of the newly formed mold. These holes will be used later to bolt the mold back together. Try and drill the holes as close to the model as possible. This will help prevent the silicone from being forced between the two mold halves



This photo shows the distal pin in place , all bolt holes and the final trim before the halves are separated



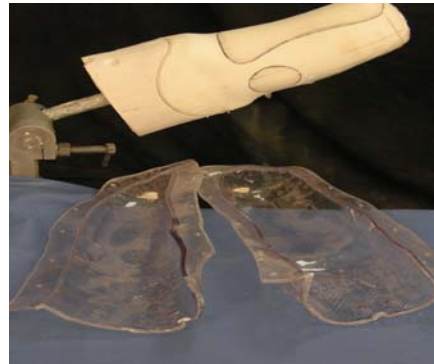
Mold trimmed on the sides and top.



The two halves can now be separated. The protective covering that was left in now serves as the parting agent. It will be necessary to separate the two halves with a screwdriver the first time.



If the plastic is at the right temperature and the vacuum strong enough during forming, the seam as viewed from the inside, will be minimized



Remove the liner



Inspect the inner casting for any defect. The smallest bubble in the casting will result in a corresponding bump on the inside of the finished product. The liquid silicone has an unbelievable ability to fill even the smallest cavity.



Fill any major defects with plaster slurry



Use a tool (a hollow piece of tubing works well) to create a small groove from the top of the liner to the top of the plaster cast. Choose a point that represents the highest point of the liner. This serves as a vent to allow air to escape and also serves as a reservoir for the excess silicone



Pick a low point on the outer mold half as a starting point for the injection of the silicone. Make the hole just large enough to accept the static mixing nozzle without allowing it to enter too far into the mold



Fit the injection hole with a threaded tapered plug



Wax or Vaseline can be worked into the cast to fill the smallest of defects. Any marks left will be faithfully reproduced in the finished liner



Place the mold half with the alignment pin first. This will make it easier to find the corresponding hole in the cast without damaging the cast with a miss



Detail showing how the alignment pin helps hold the cast in position



Place the second half of the mold on the model and bolt the halves together.



The silicone material is packaged in 400 ml side by side tubes and automatically mixed in the correct ratio by the static mixing nozzle.



The silicone can be dispensed by hand or pneumatically using injection guns designed to accept the side by side



Shown here is the in house stand designed to accept many different size models



The cast has been painted gray for contrast so you can see how the mold is filled from the bottom to the top. This helps to reduce the chance of any bubbles being trapped during the injection process



The mold is now completely filled. The silicone should completely fill the vents created at an earlier step. This extra bit of silicone becomes necessary if there is any leakage when the static mixing nozzle is removed and the threaded plug inserted.



Check the cure time of the silicone being used before opening the mold. All the platinum cure silicones can have their cure time accelerated by the application of heat if necessary. A large heating pad works well.



As soon as the silicone has cured it is safe to remove the mold halves. Do not forget to remove the distal alignment pin.



The finished liner will probably require trimming any silicone that was forced between the mold halves. (flashing)

The liner is now ready for the final trim. It can be used as is or converted into a multi durometer liner.

IMPORTANT NOTE : If you plan on a multi durometer liner, ***DO NOT*** remove the liner from the cast at this time. See supplemental information.



This cross section of the below knee liner shows the increased thickness of silicone over the crest of the tibia and the fibula head.



SUPPLEMENTAL INFORMATION
NECESSARY FOR PRODUCTION OF A **MULTI DUROMETER**
SILICONE LINER

There are a few things to consider about the multi durometer liner, most of which will depend on decisions made while creating the original liner or pattern. The ideal liner is thicker and softer in any bony or sensitive area. Remember we started with 5mm pelite and added a second layer of 3mm pelite down the crest of the tibia and the fibula head. In this example, the blue is a 20 durometer silicone. Cut through the silicone with a very sharp blade and remove the silicone. In this example, the silicone was removed from the crest of the tibia and measures 8mm thick. Keep the edges as clean as possible and begin the second injection as soon as possible.



It may be necessary to add another injection hole in the plastic at the distal point of the void created by removal of the 8mm silicone from the crest of the tibia. It is also necessary to drill a few small vent holes in the plastic at the exact top of this void. The photo shows a small reservoir made of clay so that any silicone that flows from these holes can be trapped. This excess silicone will flow back into the mold if any silicone is lost when the static mixing nozzle is removed and the threaded plug inserted. (A light spray of alcohol on the inside of the plastic mold will aid in replacing the mold halves on the silicone liner.)



The finished multi durometer liner is ready for the final trim. For the heavy user it may be necessary to laminate a finish stockinette over the silicone for added strength.





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