Hgensch

Otto Bock

TECHNICAL INFORMATION

2.3. 2

OTTO BOCK ORTHOPÄDISCHE INDUSTRIE GmbH & Co · Postf. 12 60 · D-37105 Duderstadt · Tel. (0 55 27) 8 48-0
OTTO BOCK (A/ASIA) Pty.Ltd. · 67–69 Regent Street · AUS-Chippendale, NSW 2008 · Phone (02)6 99 68 52
OTTO BOCK ORTHOPEDIC INDUSTRY of CANADA · 2897 Brighton Road · Oakville L6H 5S3 · Tel. (905) 8 29-20 80
OTTO BOCK ORTHOPAEDIC (U.K.) Ltd. · 32 Parsonage Rd. · Egham, Surrey TW 20-0JW · Phone (07 84) 3 88 41
OTTO BOCK ORTHOPEDIC INDUSTRY Inc. U.S.A. · 3000 Xenium Lane North · Minneapolis/Minnesota 55441

OTTO BOCK Modular Above Knee Prosthesis

Attention !

The content of this technical information is partially not state of the art .
Materials and techniques may have changed or may be no longer available. The applicability has to be accessed under full responsibility by the technician.

Otto Bock Technical editorial department Duderstadt
2009-02-11

Fabrication of a Socket with ORTHOCRYL Resin

Printed in Germany

646T2 = 3.2GB – 1000-1296-49e

1 Introduction

One of the major factors determining the quality of a prosthesis is the socket. Its fit and design are responsible for control of the prosthesis, the patient's gait, wearing comfort, etc.

Sockets for modular above-knee prostheses may be fabricated in a variety of materials. Accurate duplication of the dimensions must always take place, initially which, in most cases, requires the preparation of a plaster model.

This T. I. describes the fabrication of an ORTHOCRYL resin socket covering all procedures up to trial walking.

2 Materials

616G6 Dacron Felt
Width ca. 92 cm

616G12 Carbon Fiber Webbing
Width 120 cm, weight ca. 200 g/m²

623T3 Perlon Stockinette
Width 4 6 8 10 12 15 20 25 30 cm

617H19 ORTHOCRYL Lamination Resin 80 : 20
Container: 0.900 kg, 4.600 kg and 25 kg net weight

617H21 ORTHOCRYL Sealing Resin
Container: 0.900 kg, 4.600 kg and 25 kg net weight

617P37 Hardener Powder for 617H19 and 617H21
Bag: 0.030 kg and 0.150 kg net weight

617H12 PEDILEN Rigid Foam 200
Container: 0.865 kg, 4.600 kg and 9.320 kg net weight

617P21 Hardener for PEDILEN Rigid Foams
Container: 0.865 kg, 4.600 kg and 9.320 kg net weight

Sheet Materials

616F4 PVA Sheeting
Width: 76 and 130 cm, thickness 0.08 mm

99B8 = 130 × 26 × 5
PVA Bags
10 bags/package

616T3 Polyethylene Sheet
Size: 1000 × 500 mm, thickness 1 and 2 mm

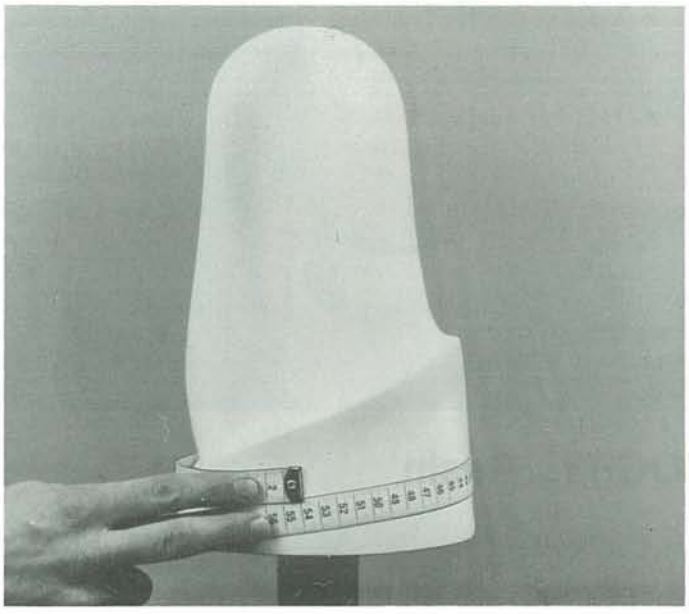
As parting agents for wet plaster casts we recommend:

617F2 PVC Fluid
Container: 0.800 kg net weight

635L12 ORTHOCRYL Lacquer
Container: 0.950 kg net weight

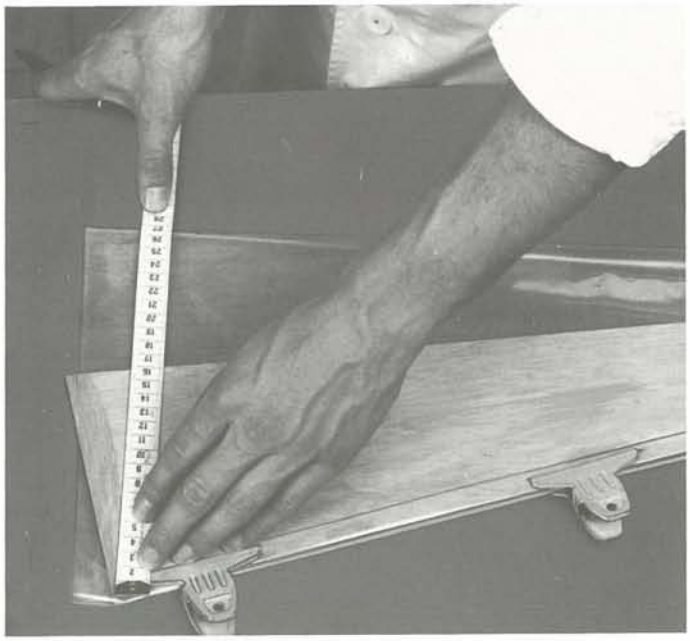
3 Fabricating a Socket with ORTHORYL Resin

Sockets may be constructed of plastic laminate to precisely conform to the residual limb. It is preferable to use a dry plaster cast. However, 617F2 PVC Fluid or 635L12 ORTHOCRYL Lacquer may be used to seal wet plaster casts.

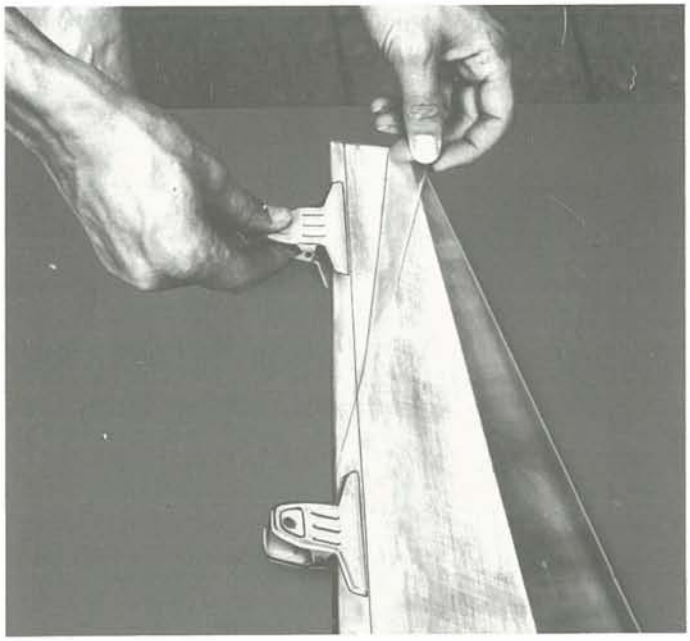


3.1 Socket Layup

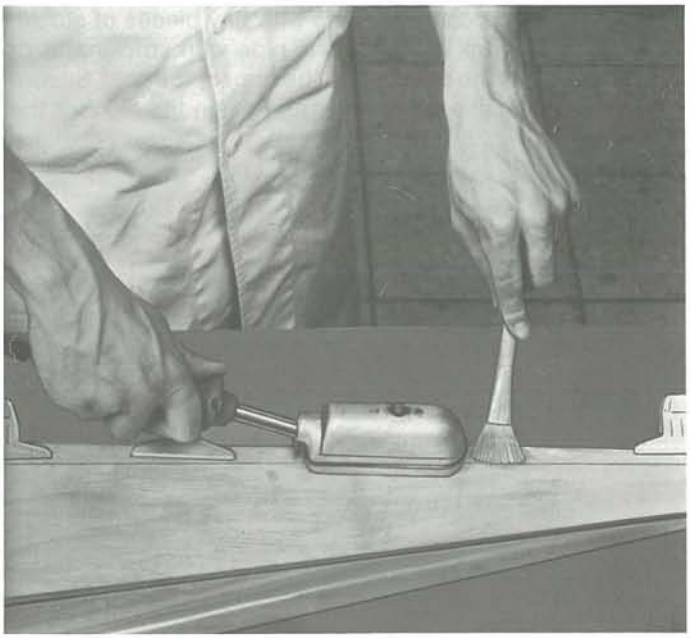
Measure both the largest and the smallest circumferences of the plaster cast. Select two 99B8 PVA Bags or fabricate two bags from 616F4 PVA Sheeting according to these measurements.



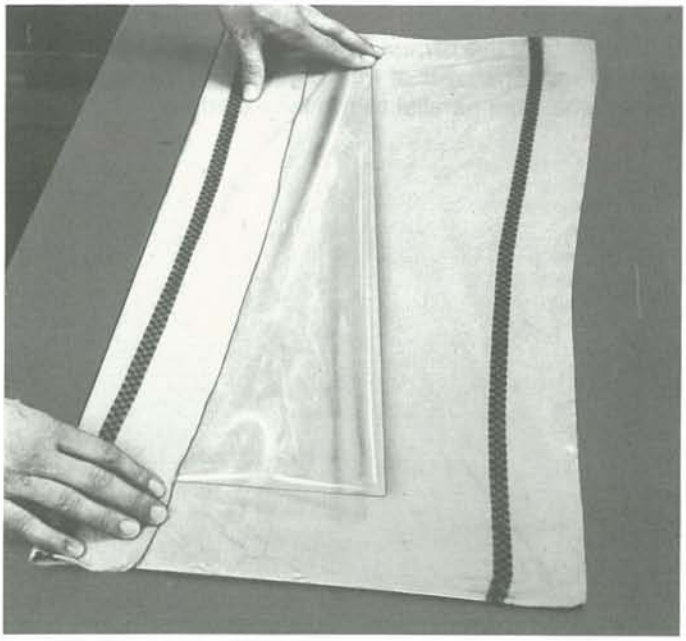
Place the edge of the bag form 15 mm from the edge of the PVA sheet. Fold this excess over the edge and clamp. Wrap the form with one layer of PVA adjusting to the largest circumference. Trim parallel to the form's edge.



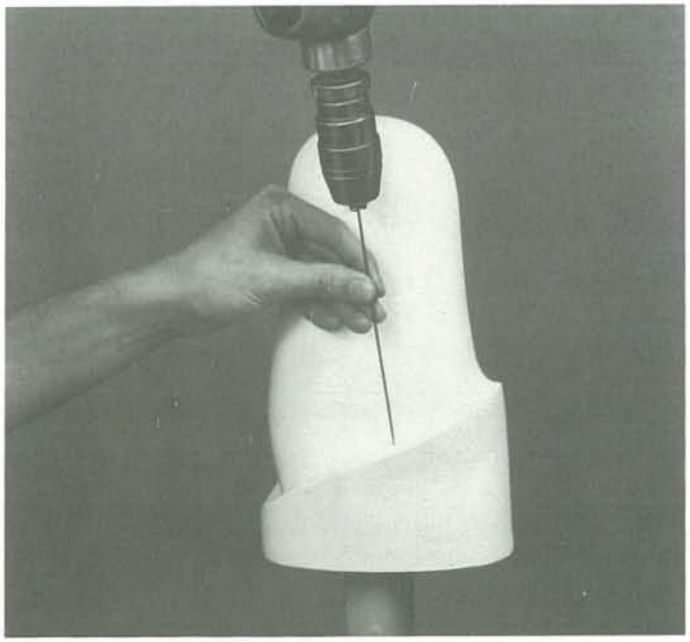
Clamp the second edge on top of the 15 mm overlap. The width of the overlapped layers should be even.



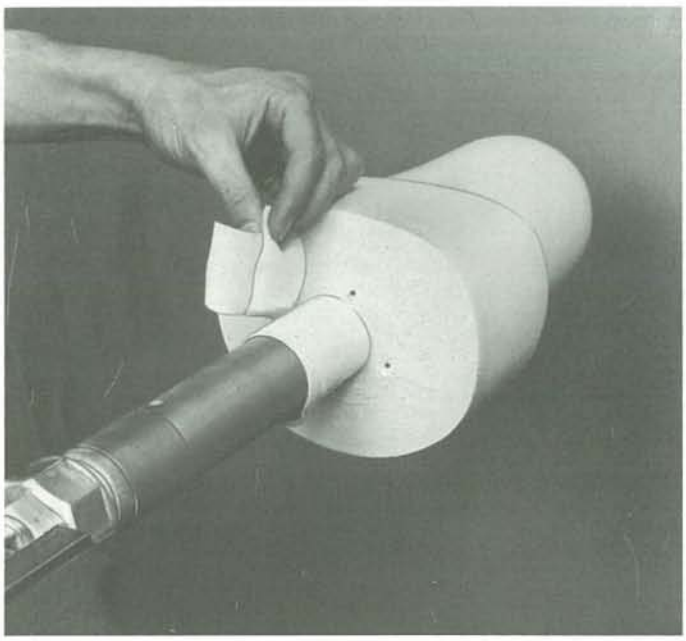
Spread PVA glue (PVA scraps dissolved in water) between the overlapped surfaces and seal immediately using a sealing iron.



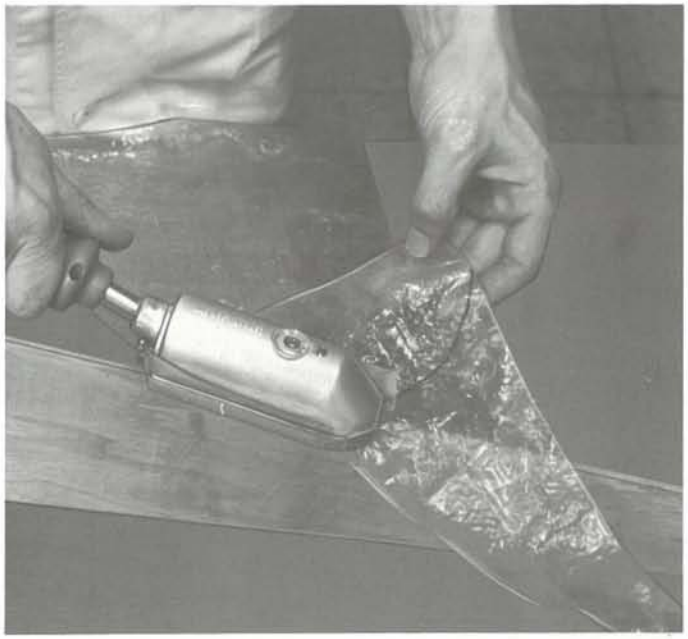
Wrap the bag in a wet towel and set aside for approximately 10 minutes.



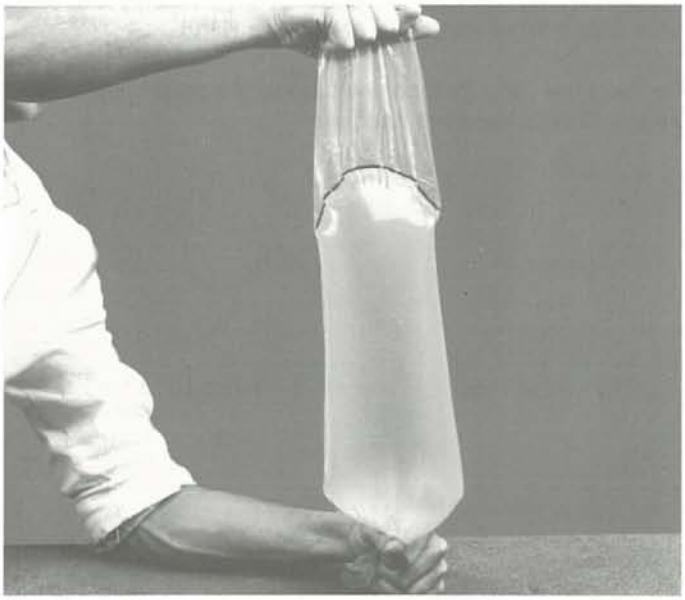
Use a 2–3 mm spring steel drill bit to drill air channels into the undercuts of the plaster cast (anteriorly, medially, laterally, and posteriorly).



Loosely fill the air channel inlets with tiny pieces of stockinette using the drill tip. Wrap the pipe with stockinette or Dacron covering the outlets and the upper pipe hole. Secure with tape. Maintain a clear lower air hole in the pipe for the outer bag.

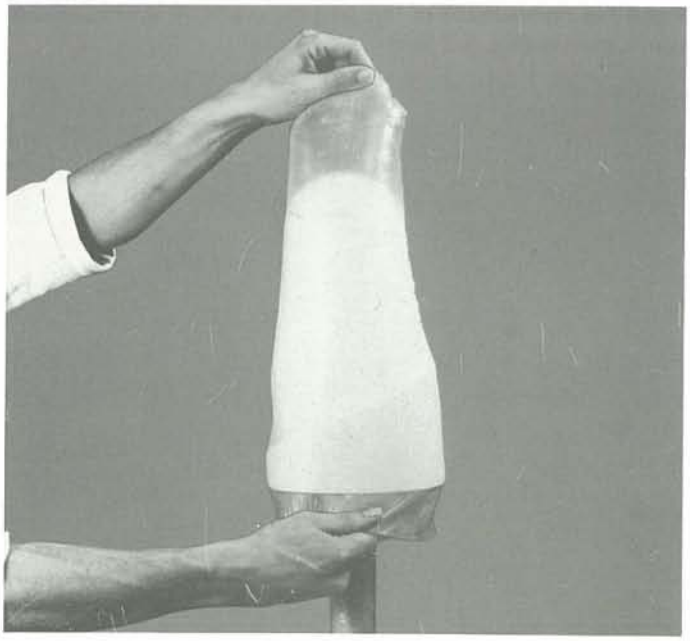


Place the narrow end of the bag on the form and seal in a semi-circle with a hot iron.



Fill the bag with air to check for leaks. Trim away the excess material and invert the bag.

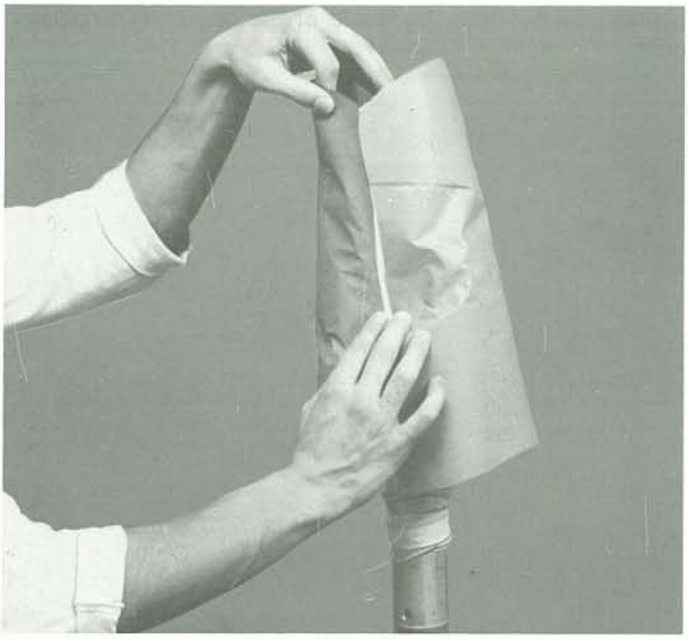
Lightly powder both the inside of the bag and the plaster cast.



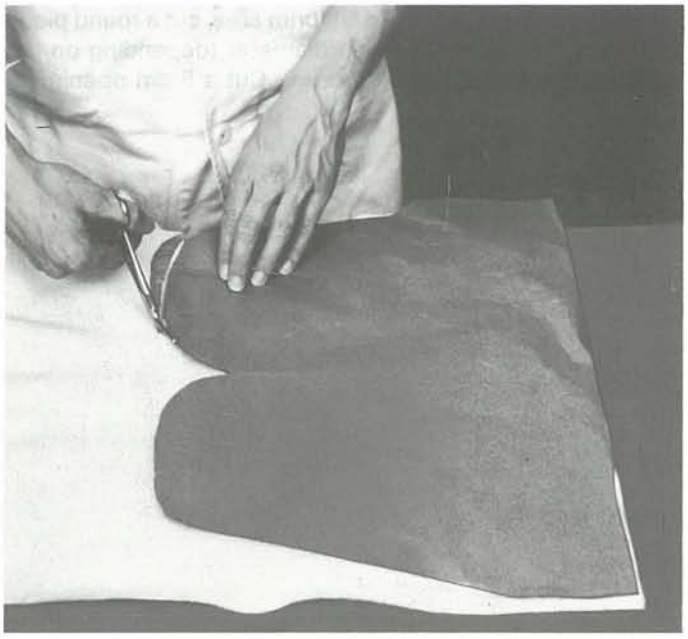
Pull the PVA bag over the plaster cast smoothing away all wrinkles on the distal end.

Pulling the bag down under tension, tie it off above the lower hole with a 10Y4 VULKOLLAN Elastic Band.

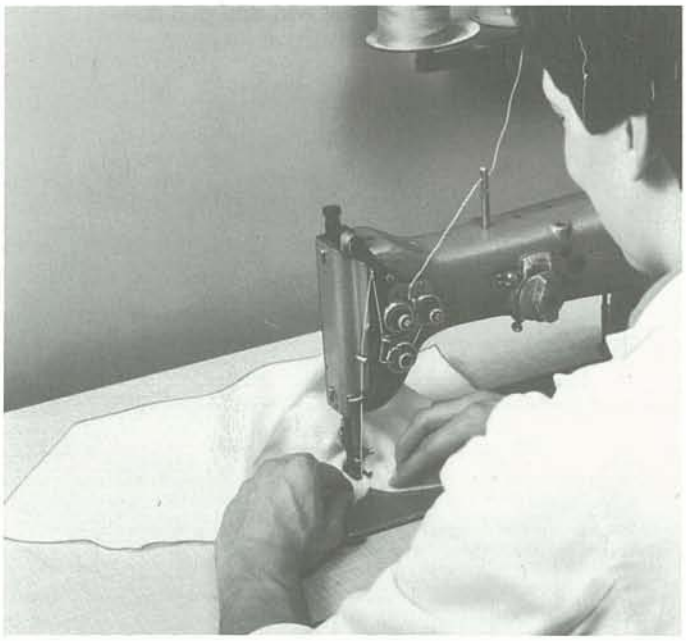
Connect the vacuum machine tube to the suction pipe. Turn on the 755E6 Vacuum Machine.



Cut a paper pattern of the plaster cast for the Dacron reinforcement.

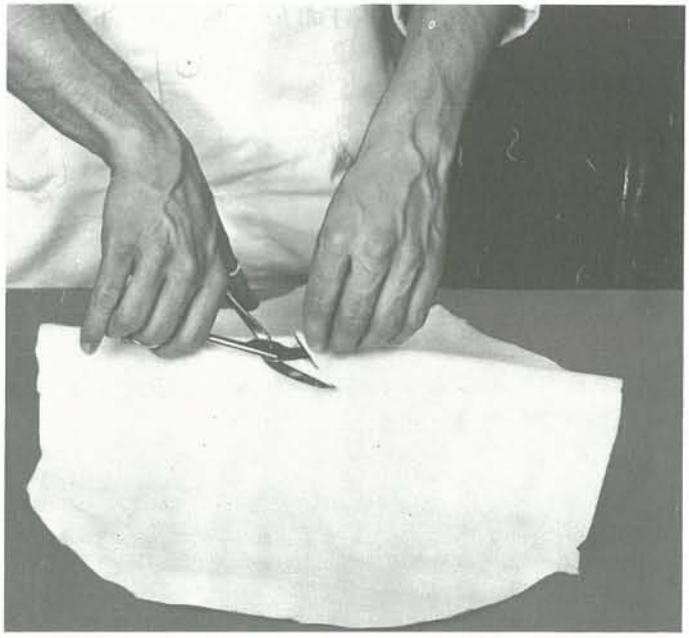


Cut a piece of 616G6 Dacron Felt following the pattern . . .



. . . and sew into a sleeve using a zigzag stitch.

Pull the Dacron sleeve over the plaster cast. Smooth away any wrinkles, especially in the distal area.

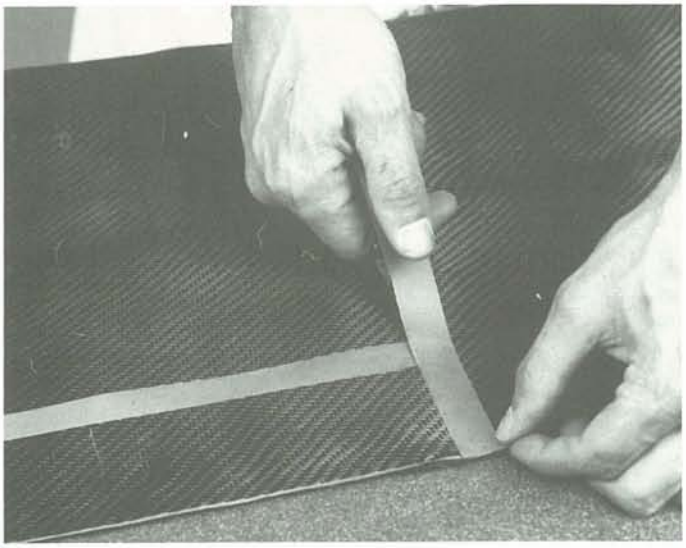


For reinforcement of the socket brim area, cut a round piece of Dacron felt 30 to 40 cm in diameter (depending on the circumference of the socket brim). Cut a 5 cm opening in the center.

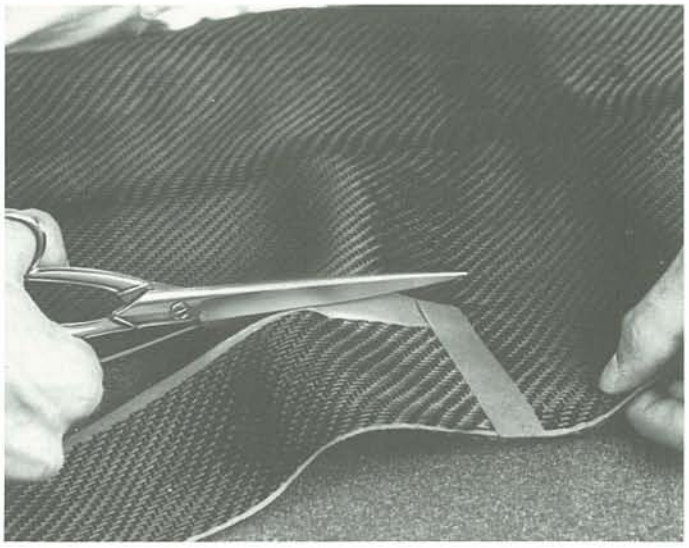
Center the hole over the distal end and pull down . . .

. . . placing the distal end of the Dacron felt one hand width from the ischial tuberosity.

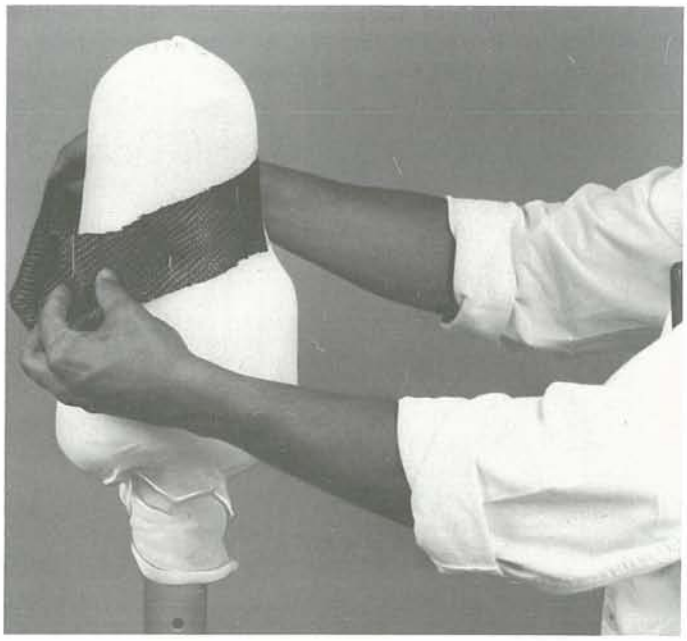
Cut a double length of 623T3 Perlon Stockinette. Pull half of the stockinette over the plaster cast, twist at the distal end and pull the other half over the model.



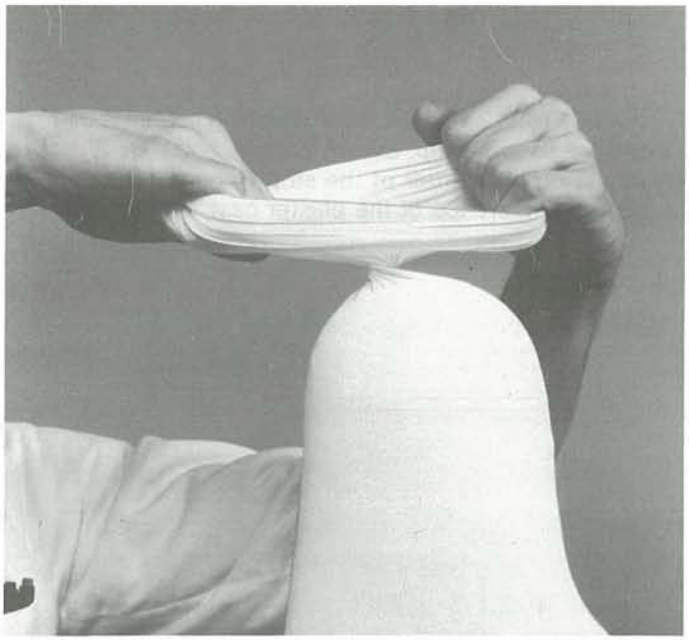
A strip of 616G12 Carbon Fiber Webbing is added as reinforcement to the layup. Before cutting, place double face PVC tape on the border of the strip to be cut. (Length = largest circumference of the plaster cast. Width = 5 cm.)



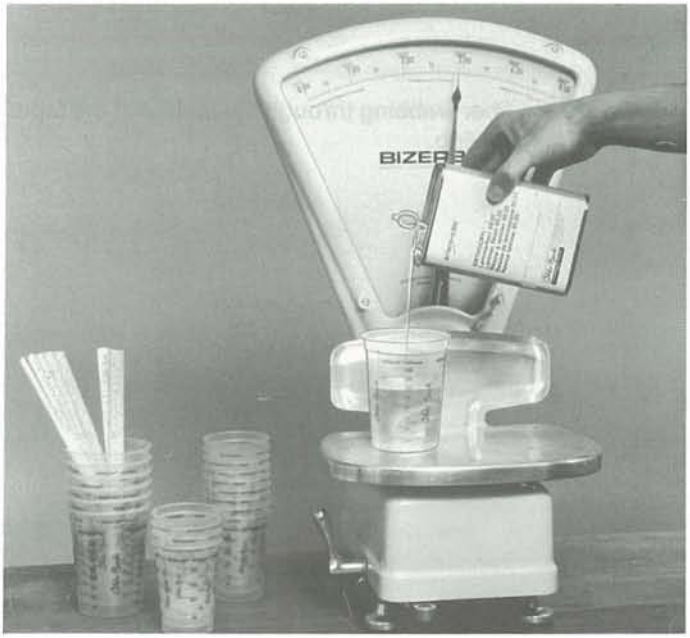
Cut the carbon fiber webbing through the middle of the tape. This prevents raveling.



Remove the tape backing and secure the carbon fiber webbing strip to the second layer of Perlon stockinette.



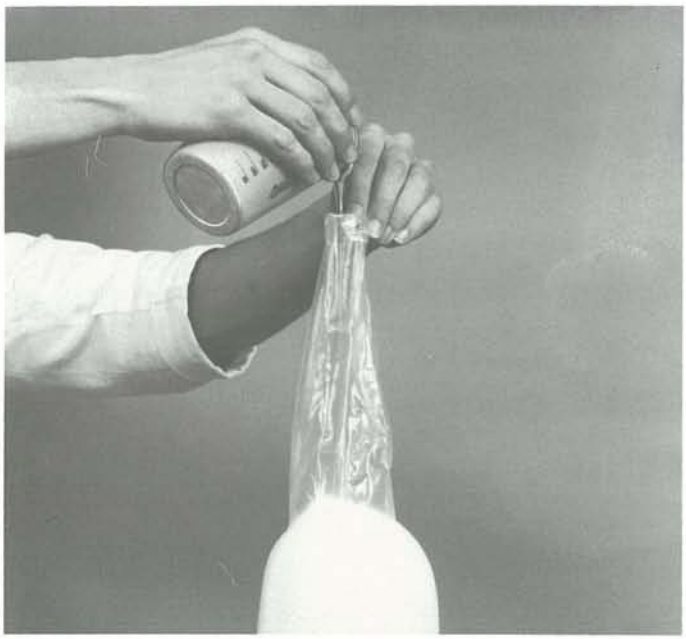
Add another double layer of Perlon stockinette in the manner described above. Pull the moist PVA bag over the layup and tie to the suction pipe.



3.2 Laminating the Socket

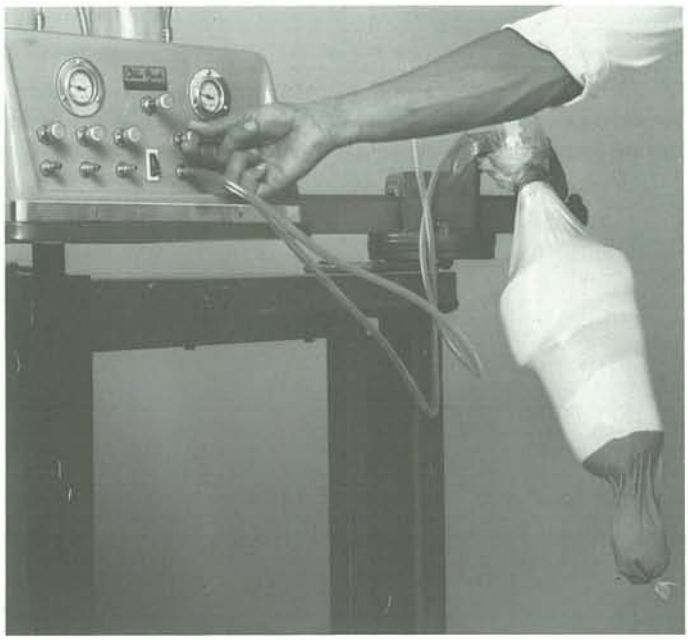
Weigh out and mix thoroughly:

300 g 617H19 ORTHOCRYL Lamination Resin
6–9 g 617Z2 Pigment Paste
6–9 g 617P39 Hardener Powder . . .



. . . and pour the mixture into the PVA bag.

Tie off the bag with a complete seal.

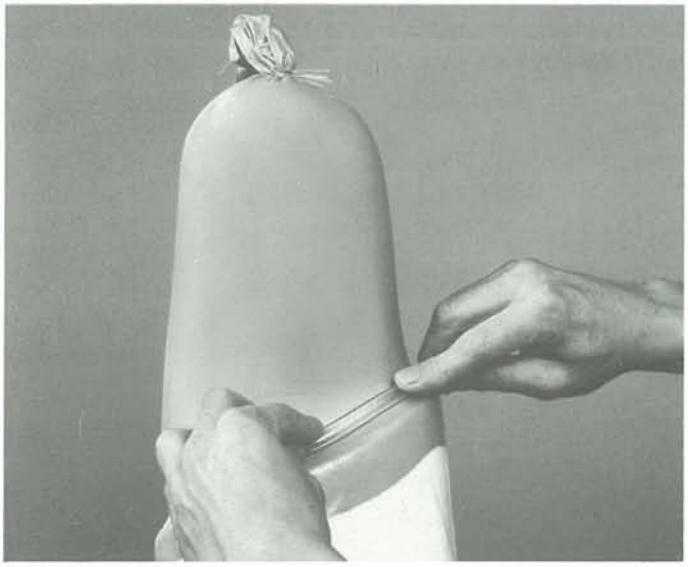


Invert the plaster cast and place it in a vise about 130 degrees from vertical. This allows trapped air to escape.

Sprinkle talcum powder on the bag. After 2 to 3 minutes, apply the vacuum.

Work the resin into the layup.

Pull the PVA bag with the excess resin away from the distal end and tie it off snug to the plaster cast. Avoid wrinkles in the bag.



Check for air pockets and excess accumulation of resin. Work the resin into the layup using a piece of rubber tubing paying special attention to the undercuts.

After the resin has cured, remove the PVA bag from the laminated socket.

4 Foaming the Inner Socket for Trial Walking

PEDILEN rigid foam applied to the surface of the socket smooths the transition over the undercut area. A wooden socket attachment block is bonded to the socket providing the connection to the lower leg.

4.1 Preparing the PEDILEN Foam and Removing the Socket

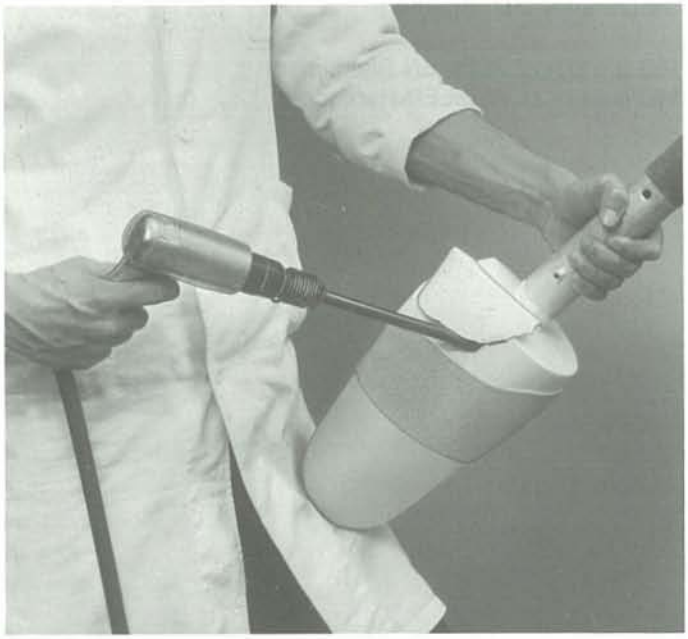
Wrap a layer of 1 mm thick 616T3 Polyethylene Sheet around the socket forming a cylinder. Secure with linen adhesive tape.

Thouroughly mix together:

150 g 617H12 PEDILEN Rigid Foam
150 g 617P21 PEDILEN Hardener

Pour the mixture into the cylinder.

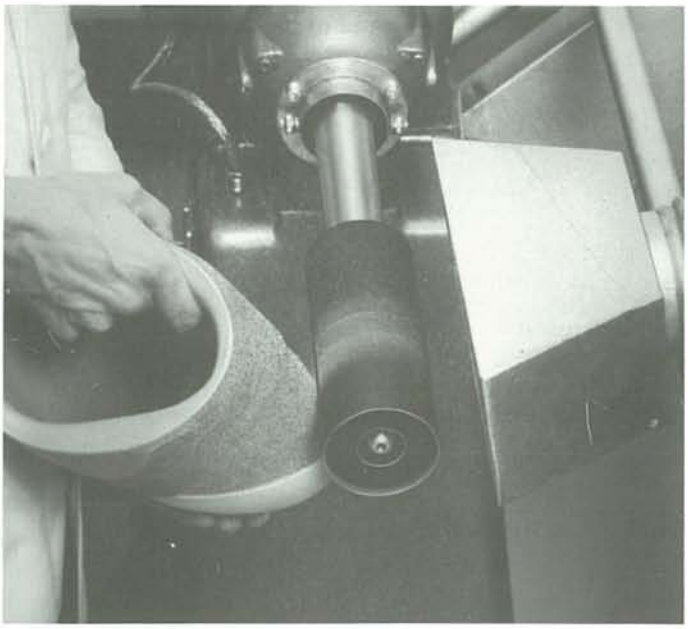
After the foam has cured (approximately 30 minutes) remove the polyethylene. Use 756B5/756E3 Electric Cast Cutter to cut through the laminate along the proximal brim of the socket leaving a 2 cm margin.



Remove the excess laminate and reinforcing material from the suction pipe. Break out the plaster cast with 756E4 Pneumatic Chisel.

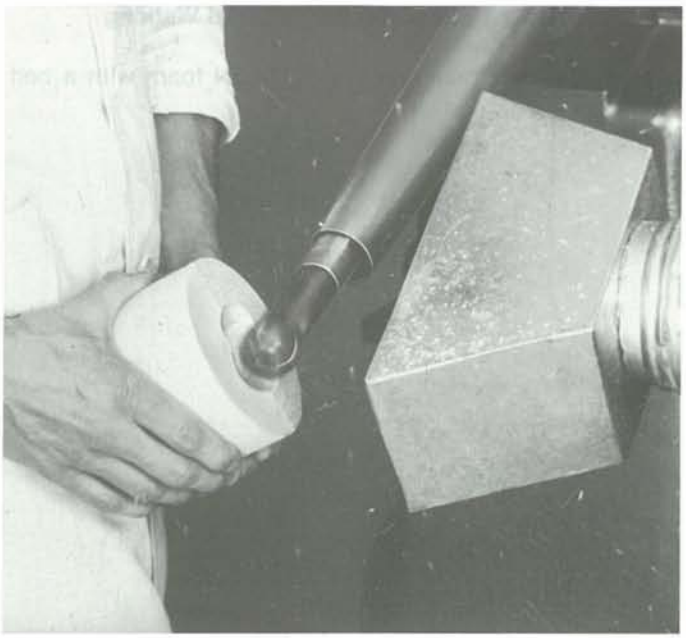
4.2 Preparation of the Socket for Trial Walking

Sand the socket brim and the PEDILEN foam with a belt sander.



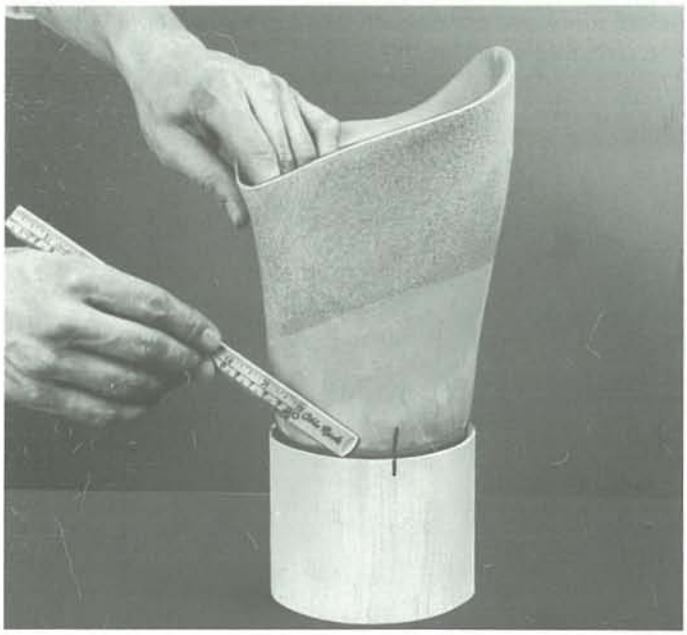
Blend the foam/socket transitions with a sanding drum.

Select a wooden connection block in an appropriate height and circumference for the socket.



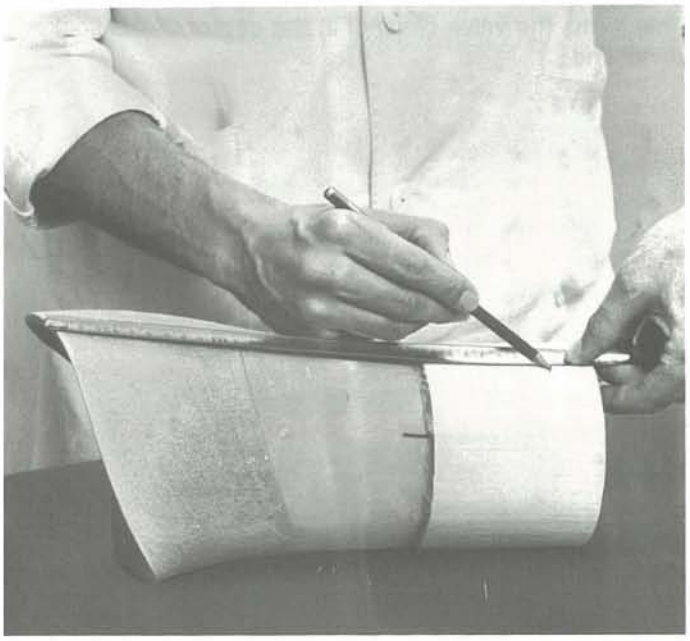
Hollow out the proximal end of the connection block 8 to 10 cm deep using a ball cutter.

Check the fit of the distal end of the socket . . .

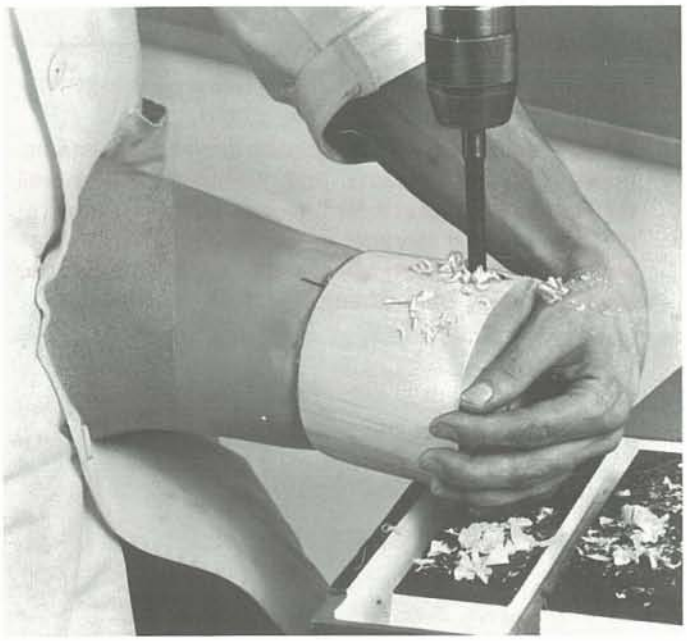


. . . and bond with 617H21 ORTHOCRYL Sealing Resin. The socket position should provide the appropriate angles of flexion and adduction for the fitting.

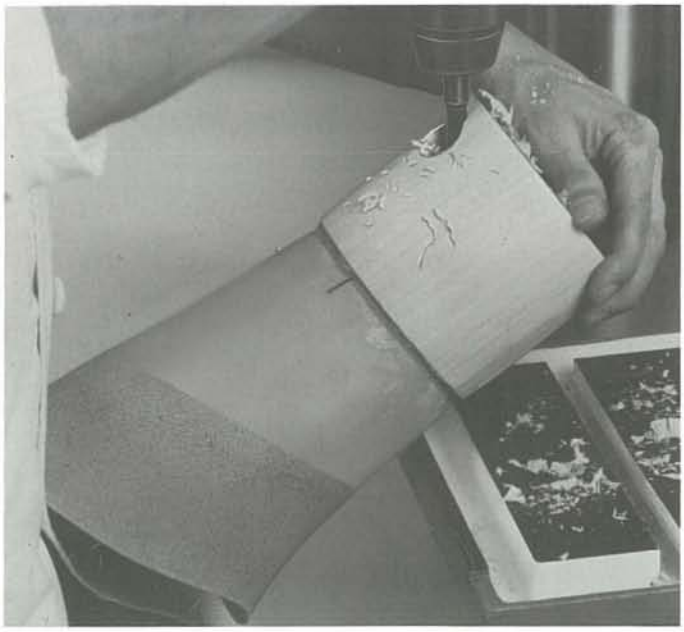
Measure the depth of the lateral interior of the socket.



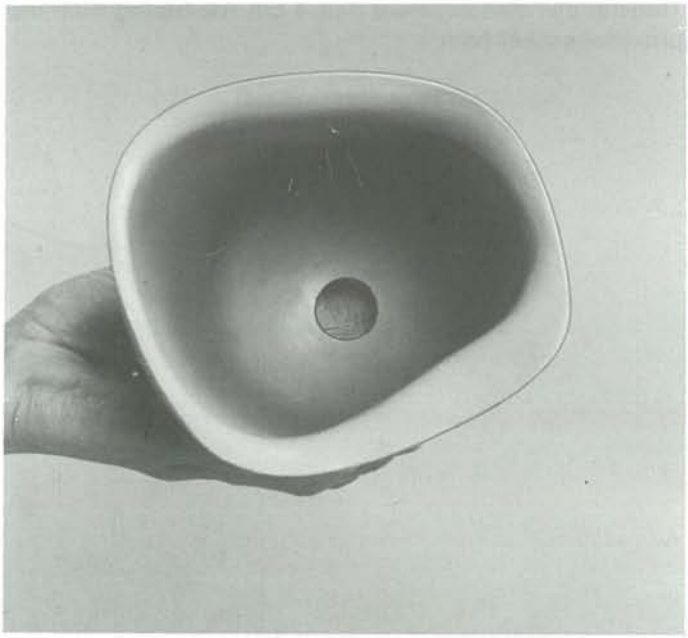
Transfer this measurement plus 4 cm, measuring from the proximal socket brim.



Drill a hole 30 mm deep with a 26 mm diameter Forstner bit.



With the drill still running, tilt the socket approximately 45 degrees and deepen the bore hole on through the laminate.



This forms the valve channel in the center of the socket's distal end.

A Product of the Research and Development Department of OTTO BOCK Orthopädische Industrie GmbH & Co, Duderstadt

Protective Measures

When processing foam and plastic lamination systems, make sure that rooms and workplaces are well ventilated. For further information about safety requirements regarding storage, processing and handling as well as personal protective measures, please refer to the DIN Safety Data Sheets.