

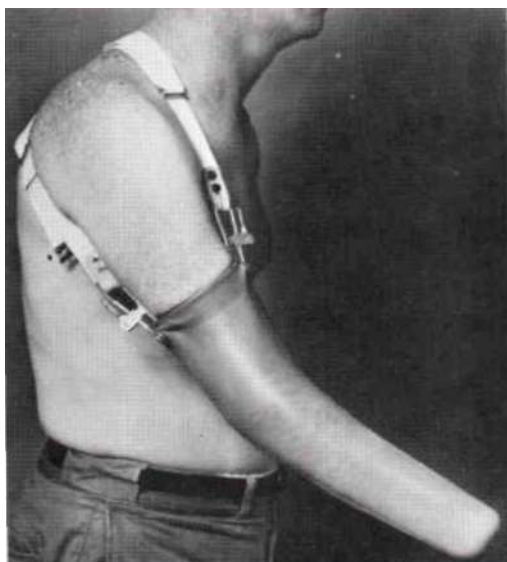
Direct Forming of Below-Elbow Sockets

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The following equipment and materials are required for this direct-forming procedure:

- Polysar² X-414 tubing
- Hot plate (thermostatic control optional)
- Tote pail and cover (height 22 in.; diameter 10 in.)
- Rubber casting sleeves
- Silicone spray
- Manila folders
- Pressure-sensitive tape
- Trichloroethylene
- Heat gun and adapter
- Cosmetic covers

All the prosthetics information required to fabricate a conventional socket is necessary for forming a socket with Polysar synthetic rubber.



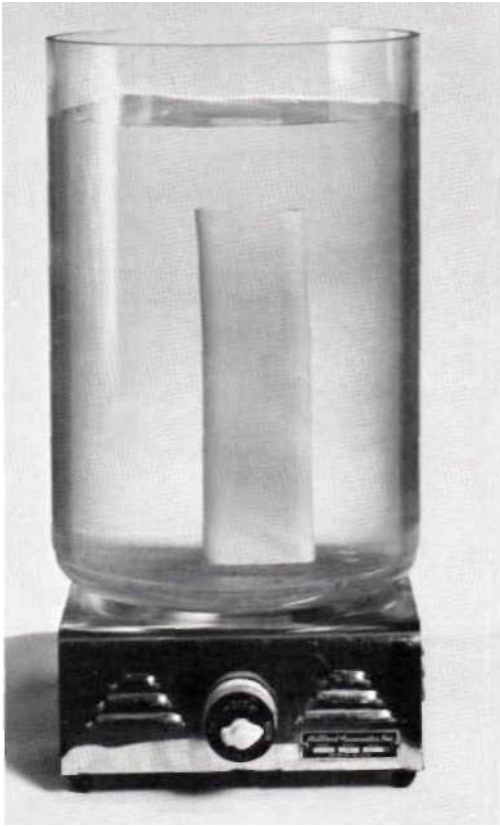
1. A rubber sleeve that will best conform to the stump is selected. (The three sizes which will accommodate most below-elbow stumps are 3 in. x 6 in. x 14 in., 3 1/2 in. x 6 in. x 14 in., and 4 in. x 6 in. x 14 in.) The rubber sleeve is pulled snugly over the stump, and the proximal end is fastened with Yates clamps to a figure-eight harness. The sleeve is lubricated generously with silicone spray.



2. Tubing whose circumference 2 in. from the distal end is closest to *but less than* the circumference of the stump is selected. (The three tube sizes which accommodate most below-elbow stumps are 4 3/4 in., 5 1/2 in. and 6 1/4 in.) The tubing is cut 3 in. longer than the measurement from the lateral epicondyle to the stump end. The inner surface of the tube is cleaned to remove loose particles.

¹ Veterans Administration Prosthetics Center, New York, N. Y.

² Registered trademark of the Polymer Corporation Limited.



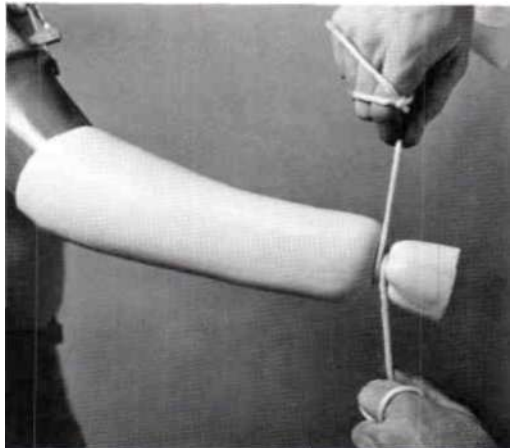
3. The tube is immersed in water heated to approximately 180 deg F. (The tube may float when it is completely soft and ductile.)



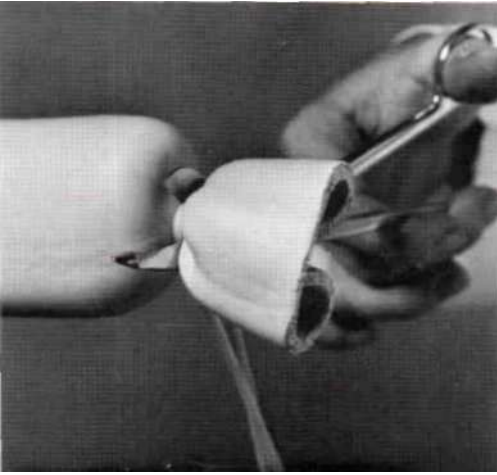
4. The softened tube is removed from the water and the entire inner surface is lubricated with silicone spray.



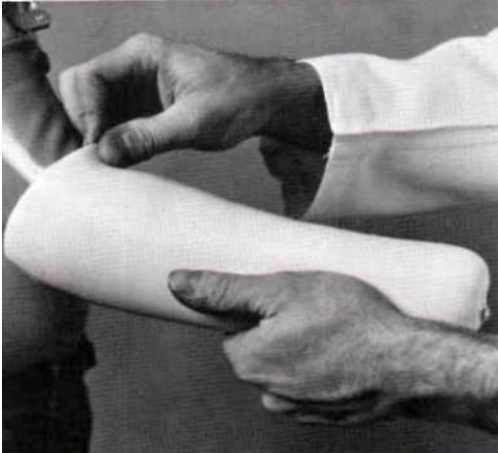
5. After the tube has cooled to skin tolerance, it is drawn up on the stump to a point where the proximal brim is about 1 in. above the olecranon.



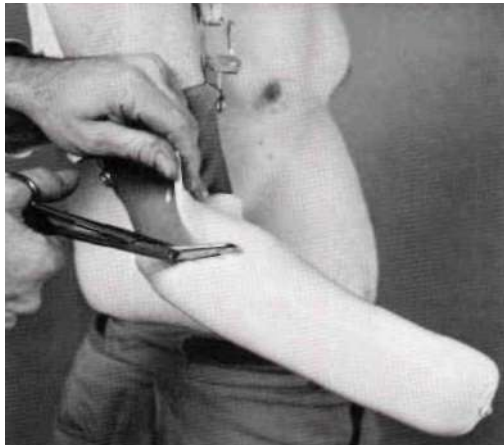
6. The tube is encircled at the distal end of the stump with nylon cord, and the cord is gently pulled until the tubing conforms to the end of the stump and is completely sealed.



7. The excess tubing is cut off close to the cord.

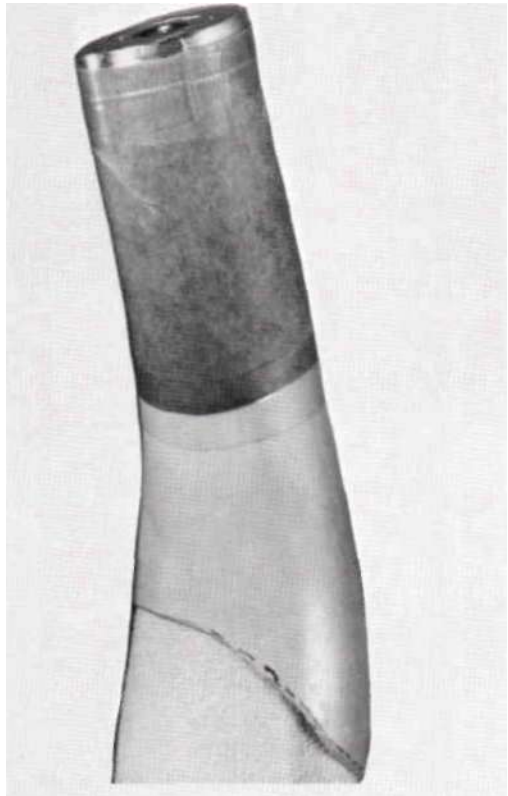


8. The tube is molded on the stump to produce the desired contours. The working time is approximately 5 minutes.

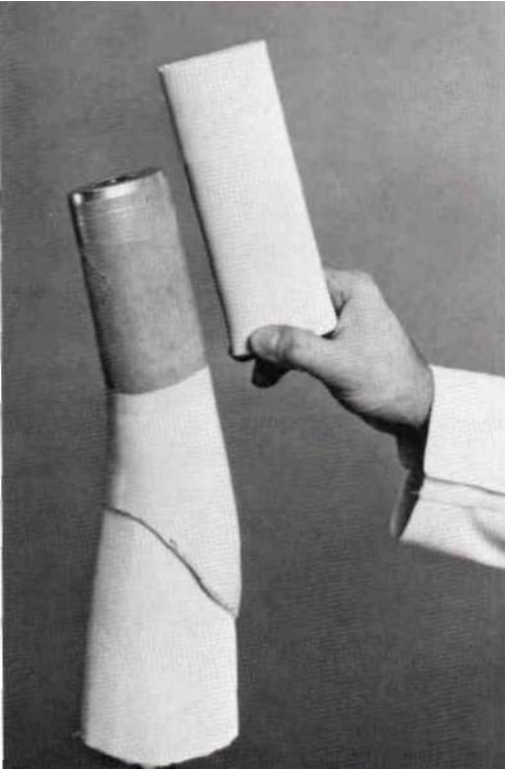


9. While the tubing is still soft, a trim line is marked according to the socket plan and the tube is trimmed. The socket is cooled before removing it from the stump: the covered stump is immersed in cold water, and hand and finger pressure are used to maintain the socket contours while it is immersed.

10. The socket is removed from the stump and trimmed to its final shape. Large areas requiring reshaping may be resoftened by immersion in hot water. Smaller areas may be softened by use of a heat gun and reshaped on the stump. (When using a heat gun on Polysar X-414, it is advisable to use a conical adapter.)



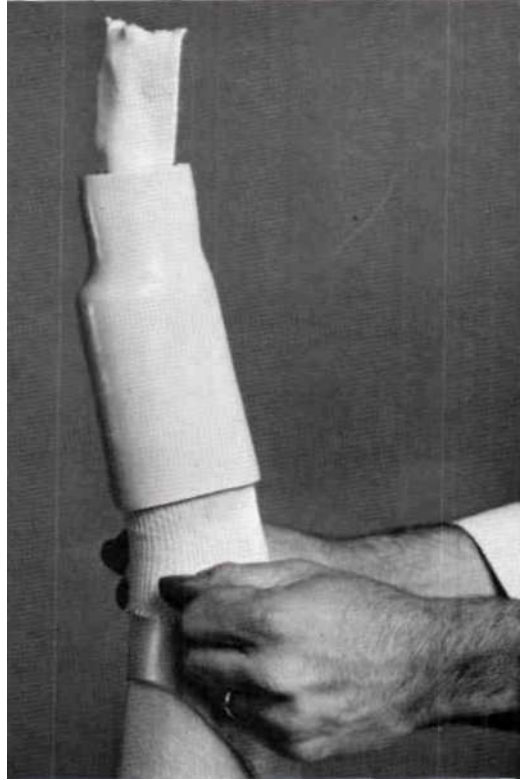
11. The forearm extension is made over a manila folder formed into a conical tube, incorporating the desired wrist fitting. The length of the tube is equal to the epicondyle-to-ulnar-styloid measurement. The tube is adjusted so that the proximal end flares into the socket approximately 3 in. over the distal end.



12. A length of Polysar tubing is cut approximately 2 in. longer than the manila tube and immersed in hot water until soft.



13. A section of 2-in. stockinet which is twice the length of the Polysar tube is pulled through the softened tube.



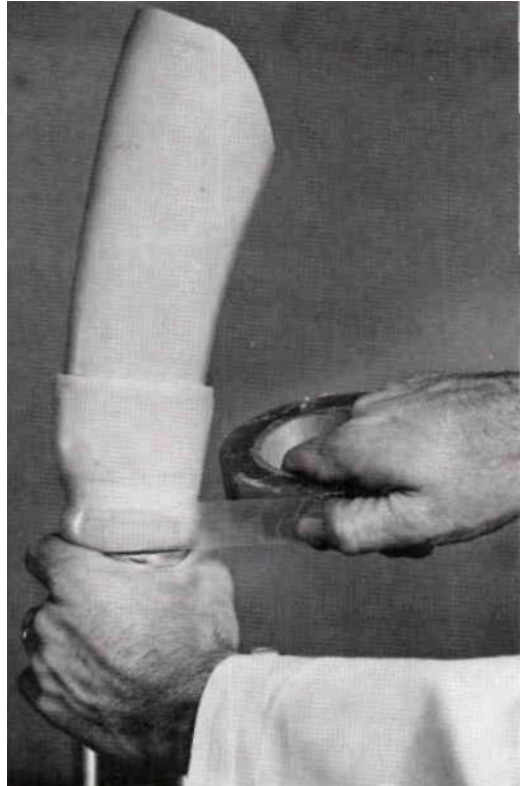
14. With the stockinet used as a "pull sleeve," the softened tube is pulled down until the proximal edge overlaps the proximal end of the manila tube by 1 in. The tube extension is cooled by immersion of the entire assembly in cold water.

15. Realignment reference lines are marked on both the socket and the extension, and the extension, manila tube, and wrist fitting are removed.

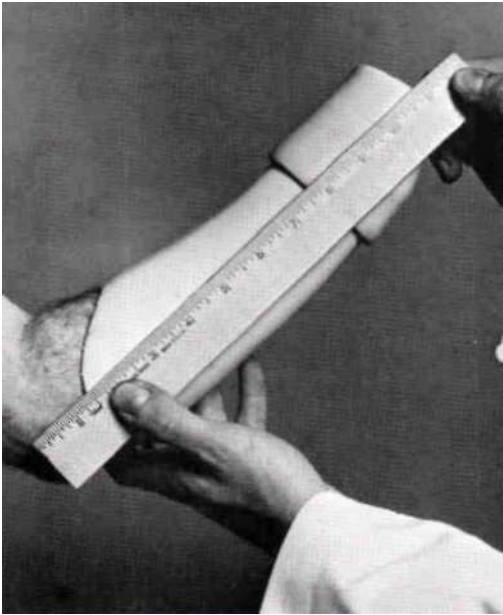
16. The socket surface covered by the extension is sanded lightly, and the socket and the extension are wiped with trichloroethylene.



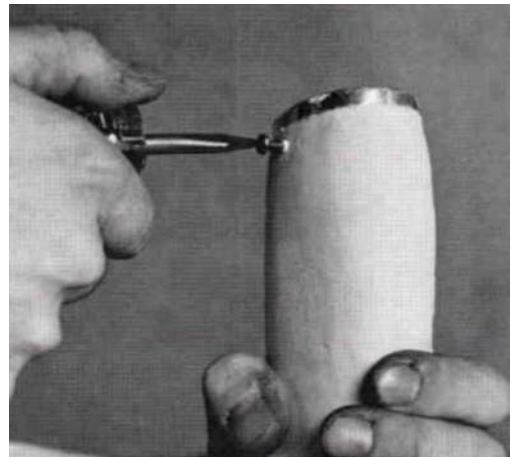
17. The extension tube is replaced on the socket and realigned according to the reference lines. The proximal 3 in. of the extension are heated until soft. (*The socket is not allowed to become soft.*) The softened end of the extension is compressed until it adheres evenly to the socket, then the socket and extension are immersed in cold water.



19. One inch of the distal end of the extension is immersed in hot water until soft. The wrist fitting is inserted into the softened extension and the tube compressed around the wrist fitting with pressure-sensitive tape. The alignment is again checked and adjusted if necessary, and the tube is cooled in cold water.



18. The epicondyle-to-ulnar-styloid measurement is checked, and the extension is trimmed if necessary.

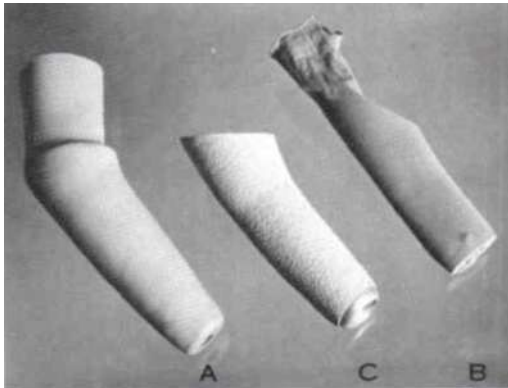


20. The extension and socket are flared by sanding. The wrist fitting is secured with four 3/8-in. #6 self-tapping pan-head sheet-metal screws.

21. The proximal socket brim is buffed with a felt wheel and wiped with trichloroethylene to produce a smooth surface.

Finishing

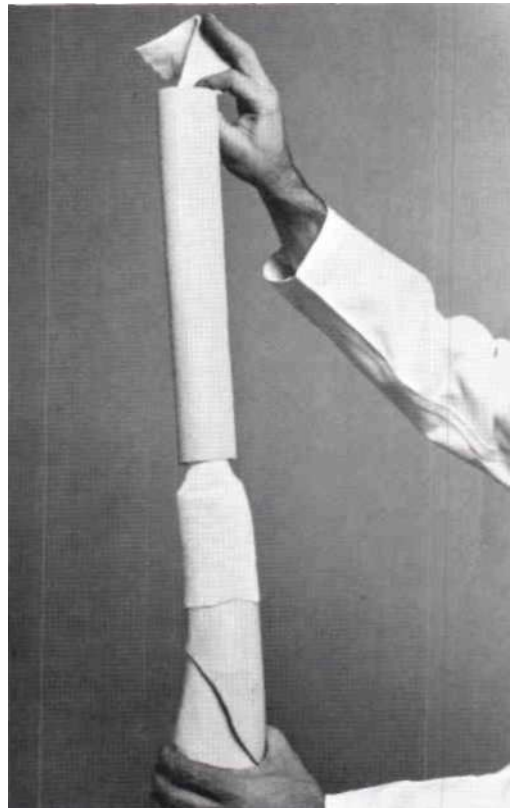
Below-elbow prostheses fabricated with synthetic-rubber sockets are best finished with prefabricated flexible cosmetic covers. Although the sockets may also be finished by conventional laminating procedures, laminates tend to reduce the yielding property of Polysar X-414, and therefore are not recommended. Three cosmetic coverings are illustrated: contoured vinyl sleeve, armllet stockinet, and tubular rubber sleeve.



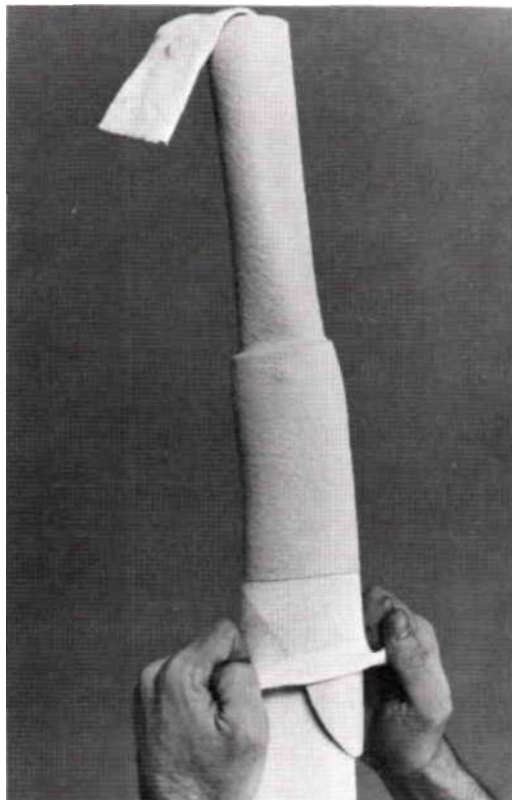
The contoured vinyl sleeve (A) is pulled over the arm after softening in hot water. The cover is trimmed approximately 1/4 in. above the proximal socket brim.

The armllet stockinet (B) is sewn closed at the unfinished end. A small opening in the sewn end is made to accommodate the threaded stud of the terminal device. The armllet is pulled over the prosthesis. (The proximal end is not cut.)

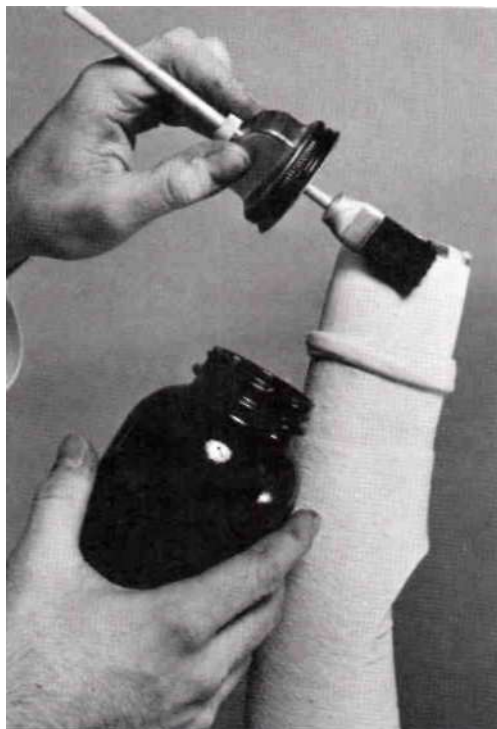
The tubular rubber sleeve (C) must be bonded to the prosthesis, as follows.



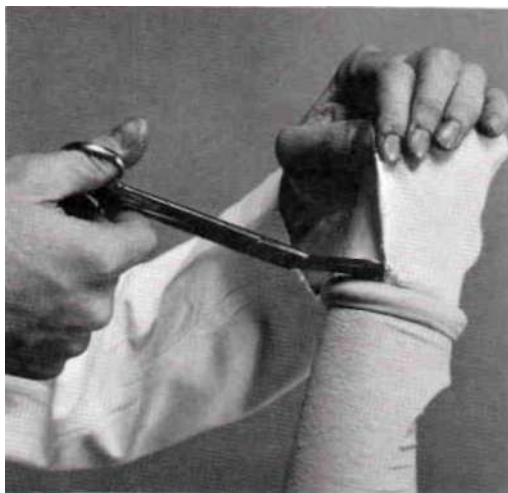
1. A length of 3-in. stockinet is used as a "pull sleeve." The stockinet is inserted into a rubber sleeve cut one and one-half times the length of the prosthesis.



2. The stockinet is pulled over the prosthesis until the rubber sleeve extends 1 in. past the proximal socket edge.



4. The exposed portion of the socket is coated with rubber cement, and the rubber sleeve is unrolled while the cement is still wet.



3. Approximately half of the rubber sleeve is rolled back, and the stockinet is trimmed.



5. The cementing procedure is repeated at the proximal end after removal of the remaining stockinet. When the cement is completely dry, the excess rubber sleeve is trimmed.

Hinges and Transmission System

Metal or leather joints are aligned and fastened with Speed rivets. All other components are installed in the conventional manner.