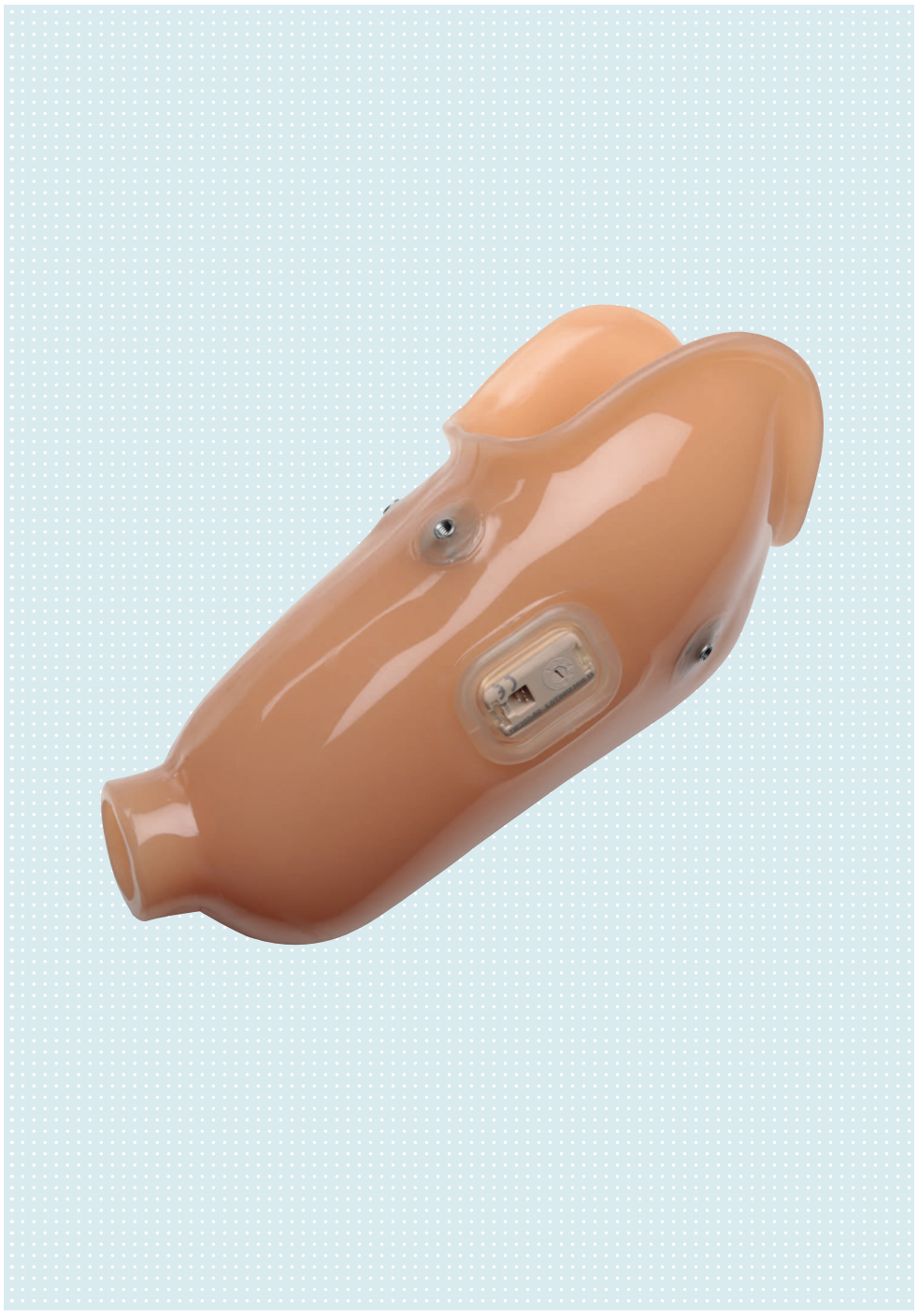
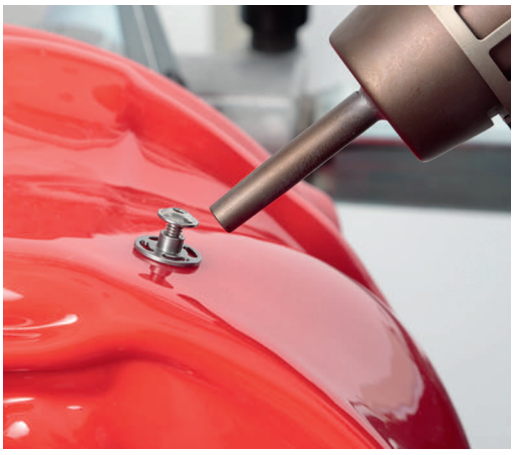
ottobock.

ThermoLyn supra flexible

Processing the thermoplastic material

Technical information 7.5.3





1 Introduction

English

This technical information provides support when working with ThermoLyn supra flexible, a thermoplastic material (EVA).

This document is directed to trained prosthetists. It is a prerequisite that the qualified personnel are trained in the handling of the various materials, machines and tools.

This technical information does not claim to be exhaustive. Reading this technical information does not substitute reading the instructions for use for all required products.

1.1 Applications

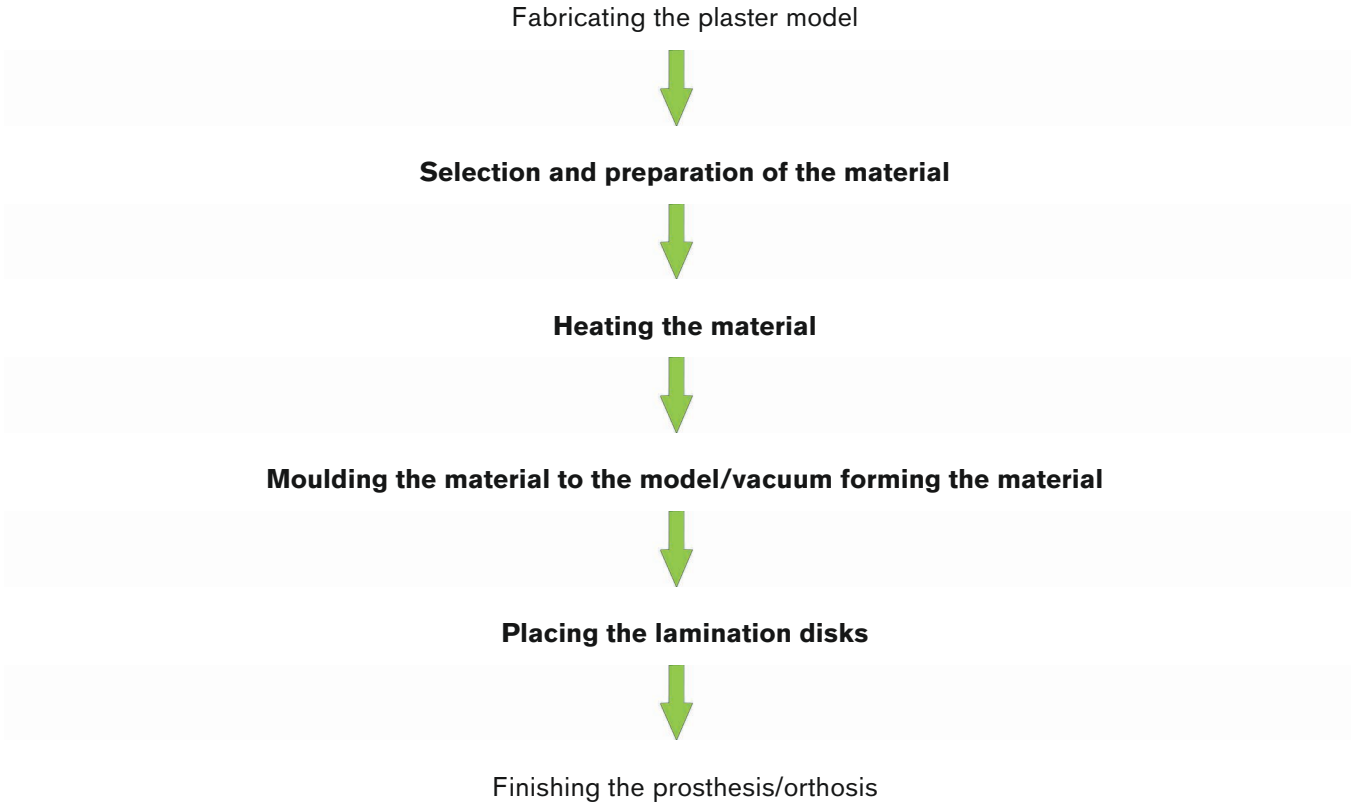
ThermoLyn supra flexible is permanently elastic, it can be wiped clean and moulded thermoplastically.

The material has a range of applications. The following table shows examples of use, depending on material thickness:

Material thickness	Example of use
2 mm 3 mm	Flexible proximal sections of orthoses Tabs Flexible inner sockets upper limb prosthetics (child fitting)
4 mm	Flexible inner sockets upper and lower limb prosthetics
5 mm 6 mm	Flexible inner sockets lower limb prosthetics (hip disarticulation area)
9 mm 12 mm 15 mm	Flexible inner sockets lower limb prosthetics (plates for vacuum forming in tensioning frame)

1.2 Flowchart

The entire process is shown in the following flowchart. All work steps described in this document are highlighted in bold.



2 Preparation

The following preparations must be made in order to work effectively:

- Collecting the materials and tools
  - Components and auxiliary devices

  - Materials
  - Machines, equipment and accessories
  - Tools
- Preparatory work

2.1 Collecting the materials and tools

The materials and tools used in the photos within this technical information are listed in the tables below. The prosthetist assumes full responsibility for the use of any other materials.

Tools	
Designation	**Reference number**
Scissors	–
Measuring devices	–
Vacuum generation unit	–
Vacuum tube (with vacuum sealing disc)	755x104*
Heat gun	756E11=*
PTFE Teflon foil, trimmed	759Y27=3
Deburring knife	718H5
Heat resistant gloves	641H13
Clean silicone for smoothing (e.g. silicone sanding cone or pieces of liners)	–

Materials	
Designation	**Reference number**
ThermoLyn supra flexible	616T112*
Lamination disc	29Y57
Isopropyl alcohol	634A58
Silicone-based parting agent (e.g. BetaSil or silicone bonding agent)	–
Polyethylene adhesive tape	627B4
Neoprene® cellular rubber tape	627B5*

2.2 Plaster model requirements

ThermoLyn supra flexible is processed directly on the plaster model. A stockinette is not used, because the ThermoLyn supra flexible would adhere to it.

The plaster model must meet the following requirements:

- Made from 87G2 porous plaster. Stockinettes are not required, because the plaster is permeable to air.
- Completely dry. A vacuum can only be generated with a completely dry plaster model.
  TIP: The plaster model can be dried in a fan oven at max. 60° C.
- Surface completely smoothed and free of bubbles. The material is very soft during processing and even small irregularities are transferred.
  TIP: Bubbles can be made good with Cellona plaster bandages. Finally polish with a piece of stockinette.

INFORMATION

87G2 porous plaster is only required when a vacuum is to be created.

2.3 Processing information

The relevant information for the processing of ThermoLyn supra flexible is summarised in this section.

Heating

INFORMATION

A protective film is located on the material, which has to be removed prior to heating.

- The material can be processed in the temperature range between **80 °C** and **120 °C**.
- **TIP:**The larger the piece of material to be processed, the lower the temperature that should be selected. The material becomes very soft, making it more difficult to process larger pieces.
- The duration of heating depends on the material thickness and the equipment in which it is heated. Lift the material at one corner to test its condition.
- The material can be heated with the following equipment: hotplate, infrared oven, convection oven

- Place the material on a Teflon film during heating.

Welding
- The material fuses with itself as long as it is at processing temperature.
- The material can be welded subsequently.

Smoothing
- The material can be shaped and smoothed using silicone (e.g. silicone sanding cones, pieces of silicone liners or silicone mats).
- **TIP:** Briefly heat the surface with a hot air gun to restore the shine.

Cutting/sanding
- The material can be cut with scissors or a scalpel.
- The material can be sanded at the socket router (e.g. with the following tools: Habermann cleaner, silicone sanding cone, foam roller).

3 Procedure

Three examples are used to demonstrate the processing of ThermoLyn supra flexible:
- Inner socket for a forearm prosthesis
- Flexible proximal section for an orthosis
- Inner socket with tab for hip disarticulation prosthesis

All relevant processing techniques are demonstrated in these examples. Information on heating the material is provided in the "Processing information" section (see Page 3).

3.1 Inner socket forearm prosthesis

INFORMATION

The following steps should be carried out by two persons.

INFORMATION

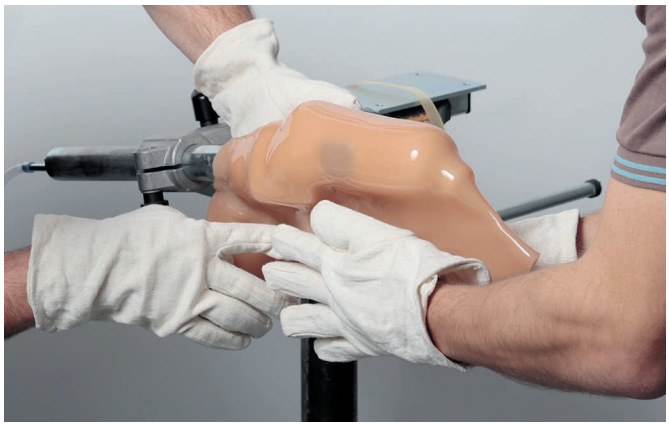
The material is placed on the plaster model from above and welded on the underneath.

► Align the plaster model so that the shortest side faces downwards. The seam is created on this side.

Select the suitable material thickness.
Ottobock recommends: 4 mm
Cut the material to size:
- According to the dimensions of the plaster model and an allowance for the seam.

Remove the protective foil.
Clean the material with isopropyl alcohol.
Place the material on a Teflon film and heat it.

Lift the heated material at its 4 corners and drape it over the plaster model.



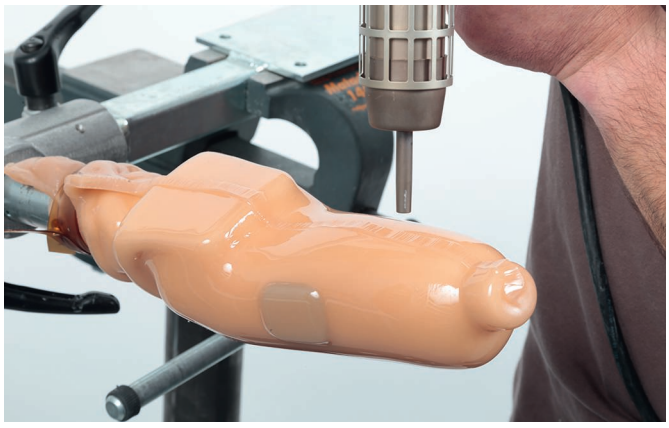
INFORMATION: Do not pull on the material, to prevent the creation of different wall thicknesses.
Shape the material to the plaster model and join the seam on the underside of the plaster model.

Switch on the vacuum unit.
INFORMATION: Keep the vacuum unit switched on throughout the entire processing.

Using scissors, cut off any excess material at the seam. This prevents the weight of the excess material from stretching the area around the seam.

Seal the area around the vacuum tube with sealing tape (e.g. made from Vulkollan®).

Allow the material to cool to room temperature.



Using a scalpel, cut off any excess material flush with the seam.

Heat the seam area with a hot air gun until the material can be shaped.

Smooth the seam with a silicone sanding cone.

TIP: Reheat the area around the seam after smoothing, to restore the shine.

Placing the lamination disks

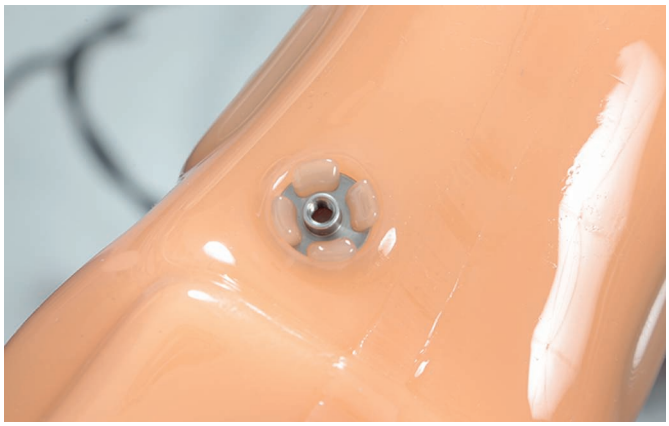
The lamination disks are embedded in the thermoplastic material. They have an M4 interior thread for screwing the thermoplastic material to a stable frame.

Screw a screw into each lamination disc until the thread is completely filled. This prevents the material from entering the thread.

Place the lamination disk in the required position.

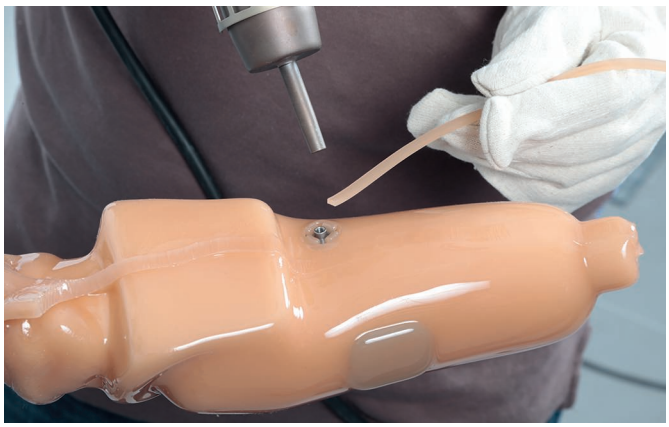
Heat the lamination disk and the surrounding material with the hot air gun.

When the material is soft enough, press the lamination disks into the material. The material is pressed through the slotted holes in the lamination disk.



Press the lamination disk into the material until the material that has been pressed through is flush with the surrounding material.

Remove the screw from the lamination disk.

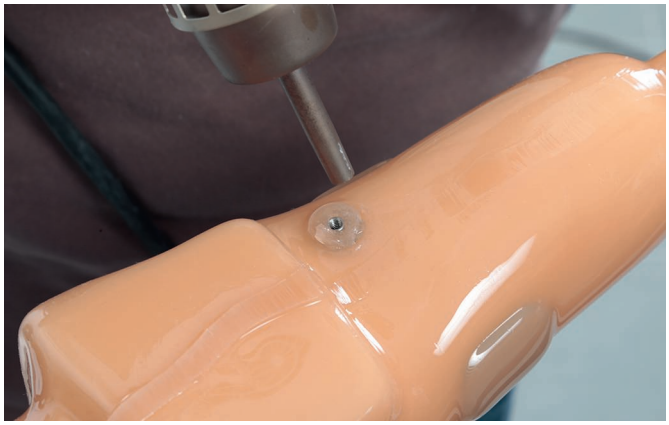


TIP: Infilling is only required if the lamination disk is not covered sufficiently.

Cut off a small strip of material.

Heat the strip and the material surrounding the lamination disk.

Fill in the indentation around the lamination disk with the strip.



Reheat the area to fuse the material.

Smooth the area with a clean piece of silicone (e.g. silicone liner).

TIP: Reheat the area after smoothing to restore the shine.

Repeat this process for all lamination disks.

Finishing the prosthetic socket

Trim and sand the socket edge.

Sand away material over dummies (e.g. for electrodes).

Remove the prosthetic socket from the mould and finish it. Finishing the prosthetic socket is not part of this document.

3.2 Flexible proximal section orthosis

INFORMATION

The following steps should be carried out by two persons.

Mark the flexible proximal section on the plaster model.

Select the suitable material thickness.

Ottobock recommends: 2 mm

Cut the material to size:

- According to the marked contours and an allowance.

Remove the protective foil.

Clean the material with isopropyl alcohol.

Place the material on a Teflon film and heat it.

Lift the heated material at its 4 corners and drape it over the plaster model.

INFORMATION: Do not pull on the material, to prevent the creation of different wall thicknesses.

Mould the heated material to the plaster model. A piece of silicone (e.g. silicone liner) can be used for this purpose.

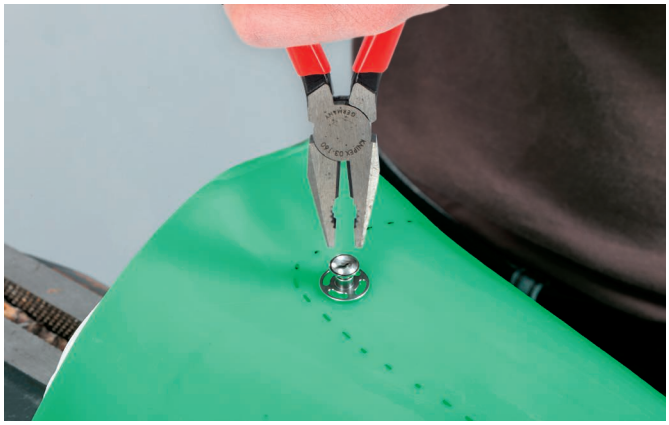
Allow the material to cool to room temperature.

Transfer the marked flexible proximal section to the material.

Mark the positions of the laminating disks.

Placing the lamination disks

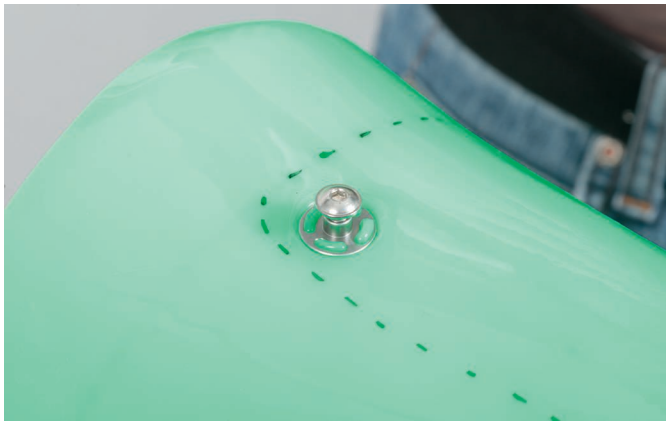
The lamination disks are embedded in the thermoplastic material. They have an M4 interior thread for screwing the thermoplastic material to a stable frame.



Screw a screw into each lamination disc until the thread is completely filled. This prevents the material from entering the thread.

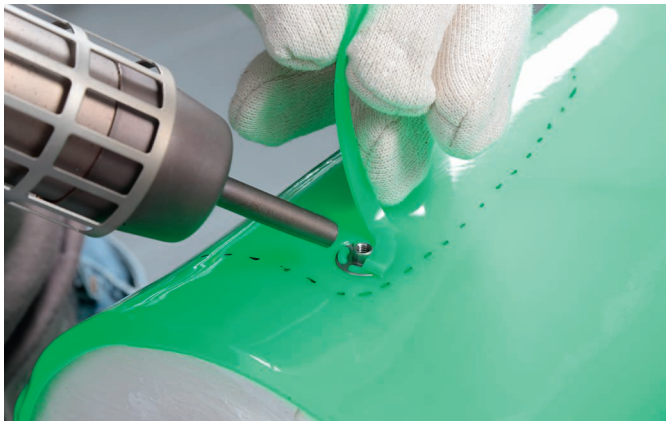
Place the lamination disk in the required position.

Heat the lamination disk and the surrounding material with the hot air gun.



When the material is soft enough, press the lamination disks into the material until the material extrudes slightly from the slotted holes in the lamination disk.

Remove the screw from the lamination disk.



TIP: Infilling is only required if the lamination disk is not covered sufficiently.

Cut off a small strip of material.

Heat the strip and the material surrounding the lamination disk.

Fill in the indentation around the lamination disk with the strip.

Reheat the area to fuse the material.

Smooth the area with a clean piece of silicone (e.g. silicone liner).

TIP: Reheat the area after smoothing to restore the shine.

Repeat this process for all lamination disks.

Finishing of the flexible proximal section

Cut the material according to the marked contours.

If required: Bevel the edges to create a softer transition to the laminate.

Attach the material to the plaster model with double-sided adhesive tape.

Carry out the lamination process. The lamination process does not form part of this document.

3.3 Inner socket hip disarticulation

Fabrication of the tab

Select the suitable material thickness.

Ottobock recommends: 2 mm

Cut the material to size:

- According to the dimensions of the tab and an allowance.

Remove the protective foil.

Clean the material with isopropyl alcohol.

Place the material on a Teflon film and heat it.

Lift the heated material and place it on the plaster model.

INFORMATION: Do not pull on the material, to prevent the creation of different wall thicknesses.
Mould the heated material to the plaster model. A piece of silicone (e.g. silicone liner) can be used for this purpose.
Allow the material to cool to room temperature.
Mark the contour of the tab on the material.

Mark the edge to be bevelled.
Bevel the edge at the socket router.
Place the material on the plaster model.

Mask the part of the tab that is to be welded to the prosthetic socket with PE adhesive tape.

Apply a silicone-based parting agent (e.g. BetaSil, Impresil or silicone bonding agent) to the material.

Distribute the parting agent thinly and evenly e.g. with a piece of foam.

Remove the adhesive tape immediately after the parting agent has been applied.

Leave the parting agent to harden.

Cut a strip of Neoprene® cellular rubber tape to size and place it where the inner socket is to be opened.

Attach the Neoprene® cellular rubber tape with a stapler.

Fabricating the inner socket

INFORMATION

The following steps should be carried out by two persons.

INFORMATION

The material is placed on the plaster model from above and welded on the underneath.

► Align the plaster model so that the shortest side faces downwards. The seam is created on this side.

Select the suitable material thickness.
Ottobock recommends: 5 mm
Cut the material to size:

- According to the dimensions of the plaster model and an allowance for the seam.

Remove the protective foil.
Clean the material with isopropyl alcohol.
Place the material on a Teflon film and heat it.
Lift the heated material at its 4 corners and drape it over the plaster model.

INFORMATION: Do not pull on the material, to prevent the creation of different wall thicknesses.
Mould the material to the contours of the plaster model and join the seam on the underside of the plaster model.

- Join the seam on the underside of the plaster model.
- Join the material on the side of the residual limb.

Switch on the vacuum unit.
INFORMATION: Keep the vacuum unit switched on throughout the entire processing.
Shape the material to avoid seams or folds in the area of the future prosthetic socket as much as possible.

Using scissors, cut off any excess material at the seams. This prevents the weight of the excess material from stretching the areas.
Seal the area around the vacuum tube with sealing tape (e.g. made from Vulkollan®).

Allow the material to cool to room temperature.

Using a scalpel, cut off any excess material flush with the seam.

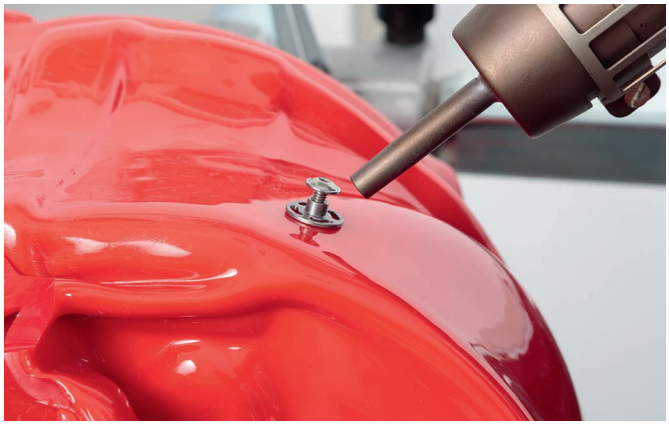
Heat the seam area with a hot air gun until it becomes malleable.

Smooth the seam with a clean piece of silicone or a silicone sanding cone.

TIP: Reheat the area around the seam after smoothing, to restore the shine.

Placing the lamination disks

The lamination disks are embedded in the thermoplastic material. They have an M4 interior thread for screwing the thermoplastic material to a stable frame.



Screw a screw into each lamination disc until the thread is completely filled. This prevents the material from entering the thread.

Place the lamination disk in the required position.

Heat the lamination disk and the surrounding material with the hot air gun.

When the material is soft enough, press the lamination disks into the material. The material is pressed through the slotted holes in the lamination disk.

Press the lamination disk into the material until the material that has been pressed through is flush with the surrounding material.

Remove the screw from the lamination disk.

TIP: Infilling is only required if the lamination disk is not covered sufficiently.

Cut off a small strip of material.

Heat the strip and the material surrounding the lamination disk.

Fill in the indentation around the lamination disk with the strip.

Reheat the area to fuse the material.

Smooth the area with a piece of silicone (e.g. silicone liner).

TIP: Reheat the area after smoothing to restore the shine.

Repeat this process for all lamination disks.

Finishing the prosthetic socket

Cut open the prosthetic socket in the middle above the Neoprene® cellular rubber tape. Do not cut into the tab while doing so.

Trim the socket edge.

Remove the prosthetic socket from the mould and finish it. Finishing the prosthetic socket is not part of this document.

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