

ÖSSUR[®]
A C A D E M Y

Össur Touch Solutions:
Introduction to Livingskin™

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- Production Process
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- Ordering a Device (mylivingskin app)
- Casting/Impression taking



Introduction

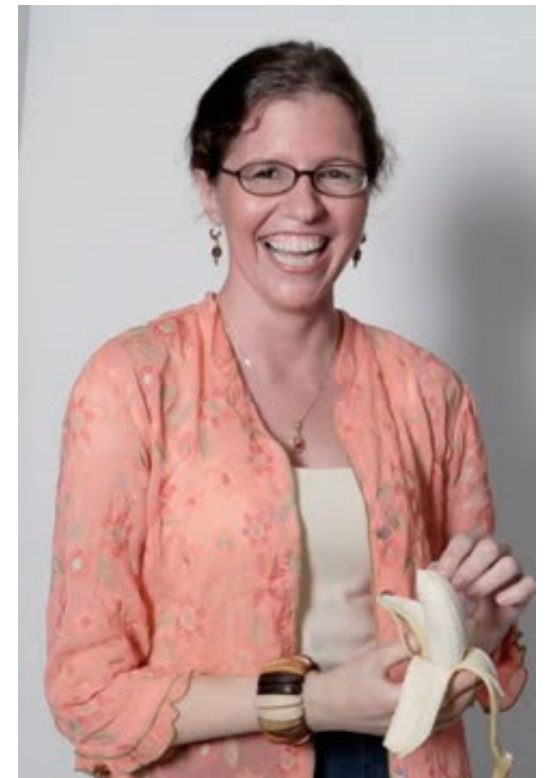
- Passive solutions for all levels of **upper limb** amputations and some **lower limb** amputations
- Functional capabilities can assist in a variety of ADLs including pushing, pulling, stabilising, supporting, grasping, typing, gait, and balance
- Custom sculpting and painting ensures individualised fit
 - Optimum match to patient skin tone – colour imitates dermal layers of skin
 - Personalised details – freckles, hair, moles, seasonal colour change



Functional Benefits of Passive Devices

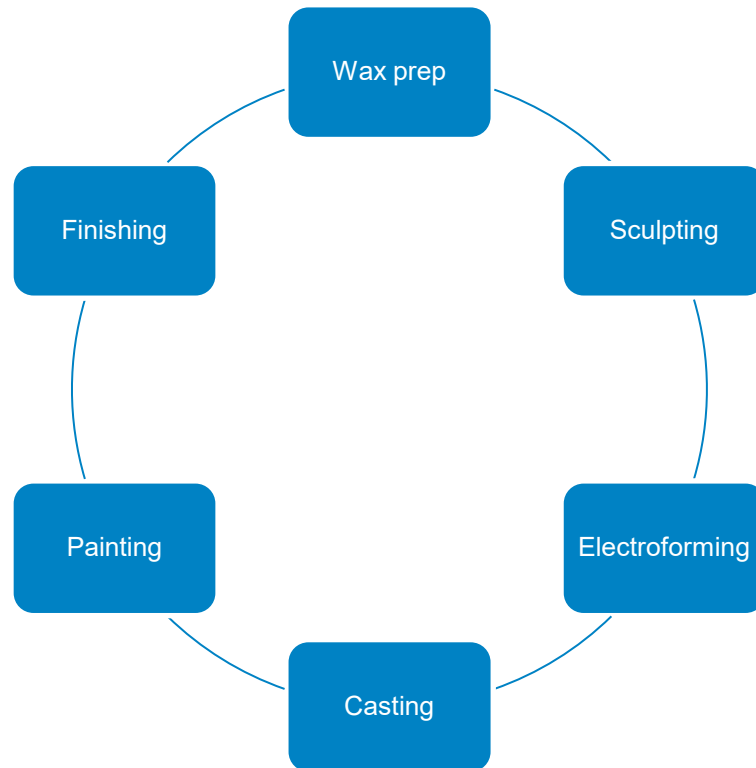
Provide body symmetry & stability:

- Stabilisation (hold paper when writing, stabilise plate or objects)
- Restore digit length (typing, grasping)
- Push/Pull tasks (open door, push shopping cart)
- Psychosocial benefits (Improved social confidence)
- Improved posture/balance



LivingSkin™ Team

- Team of 21 with multiple departments



- Located 90 minutes North of Manhattan
- Newburgh, NY 12550



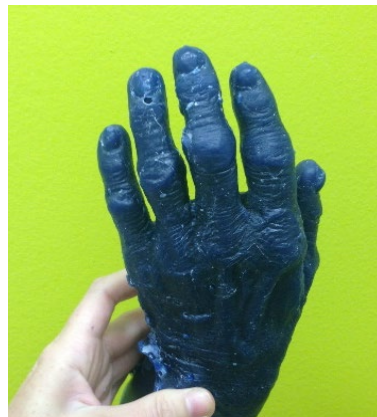
Production Process

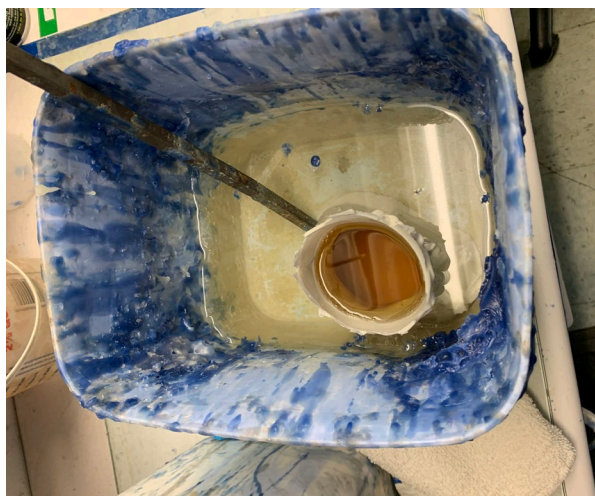
- The process begins when the kit contents are received
- Waxes will be poured from the impressions to verify if they are acceptable for fabrication
- If applicable, the socket is reviewed for proper construction, measurements and reference points
- Orders that are deemed unacceptable will get their own bin for storage until obtaining the missing items
- Once the items are received and everything is acceptable for fabrication the order is processed



Wax Prep

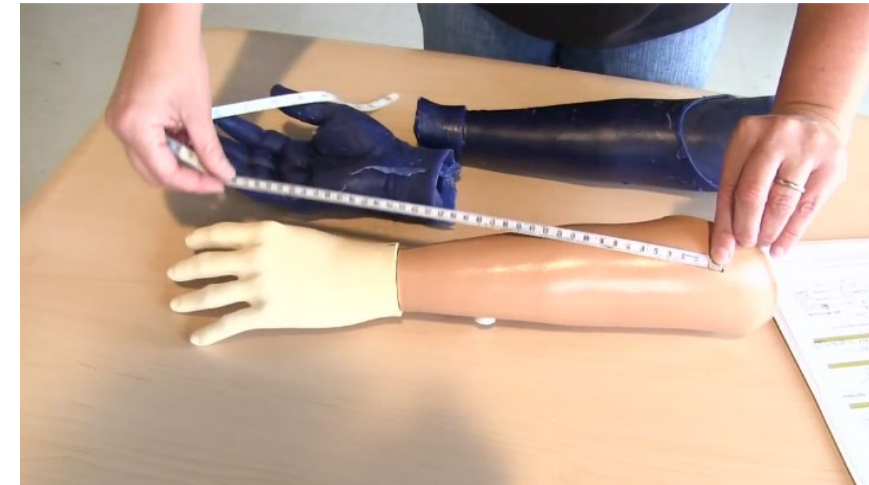
- First processed by Wax Prep
- The impression will be poured multiple times
 - Two blue sound side waxes and a yellow and a blue affected side wax.
 - The yellow affected side wax is used by the finishing team when setting the silicone skin against the affected anatomy. The yellow colour prevents any staining from the blue dye
 - Blue wax is used to enable visualisation of fine detail in the model

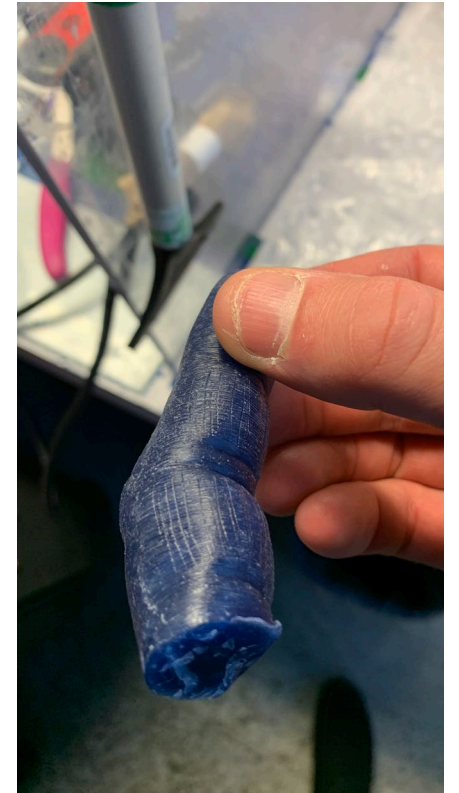




Sculpting

- The next stage is the sculpting of the definitive prosthesis
- The sound side anatomy will be used as much as possible or when applicable to recreate the absent form
- When there is no sound anatomy or for large pieces like transradials, a donor is used for the form
- Details are mirrored and reversed to recreate the missing limb





Electroforming

- The next stage is Electroforming (also referred to as Mold Making or Tooling)
- A copper bar is imbedded in the wax model, then sprayed with a thin silver paint, to make it conductive
- Placed in the electroforming tank for solution baths
- Once the bathes are complete, the created tool will be cut to remove the copper bar and the flashing
- Wax is then melted out, and the interior sandblasted to clean the tool
- A thin lubricant will be applied to prepare it for the casting stage

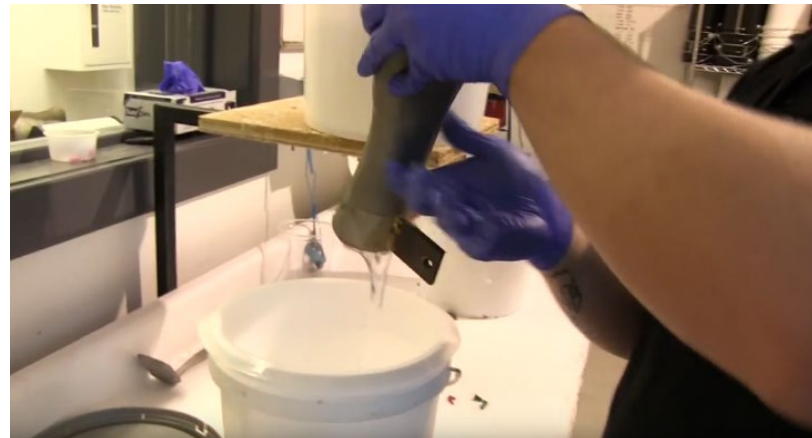






Casting

- The tool is now ready for casting
- A silicone mix is created with a 2-part silicone and a solvent for thinning
- The mixture will get to a milk-like consistency and then it will be degassed to prevent bubbles in the skins
- The silicone is poured into the metal mold and then poured back out
- It is then attached to the rotator where it will rotate for an hour



Casting

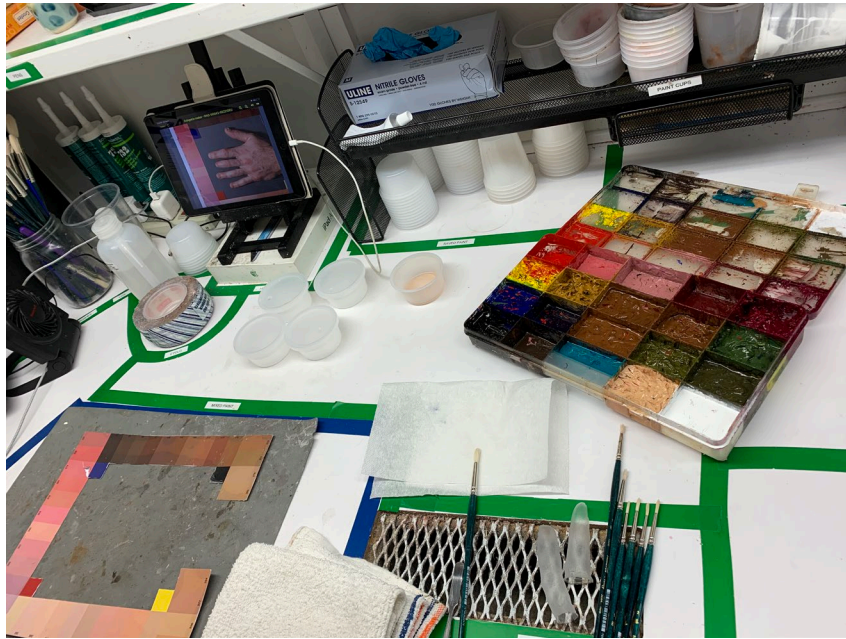
- The tool will be left to rotate and air dry overnight, baked at a low temperature and slowly cooled
- Once cool the skin will be pulled from the tool
- A standard order will have 2-3 skins cast before it can move on to the next stage
- The skins will be quality controlled and bagged for the paint department
- i-limb[®] skin match gloves have a slightly different approach



Painting

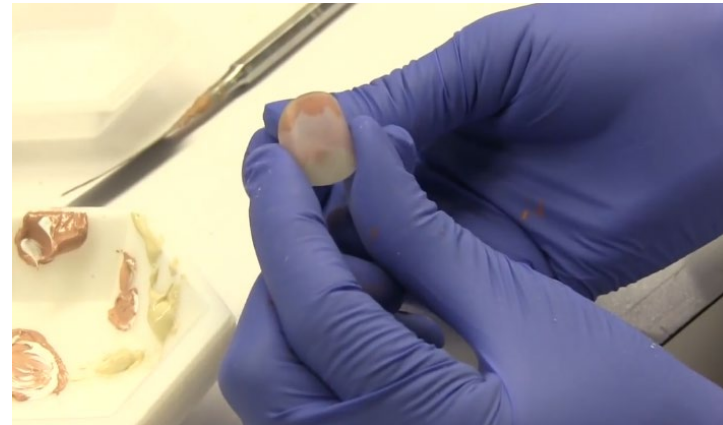
- The painter will refer to the mylivingskin app order and start to prepare small cups of pigmented silicone for the colours they see present in the skin
- They may have multiple cups for both the dorsal and palm sides of the limb. If hair, freckles, moles, or palm lines are present, these would be laid in first
- Once those are dry the painter applies layers of the colour in the various areas from the image. All colour is applied in the interior





Finishing

- The last stage of the line is the finishing stage
- The finisher will clean the outside of the skin and invert the skin to grind the paint nice and smooth where it will contact the affected limb
- The finisher will then create the acrylic nails if applicable
- The device will have silicone filling packed into it and then it will be donned on the yellow wax or the foamed socket



Finishing

- Once the main fill is inside, fingers or toes are filled slowly with an injector and the nail is installed
- When cured, the exterior skin is ready to be cleaned
- The exterior is cleaned, and the prosthesis will be pulled from the wax
- The interior will be cleaned up to remove any rough areas, and a coat of thinned pigmented silicone with solvent is used to create a smooth glass-like interior
- Trim lines and edges are refined and is ready for final quality inspection



Candidates

- Appropriate for anyone with any level of upper limb absence who prefers a highly cosmetic prosthesis with supporting functions
- Lower limb options available
- Paediatric solutions offered

Total Hands



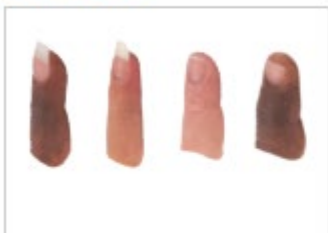
Partial hands



Below elbow and above elbow



Half fingers



Full fingers



Feet and toes



Patient Evaluation

Assess the patients affected limb:

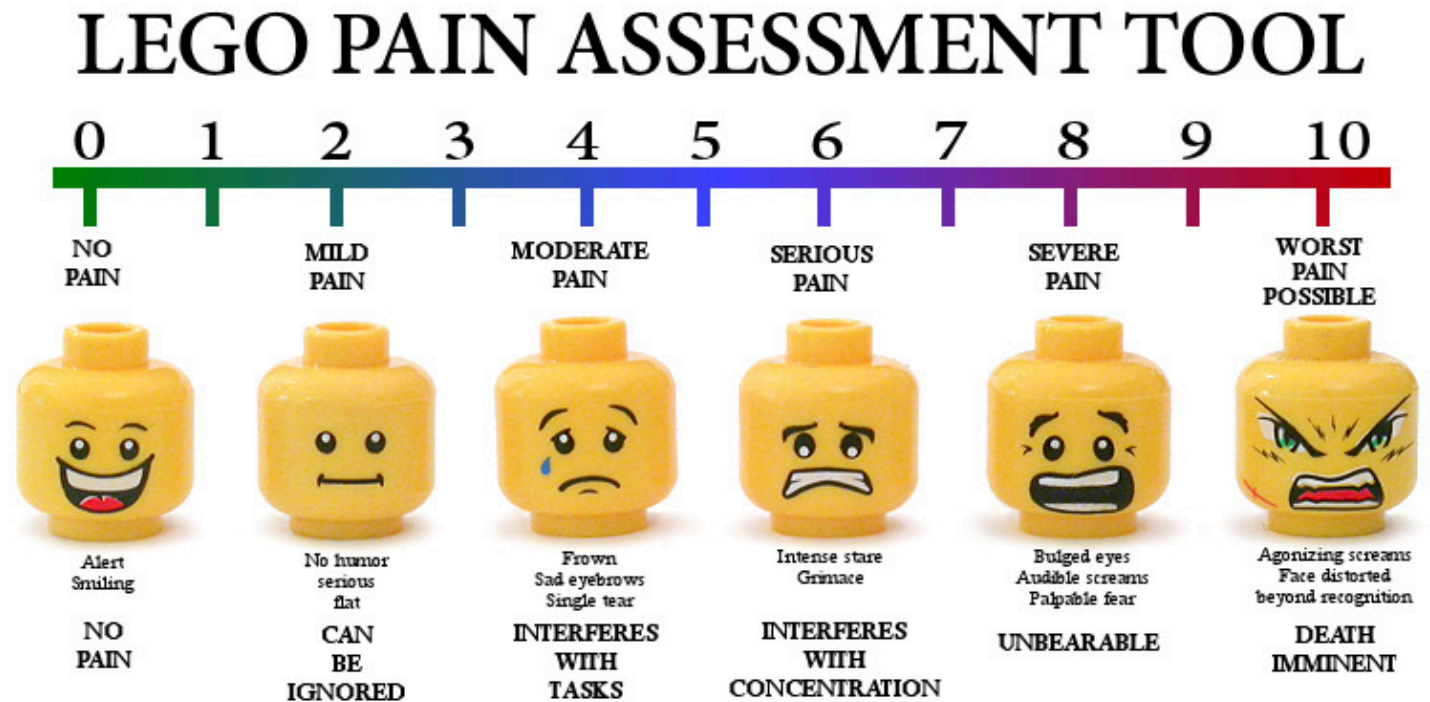
- Physical presentation

- Pain
- Sensitivity
- ROM
- Contractures

- Daily activities

- Cosmetic requirements

- Expectations from prosthesis

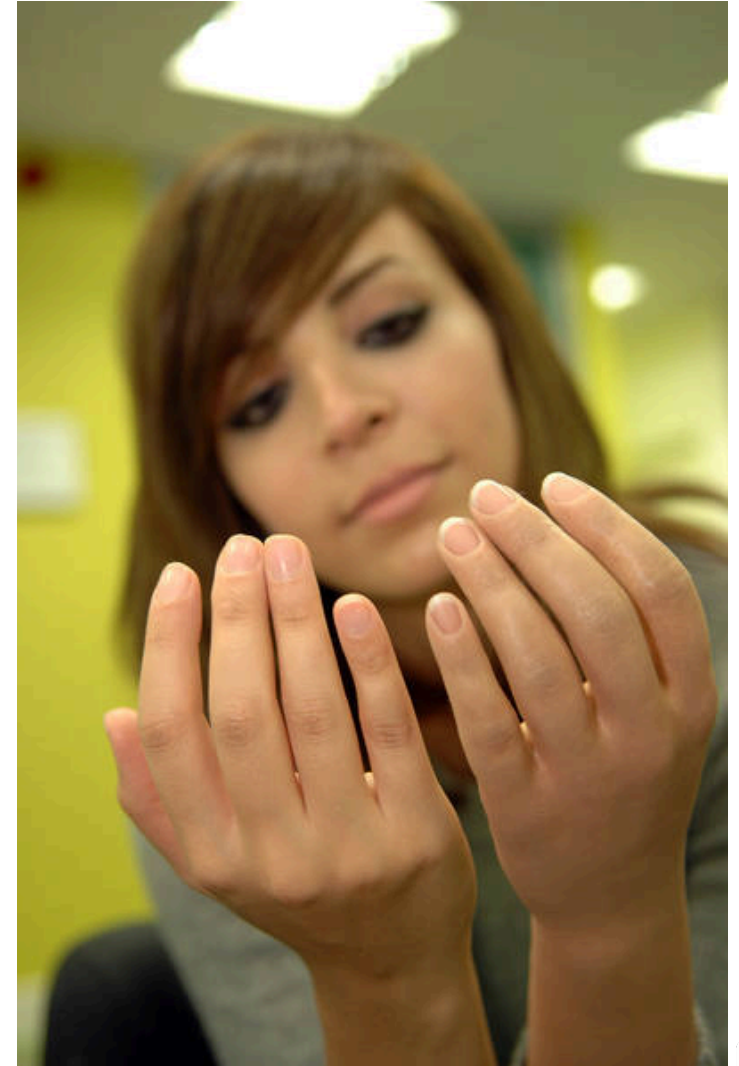


Created by Brendan Powell Smith www.TheBrickTestament.com This chart is not sponsored, authorized, or endorsed by the LEGO Group.



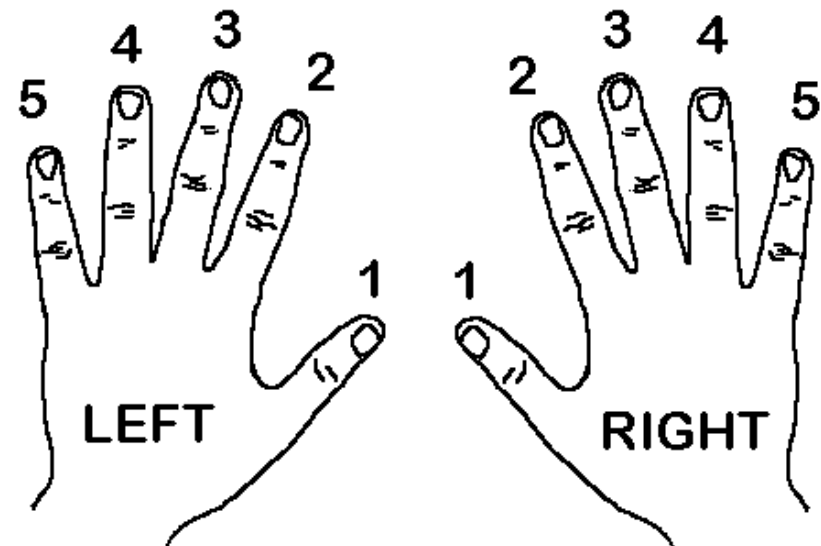
Patient Evaluation: before image taking

- Factors that can affect skin colour:
 - Emotion
 - Temperature
 - Movement
 - Limb position
 - Smoking
 - Season
- Patient should be:
 - Calm
 - At room temperature
 - Rested
 - Sat with arm at table height
 - Cigarette free for 30+ mins
- Make sure pt skin colour is typical for them (not tanned etc)



Determining the correct product and terminology

- When describing an amputation, we refer to the digits or toes as 1-5
- If a client is missing **2 fingers on the right** and **3 fingers on the left**, the order would be placed as a 2-finger device and a 3-finger device, not a 1 finger device (x5)

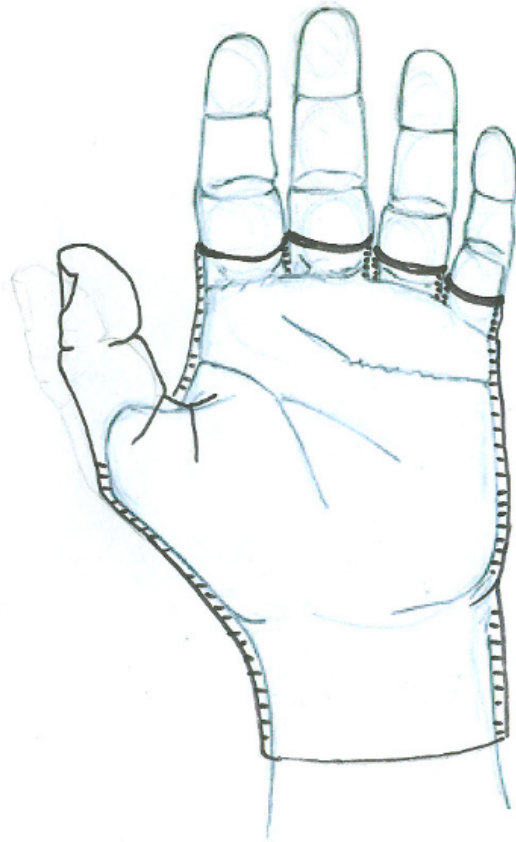


Determining the correct product and terminology

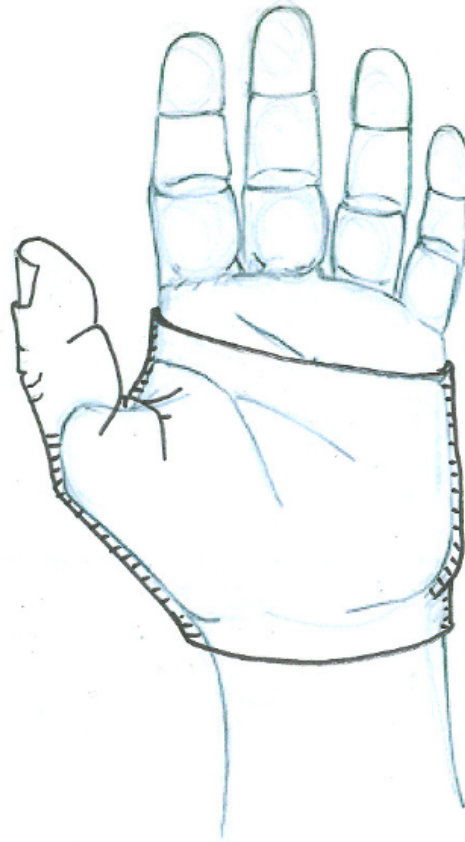
- When hair is being included always ensure you account for the quantity, for hair on 4 fingers the order would be derma hair-finger x4 not just a single order of derma hair-finger
- When ordering hair for hands or arms, the code is a standard derma hair-hand or derma hair-TR or TH, qty is not necessary



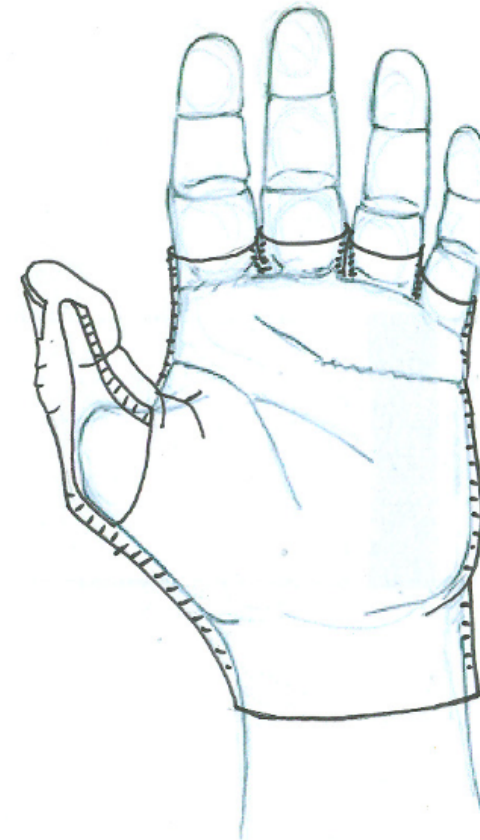
Product sketches



OPTION 1: This is the tool we will carve. This gives us the most silicone skin to work with. This design is the most common device we make for patients with this kind of amputation.



OPTION 2: We could tailor the trim lines as shown in this sketch. I would recommend trying this after the first option. (you can't add skin once it is cut!)



OPTION 3: We could also add a thumb stabilizer to this piece. It is a plastic insert within the silicone that makes the thumb more rigid. The addition of this insert will result in a bulkier look esp near the thumb base.



Product Offerings: Fingers

- Half Finger: 2cm of residuum is required beyond the PIP
- Full Finger: If less than a 2cm residuum a band suspension may be necessary
- Thumb: If less than a 2cm residuum, a partial hand suspension may be necessary- thumb stabilisers may be added



Product Offerings: Full Fingers and Partial Fingers

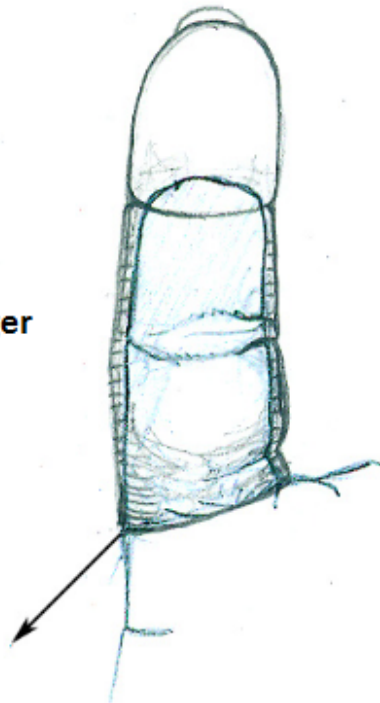
- Any finger or thumb
- Nails can be acrylic or silicone (acrylic is standard)
- Suspension
 - Suction
 - Mechanical Assistance (Finger bands)
 - Adhesive
- Clear Transitions, aids in transition edges for seamless blending



Full finger vs Partial finger

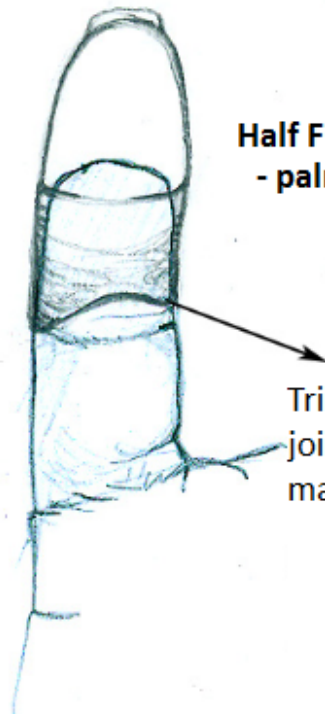
Acrylic nail fitted in both cases

**Full Finger
- palmar**



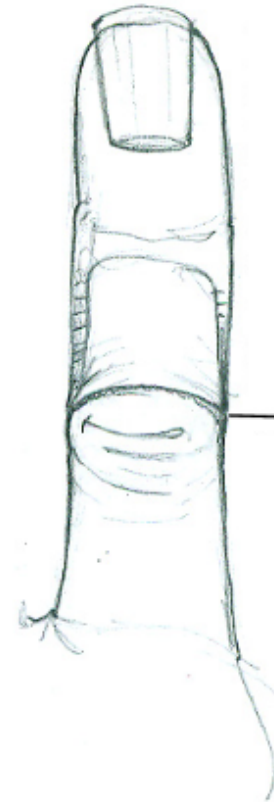
Trim line at base of finger, may inhibit ROM but easier to disguise

**Half Finger
- palmar**



Trim line at PIP joint to allow max ROM

Half Finger - dorsal



Trim line just above knuckle, and will be visible. Good colour match & grinding down the silicone blends the trim line & prevents a thick, noticeable step



Product Offerings: Hands

- Partial hand
 - Multiple finger deficiencies that are distal to the MCP Joints
 - Uses anatomical suspension
 - Armatures installed where room permits
 - Stabilisers are also an option when appropriate
- Full hand
 - 5 fingers amputated distal to the MCP Joint
 - 5 fingers amputated proximal to the MCP joint
 - Can be used in conjunction with i-digits™
 - Uses anatomical suspension
 - Armatures installed where room permits



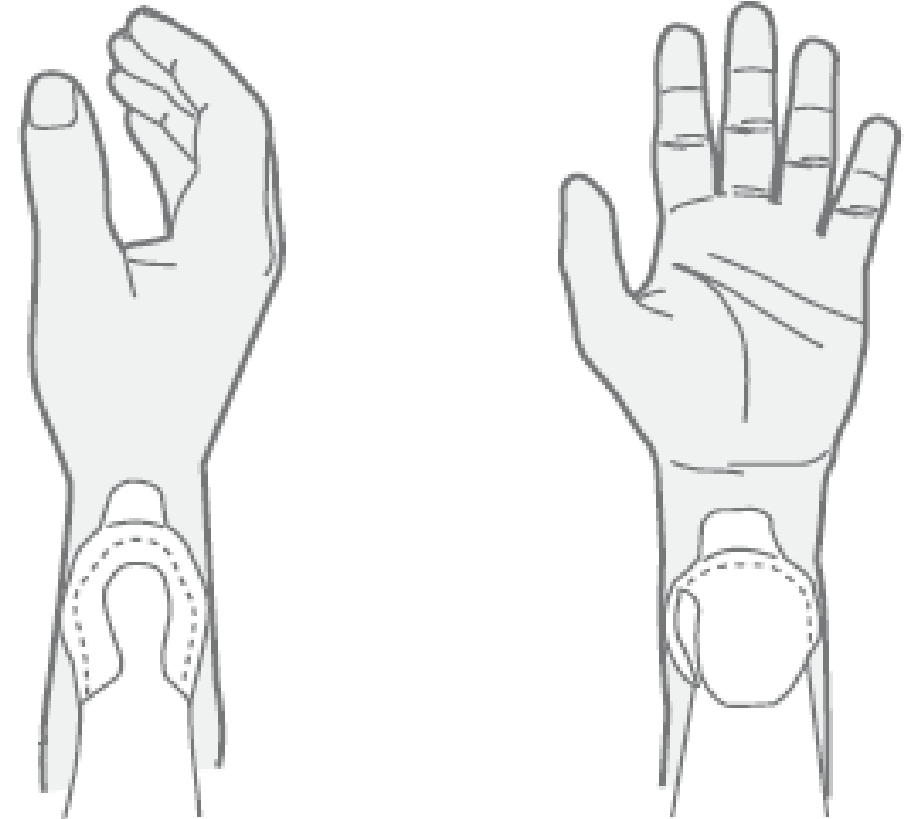
Thumb Stabilisers

- A thumb stabiliser can be added to a prosthesis if a patient has a very short thumb residuum
- Provides thumb stability for added function
- Completely enclosed within the silicone hand
- Partial hand prosthesis will be required if thumb residuum less than 2cm



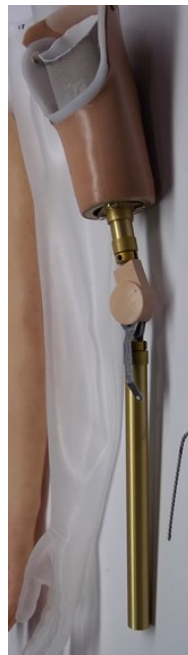
Product Offerings: Wrist Disarticulations

- Internal ‘clam shell’ for suspension
 - Rigid frame or “clamshell” prevents flopping at the wrist by creating a rigid under structure
- Armatures
- Full hand constructed over the ‘clam shell’
- May require termination mid-forearm



Product Offerings: Transradials & Transhumeral

- Transradial - **endoskeletal sockets only** for order submission, must include a pylon made from aluminum or metal
- Transhumeral - endoskeletal socket only, elbows must be passive and not have any motors or mechanics other than passive levers or buttons
- All the internal foaming on the socket is provided (except for shoulder disarticulations) to the dimensions provided by the clinician
- Wrist components are an option – flexion/extension and pronation/supination are available upon request.



Product Offerings: Transradials & Transhumeral

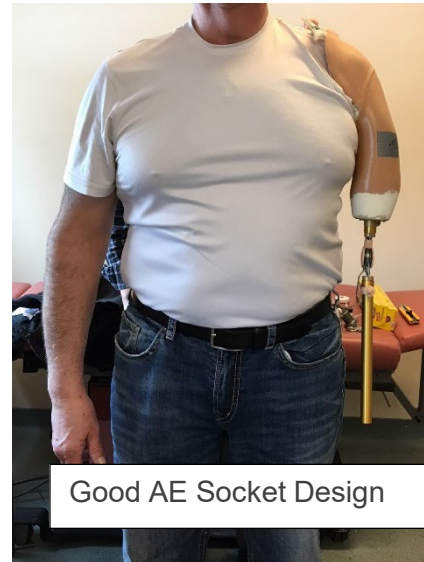
- Transradials, Transhumeral, and Shoulder Disarticulation cannot be provided an anatomical match to their sound side with an exoskeletal socket design
- For a Transhumeral and Shoulder Disarticulation, the elbow must be permanently mounted to the definitive socket and the **METAL** pylon must then be attached. Please leave all pylons long
- Socket registration/measurements are a critical part of the mylivingskin appointment
- Mark an X or a dot on the socket with a black marker for reference points required
- All required measurements will be guided by the mylivingskin app



Bad socket construction-
laminated pylon- should be
METAL



Good BE Design



Good AE Socket Design



Good AE Socket design



Transradials & Transhumeral: Additional Information

- Sockets with unique shapes or donning
 - Can accommodate unique brim shapes
 - Holes for a donning aid or a valve, can also be accommodated
- Mounting a Pylon
 - Pylons will require a secure fixation
 - Ensure that the alignment of the pylon is correct for the patient
- All information can be provided in the comments section of the app



Bad shoulder disarticulation design, should and pylon were mounted too close to the body. Our process limitations would not allow us to sculpt or mold into the armpit. A 2-piece skin was necessary



Product Offerings: Lower limb

- Toes, Toes with band, partial foot and full foot options available
- Trans-metatarsal amputations or more distal
 - Chopart, Symes and amputations of just the heel are possible



Product Offerings: i-limb[®] skin match

- i-limb covers that are completely customised to patient's skin tone including nail colour and fingernail shape
- This is a pre-shaped skin to ensure hand function
- Socket covers can be included, a definitive socket will be required
- Silicone nails or Acrylic may be chosen, silicone are more durable on functional devices



Optional Extras

Derma Hair

- Natural and/or synthetic hair individually placed on the skin prior to painting
- Added to mimic the client's natural hair patterns
- Never fades or rubs off or falls out
- Custom matched hair colour



Optional Extras

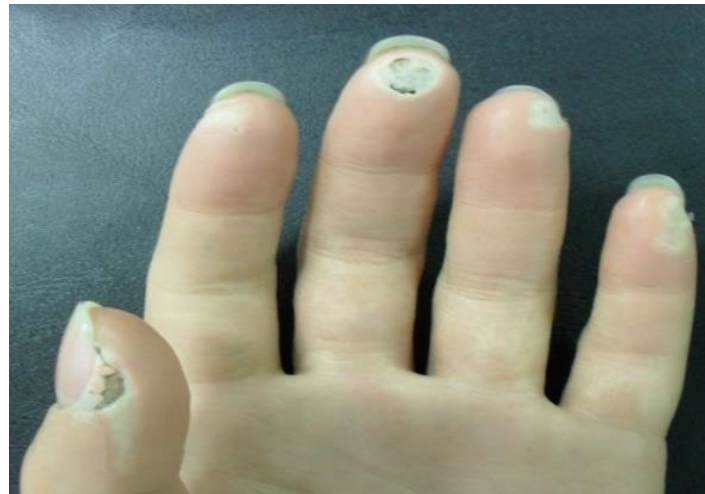
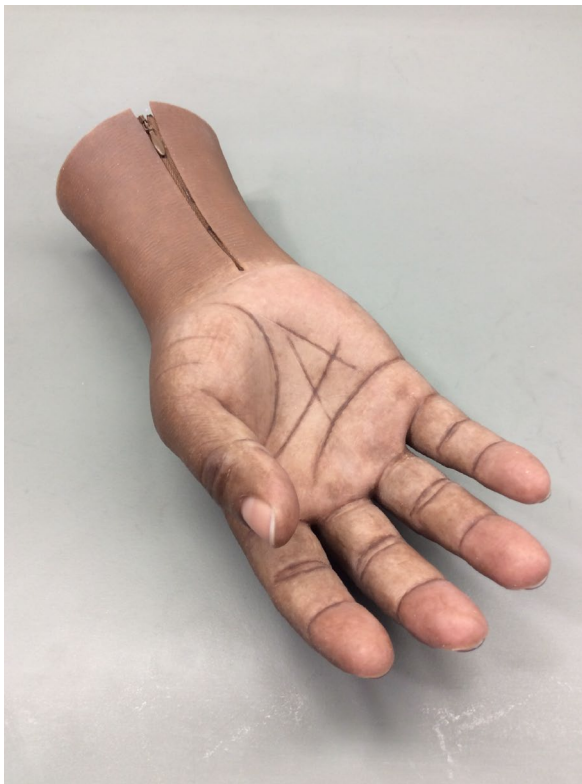
Seasonguard

- Seasonguard is a topical colorant used to transition devices from the Autumn/Winter months into the Spring/Summer
- The colourant fades like a tan under UV exposure, it should last several weeks depending on application



Additional Options and Services

- Zippers: May be installed in devices where donning and doffing is a challenge
- Repairs: Devices may be repaired in and out of warranty



Ordering a Livingskin™ Device & Support Process

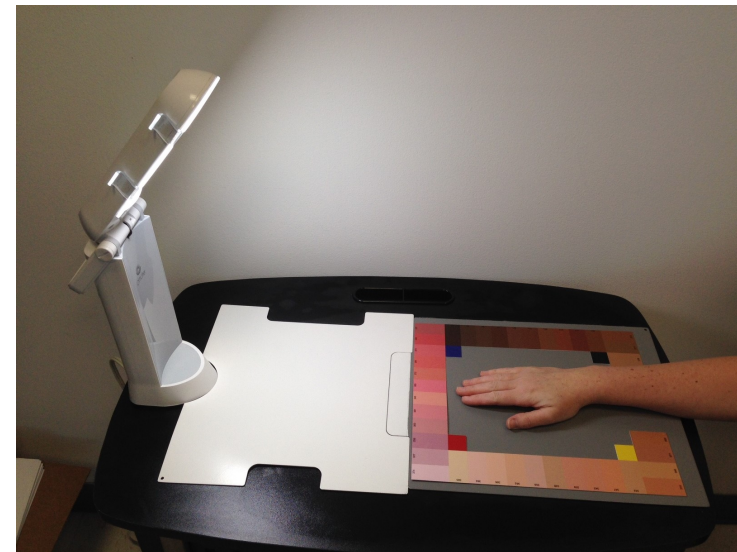
- The Livingskin system comes with everything required for the silicone restoration order
- The kit includes an Ottlite, desk plates (grey and white), colour panel, an iPad, spare bulb, charger, and order print out
- Össur clinicians can offer full support of the process if required



Ordering a LivingSkin™ Device

The mylivingskin App

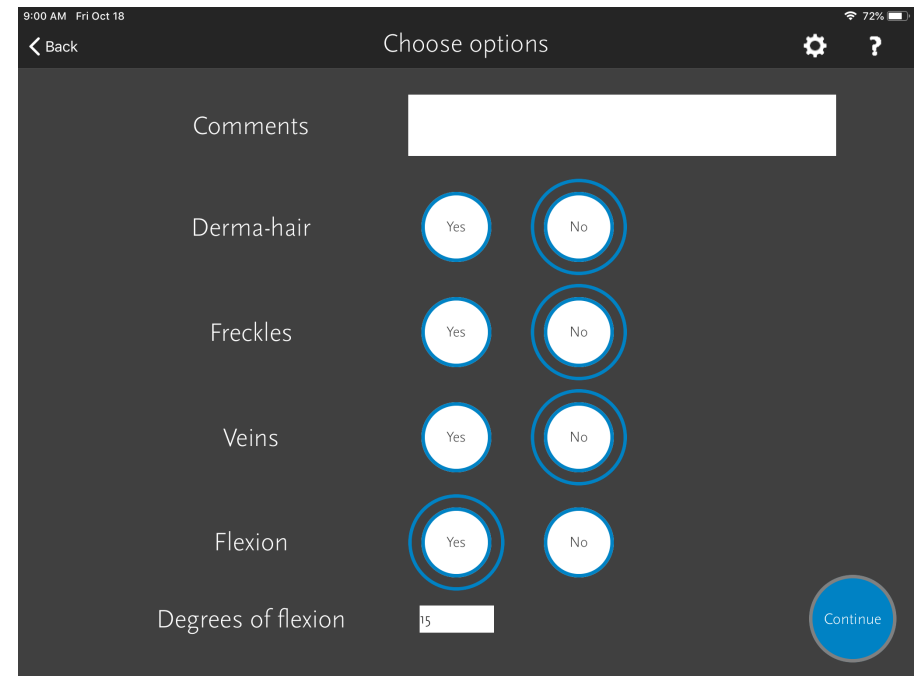
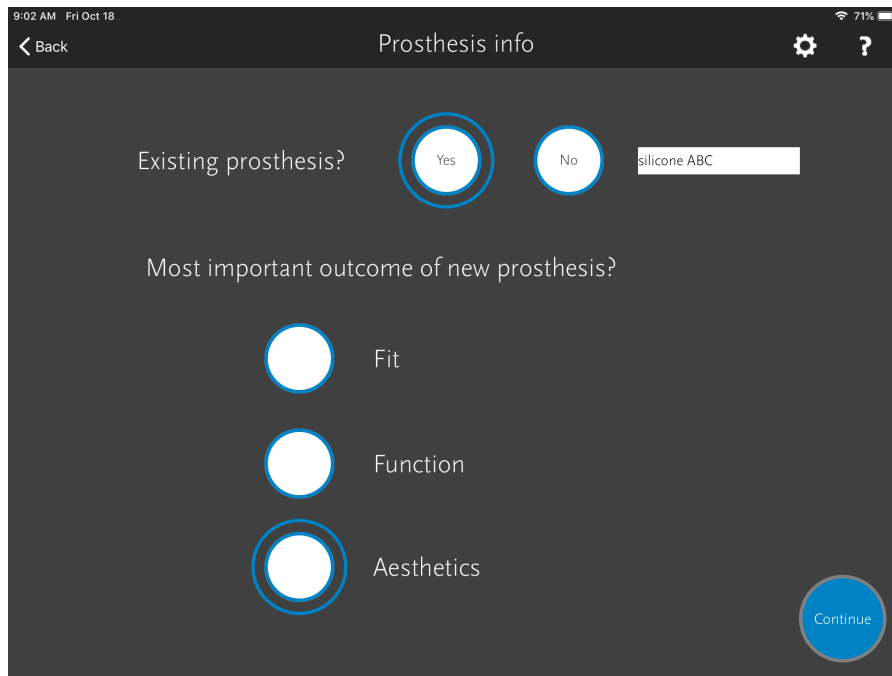
- The use of a room where the overhead lighting can be turned off and access to Wi-Fi is required
- Ottlite is positioned to the left and the client is positioned to the right, improper positioning will cause the camera to deactivate
- Optimal framing will be required, you will be guided by the app



Ordering a LivingSkin™ Device

The mylivingskin App

- Once images are captured, the clinician will fill out the fabrication information required for the specific device
- There is a comments box for the clinician to add anything that imperative to fabrication, special sculpts with the degree of flexion indicated. Longer or shorter transition requests, areas of pain or discomfort, etc.



Requirements Per Device Type

Upper limb devices

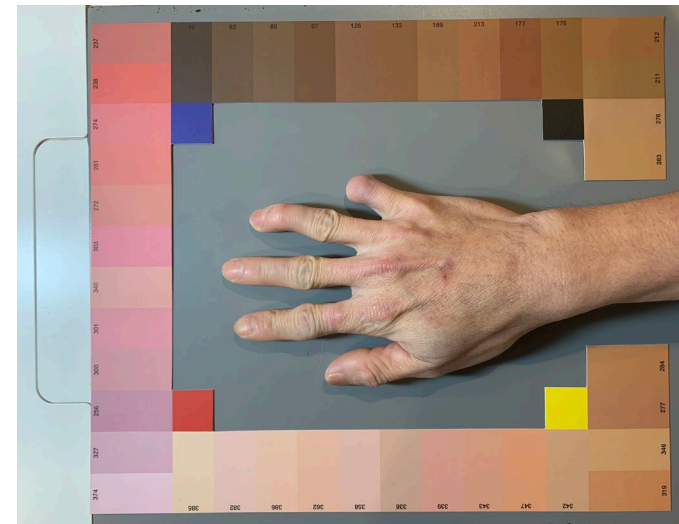
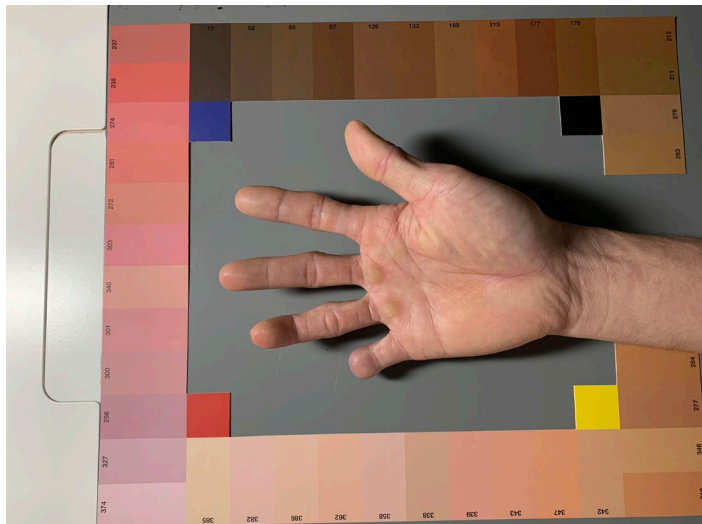
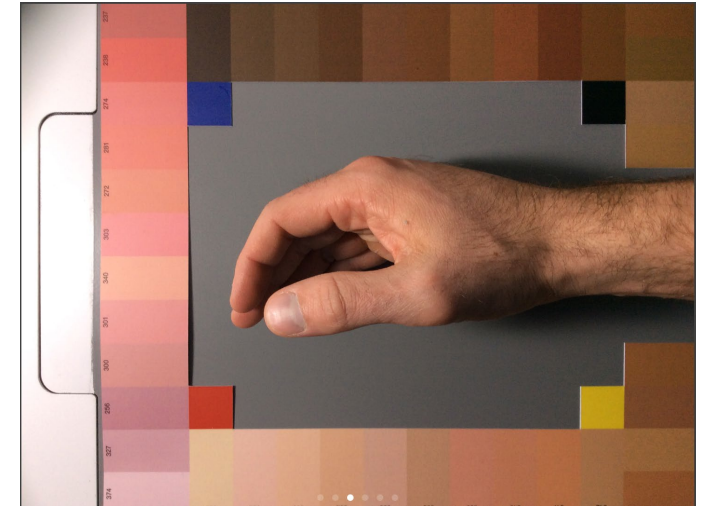
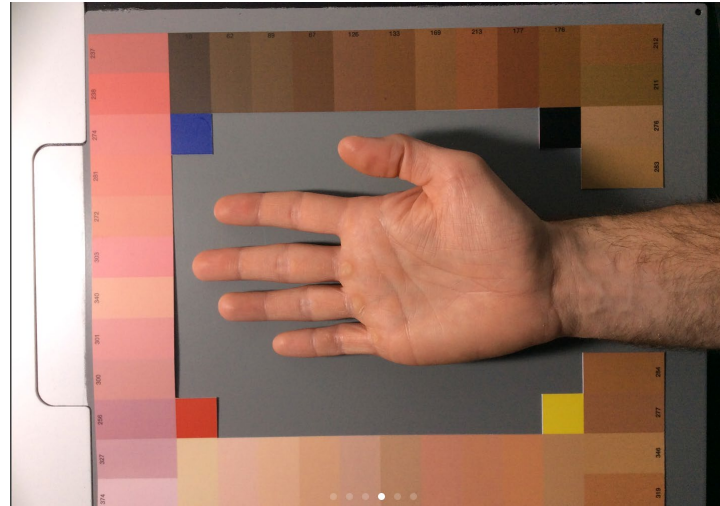
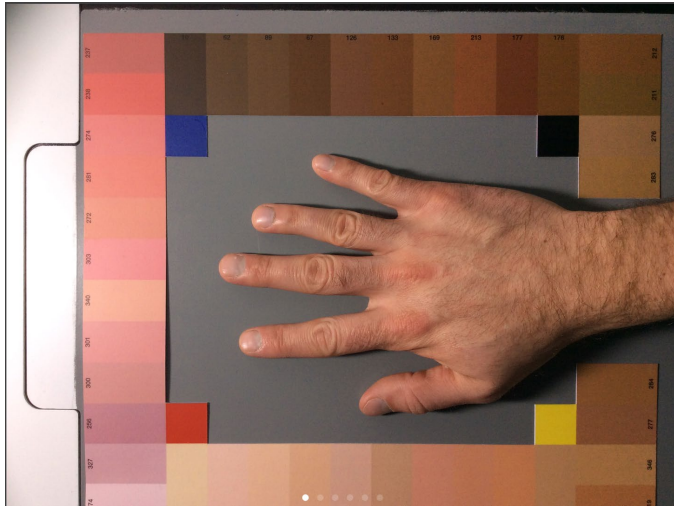
	DORSUM SOUND SIDE HAND	CLOSE UP OF NAILS SOUND SIDE	PALM SOUND SIDE HAND	THUMB POSITION	DORSUM AFFECTED SIDE	PALM AFFECTED SIDE	PATIENT WEARING SOCKET FRONT + REAR	INSIDE SOUND SIDE ARM	DORSUM SOUND SIDE ARM	PRAYER POSE	IMPRESSIONS SOUND SIDE REQUIRED	IMPRESSIONS AFFECTED SIDE REQUIRED	SOCKET REQUIRED
HLIMB SKIN MATCH	●	●	●	●									
HLIMB SKIN MATCH TRANSRADIAL	●	●	●	●				●	●			Impression of socket needed	
FINGER	●	●	●	●	●	●					●	●	
FINGER BAND	●	●	●	●	●	●					●	●	
PARTIAL HAND	●	●	●	●	●	●					●	●	
FULL HAND	●	●	●	●	●	●				●	●	●	
WRIST DISARTICULATION	●	●	●	●	●	●				●	●	●	
TRANSRADIAL	●	●	●	●			●	●	●		●		●
TRANSUMERAL	●	●	●	●			●	●	●		●		●
SHOULDER DISARTICULATION	●	●	●	●			●	●	●		●		●

Lower limb devices

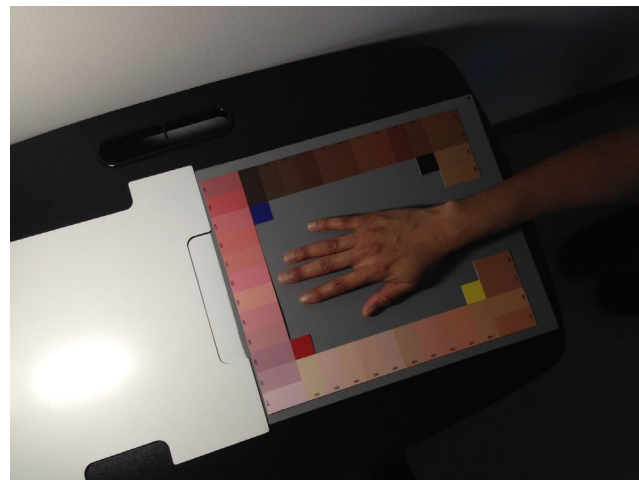
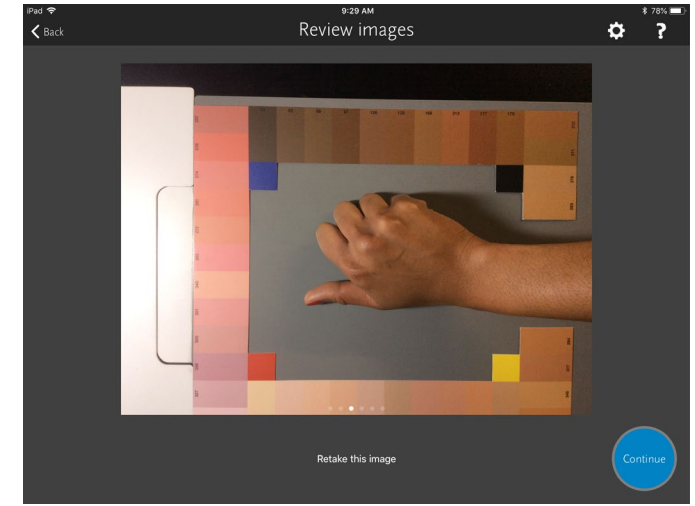
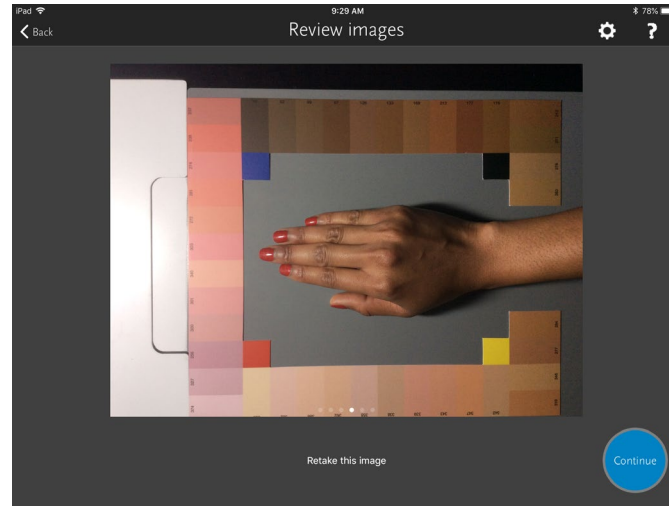
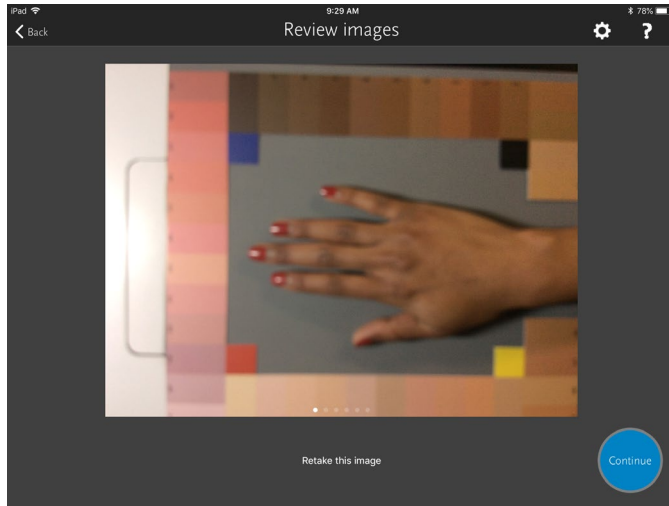
	DORSUM SOUND SIDE	CLOSE-UP OF NAILS	DORSUM AFFECTED SIDE	PLANTAR SOUND SIDE	PLANTAR AFFECTED SIDE	LATERAL SOUND SIDE	LATERAL AFFECTED SIDE	MEDIAL SOUND SIDE	MEDIAL AFFECTED SIDE	IMPRESSIONS SOUND SIDE REQUIRED	IMPRESSIONS AFFECTED SIDE REQUIRED
ANY DEVICE TYPE	●	●	●	●	●	●	●	●	●	●	●



Examples of GOOD images

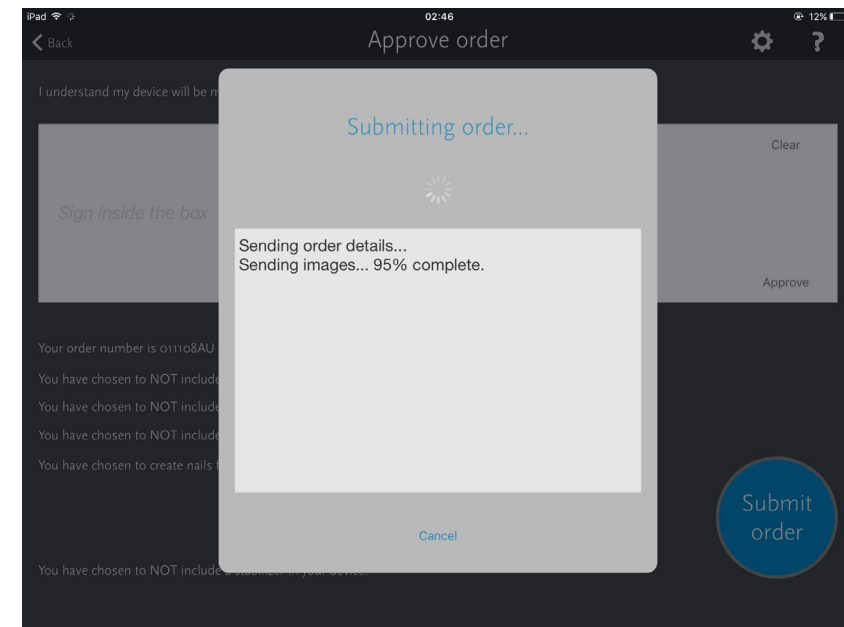
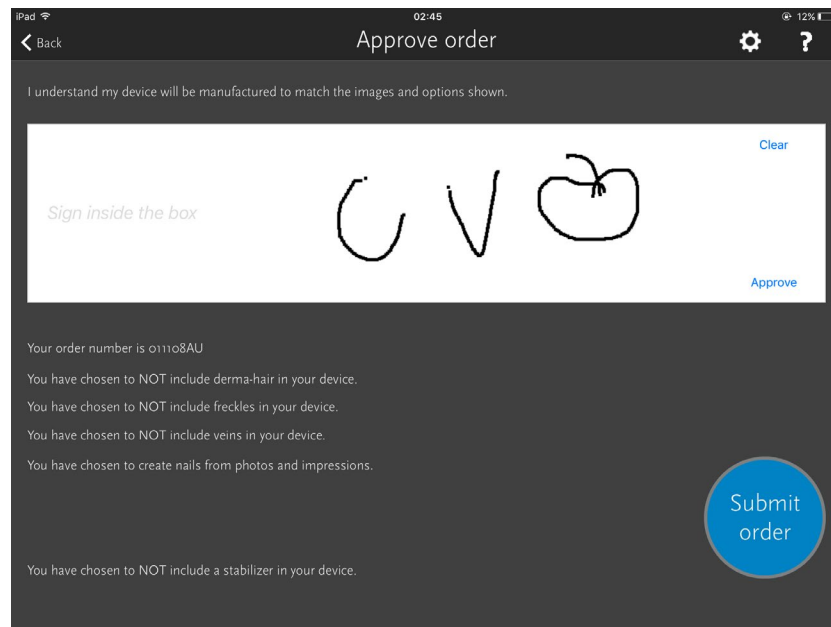


Examples of POOR images



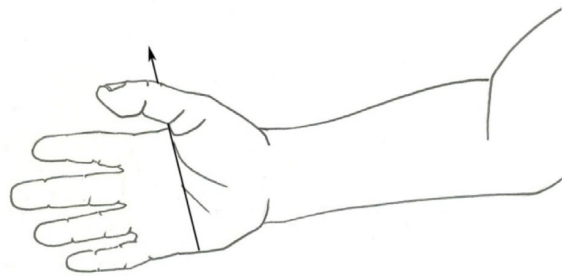
Ordering a LivingSkin™ Device: Submission

- Once patient and Prosthetist are happy with the review, there will be a box for the patient to sign off on the order
- Press submit order (images will be uploaded to the cloud to be reviewed for approval)
- Sending order box with progress will appear
- **A minimum of 3 sets of images must be submitted for a job**
 - Submit the first set of images with your assigned order number, then add -2 for the 2nd and -3 for the 3rd.
 - Images will be reviewed following day due to AUS – US time difference

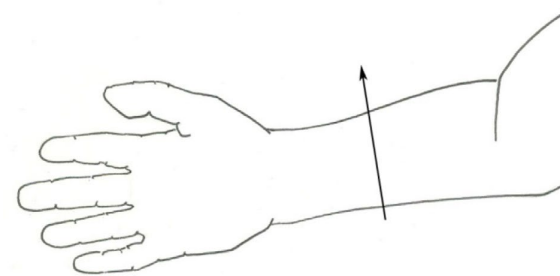
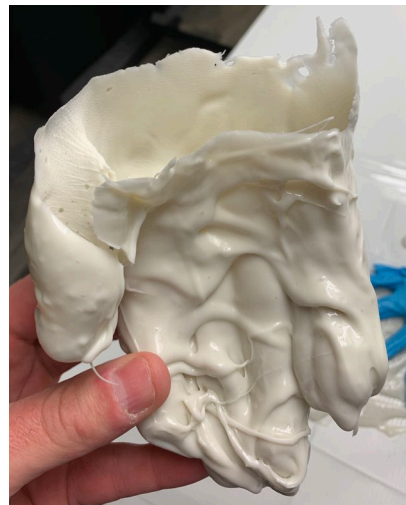


Casting/Impression Taking

- After images are taken casting is done bilaterally.
- Fingers:
 - cast will be taken to mid-palm of all 4 fingers.
 - Both sound and affected sides.
 - If for a thumb or includes multi-digit loss the cast will be taken to the wrist crease
- Partial hand and full hand casts will be taken 5cm proximal to the styloid



Single Finger Cast Length

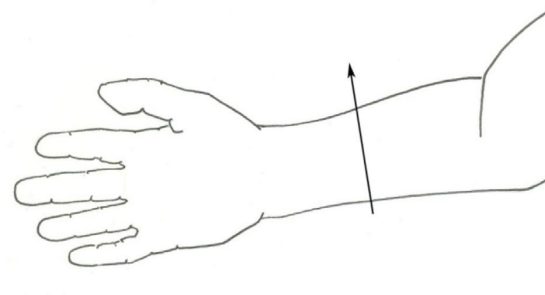


Hand Cast Length



Casting/Impression Taking

- Wrist disarticulation:
 - Sound hand cast taken 5cm proximal to the styloid
 - Affected limb will be taken mid-forearm or to the elbow crease depending on the case.
- Transradial and transhumeral casts:
 - Sound hand cast taken 5cm proximal to the styloid is the only cast required.

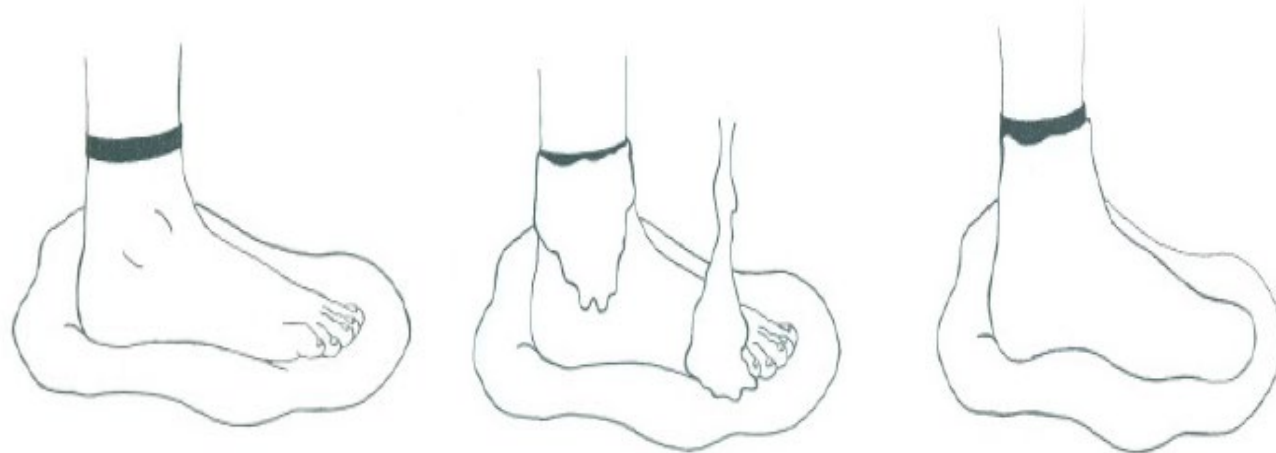


WD and Arm Cast Length



Casting/Impression Taking

- For all lower limb, client's casts are required 5cm above the ankle bone with a semi-weight bearing position of both sound and affected limbs.



Foot Cast Length



Sound side cast - foot



Affected side cast - foot



Video links

- <https://www.youtube.com/watch?v=xy5nktatLts>
 - Livingskin Process
- <https://www.youtube.com/watch?v=m93AKtjOlkw>
 - Full hand Impression
- <https://www.youtube.com/watch?v=-ctYHFhWMXI>
 - Fingers and Finger bands Impressions
- <https://www.youtube.com/watch?v=tbrGX9K5Y48&feature=youtu.be>
 - Full Foot Impression



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Lizzie Carey: ecarey@ossur.com

WE IMPROVE PEOPLE'S MOBILITY

