

ottobock.

Everyday life with the bebionic[®] hand

Therapy and rehabilitation

Quality for life

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Incredibly versatile

The bebionic® hand at a glance

Smart thumb

- 8 grips in opposition
- 6 grips in lateral position

Opposition



Lateral position



Aesthetic aspects

- Rounded finger profile
- Natural appearance of the knuckles
- Natural transition to the wrist joint
- Anatomical design based on the bone structure of the human hand

Program switch

- On/off: press and hold for 3 seconds
- Primary and secondary grips: press and hold for less than 2 seconds
- Bluetooth: after switching on, press and hold for 4–5 seconds until 2 beeps are heard and vibration starts
- Glove donning mode: thumb in opposition, turn the hand off, press and hold the program switch for 6 seconds, the thumb automatically moves to the glove donning mode position

Wrist options

- EQD wrist (quick-disconnect wrist unit)
- Flex wrist (three-stage joint)
- Short wrist
- Multi-flex wrist (only for bebionic medium and large)

Hand control based on passive and active functions

Active functions

Thumb in opposition



Tripod grip



Pinch grip

Thumb in lateral position



Mouse grip



Key grip



Power or hook grip



Hook grip



Finger point



Column grip



Active index grip



Precision open grip



Relaxed hand position



Open palm grip



Precision closed grip



Finger adduction

Passive functions

Turning the prosthesis on and off

Locking/unlocking the wrist









Program switch functions

Detaching the hand from/reattaching the hand to the prosthetic socket

Manual thumb adjustment

Charging the prosthesis

Individual adjustment based on the standard settings

Primary grips	Thumb in opposition	Thumb in lateral position	Secondary grips	Thumb in opposition	Thumb in lateral position
Standard (grip 1 or 3) Grips used most often by the user	 <p>Tripod grip</p>	 <p>Key grip</p>	Standard (grip 5 or 7) Grips for special situations	 <p>Active index grip</p>	 <p>Column grip</p>
Alternative (grip 2 or 4) Grips used frequently in daily life	 <p>Power or hook grip</p>	 <p>Finger point</p>	Alternative (grip 6 or 8) Grips for rare occasions	 <p>Finger adduction</p>	 <p>Mouse grip</p>

Switching (see next page) between standard and alternative grips requires a muscle signal (opening/closing or co-contraction). The pre-configuration of selected grips and also the switching mode can be changed individually by a muscle signal using the bebalance software.

Please note that the precision grips (open and closed) are not recommended if tripod grip has been programmed. The thumb will only be aligned correctly for tripod OR precision.

Switching options

Switching between eight different grips

Manually adjusting the thumb position

The thumb is moved manually from the lateral position to opposition and vice versa. This is used to choose between grips 1-4 or 5-8.

Switching between primary and secondary grips with the program switch

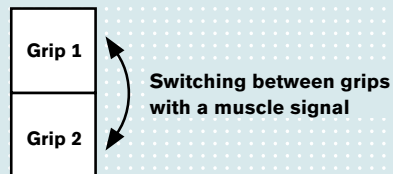
Press and hold the program switch (on the back of the hand) for less than 2 seconds.

Switching between grips with a muscle signal

The muscle signals "open/open" or "co-contraction" are used to switch between the individual standard and alternative grips.

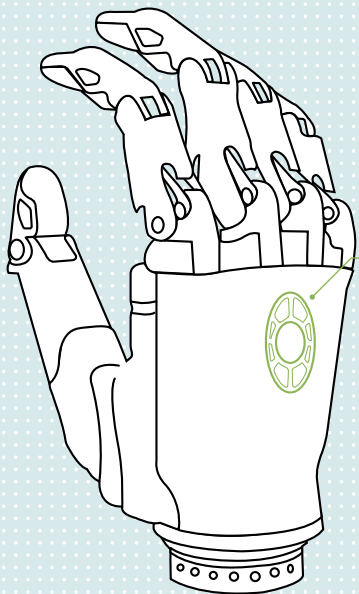
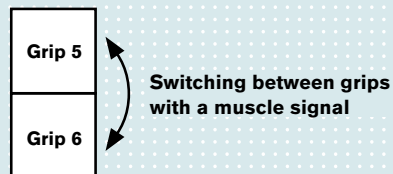
Thumb position: opposition

- Primary grips:
Grips used frequently in daily life



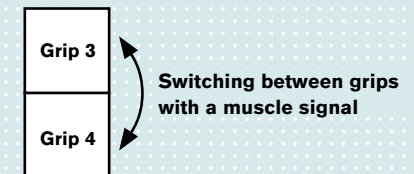
Switching between primary and secondary grips with the program switch

- Secondary grips:
Grips for special situations



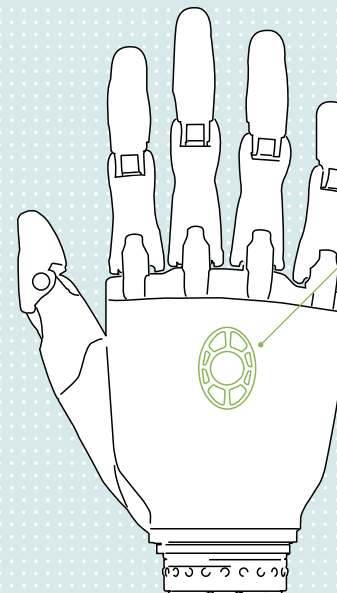
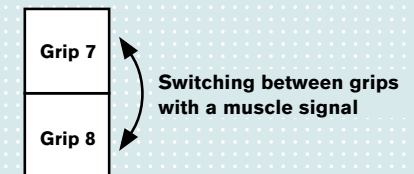
Thumb position: lateral

- Primary grips:
Grips used frequently in daily life



Switching between primary and secondary grips with the program switch

- Secondary grips:
Grips for special situations



Training with the bebionic hand

Reaching the goal with the right training

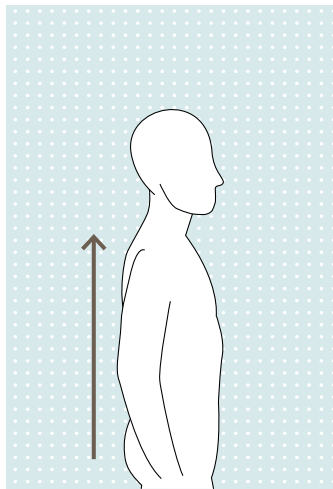
Routine control of the bebionic hand in daily life requires specific training. We have summarized valuable tips for you on the following pages. The many years of experience with Ottobock prosthetic hands accumulated by our technicians, therapists and users are the basis for specific everyday training with the bebionic hand.

Our recommendation

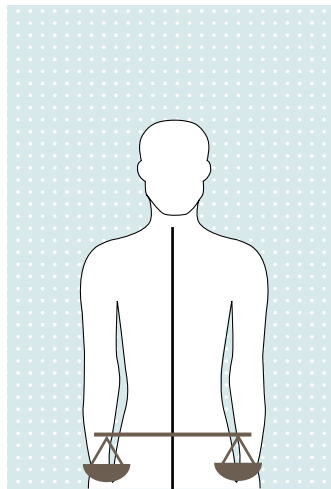
For the best possible training results, always monitor body posture and correct and harmful compensatory movements.

- ▶ The focus is on the optimal use of the hand in daily life
- ▶ The training objective is to become familiar with and accustomed to the prosthesis
- ▶ The user gets a feel for controlling the prosthesis in order to reliably perform everyday activities with one or both hands.

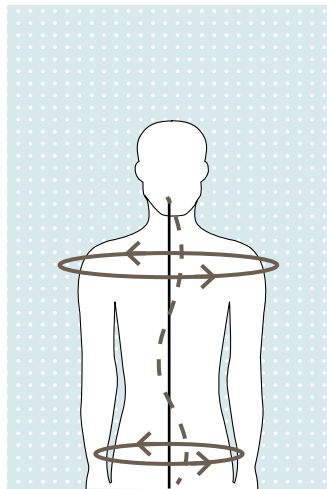
Training recommendations for successful prosthesis control



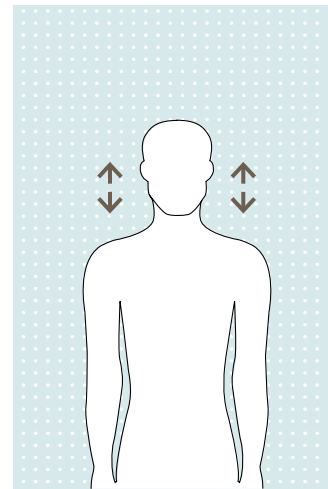
1 Upright posture



2 Balanced stance



3 Avoid rotation in the spine



4 Relaxed shoulder position

**ADAPT TO THE ABILITIES
OF THE USER**

**GIVE SIMPLE INSTRUCTIONS &
TAKE BREAKS**

**10-15 REPETITIONS
PER EXERCISE**

**VARY EXERCISES AND
POSITIONS**

Full body training

Achieving optimal physical conditioning

Physical conditioning should focus on increasing balance, coordination, stability, strength, and endurance. All of these factors will lead to successful use and control of the prosthesis.

ADAPT TO THE ABILITIES OF THE USER

The following exercises are easy to complete and very well suited for performing at home.

- ▶ Prior to the prosthetic fitting
- ▶ Without the prosthesis
- ▶ With the prosthesis
- ▶ During rehabilitation

Sample exercises for full body training

10-15 seconds per exercise

Basic exercises

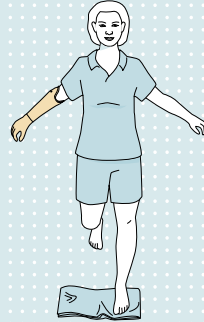


Start position

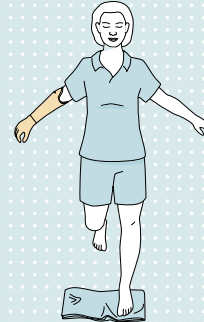


End position

Advanced exercises



On an uneven surface



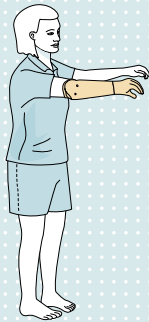
With the eyes closed

One-legged stance –
balance training

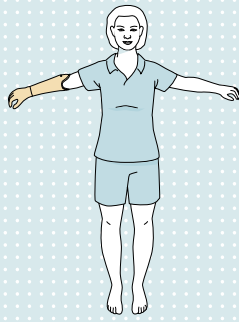
Basic exercises



Start position



End position A
Extend the arms forward

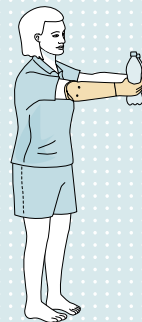


End position B
Extend arms to the sides

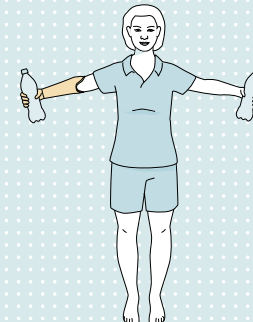
Advanced exercises



Start position



End position A
Extend the arms forward



End position B
Extend arms to the sides

Lifting the arms –
shoulder and trunk
strengthening

Basic exercises



Start position



End position

Advanced exercises



Feet on an uneven surface

Bridge –
strengthening the back,
hips and thighs

Controls training

Hand control training encompasses passive and active functions.

Passive functions

- Switching on and off
- Program switch
- Manual thumb adjustment
- Locking/unlocking the wrist
- Detaching the hand from/reattaching the hand to the prosthetic socket
- Charging the prosthesis

Active functions

- Open/close hand
- Rotate wrist
- Movement sequences

Before starting

Discuss and understand the passive functions

GIVE SIMPLE INSTRUCTIONS & TAKE BREAKS

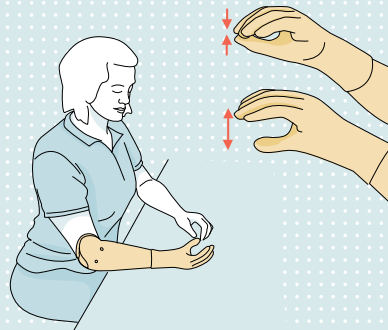
See pages 18-19 for specific controls training sequences.

- ▶ In this phase, the focus is on the optimal practical value of the prosthesis
- ▶ The user becomes familiar with all prosthesis functions during this training
- ▶ The user gains confidence in controlling the prosthesis without objects

Objective

User can follow explicit commands without any random movements of the hand occurring.

Controls training: active functions



Start position
(sitting)

A. Opening and closing the hand – in lateral and opposition

B. Rotating the wrist in both lateral and opposition.

C. Vary the speed and control during the exercises

- ▶ Slow/fast
- ▶ Full and partial grip closure/opening
- ▶ With/without visual feedback

D. Combining hand and wrist movements

Examples for a movement sequence:

- ▶ Open the hand ▶ rotate inwards ▶ rotate outwards ▶ close
- ▶ Open the hand quickly ▶ close slowly ▶ open halfway ▶ open fully ▶ close fully

Training the active functions is carried out in various positions.



Standing



Behind the body



Over the head



In motion

- ▶ Continue to the next phase as soon as the user feels confident in controlling the prosthesis independently.

Controls training: repetitive drills

See pages 18-19 for specific repetitive drills training sequences.

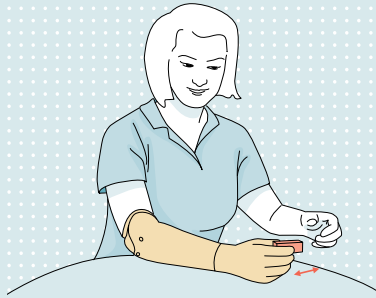
10-15 REPETITIONS
PER EXERCISE

- ▶ Gripping, holding and releasing objects of various sizes, textures and firmness
- ▶ Variations, repetitions and combinations of the exercise improve the success of training

Objectives

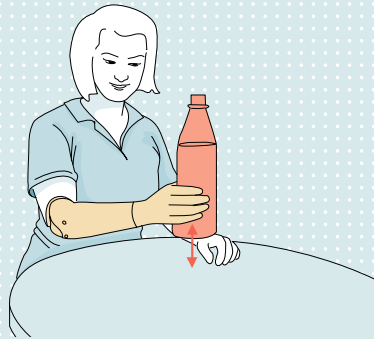
- Confidently and reliably handling objects in various situations with optimal gripping force, speed and precise opening width.
- Master proportional control.

Indirect grasping

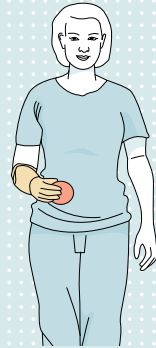


Training in various positions of the arm and body, standing, over the head, behind the body and in motion

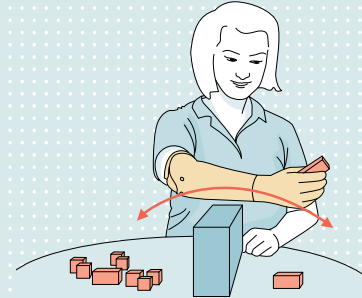
Direct grasping



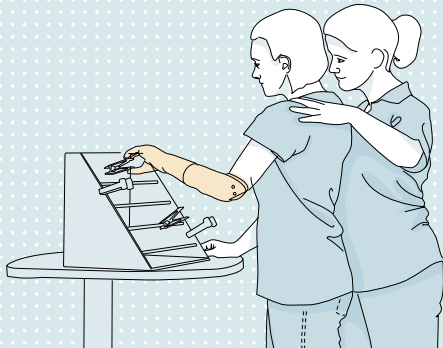
Lifting a water bottle



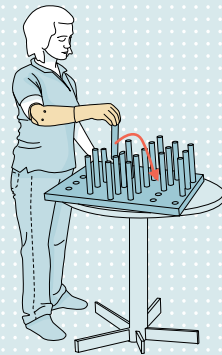
Grasping a foam ball



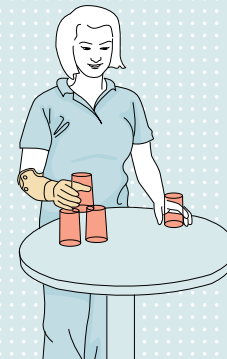
Moving building blocks



Positioning clothespins



Positioning wooden rods



Stacking cups

A. Indirect grasping*

First the object is grasped with the sound hand and passed to the prosthetic hand. The information perceived this way helps the user control the prosthetic hand as effectively as possible, regardless of the type of object.

Recommended training objects

- Building blocks
- Soft balls
- Plastic cups
- Bottle
- Clothespins
- Plate/bowl/cutlery
- Playing cards

B. Direct grasping*

Grasping an object directly with the prosthetic hand.

Training variations

- Training various hand modes
- With/without visual feedback
- Focus on precise grip force
- Integrate movements and coordination

* Hanneke Bouwsema, Learning to handle a myoelectric upper-limb prosthesis, 2014

Prosthesis training related to daily life (ADL training)

Confidently mastering daily activities

Make sure that you are familiar with the user's daily routine and incorporate the associated activities into the training.

VARY EXERCISES AND POSITIONS

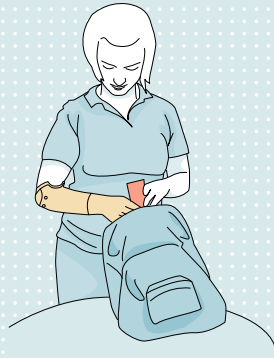
Objective

To promote independence, have the user perform functional activities learned with both hands using objects of daily life.

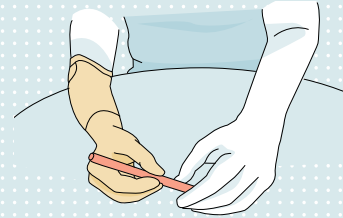
Examples of activities



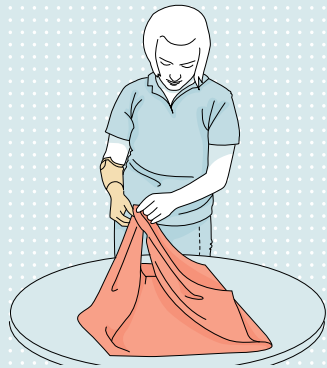
Opening a screw cap jar



Packing a backpack



Holding a pen



Folding laundry



Dressing and undressing



Filling a glass

Grips in opposition

Tripod grip or pinch grip

Tying shoelaces

Using a pen

Opening/lifting a lid

Power or hook grip

Carrying a bag/shopping bag

Using cutlery

Slicing a salami or cucumber

Active index grip

Using a spray bottle (e.g. deodorant)

Using a blow dryer

Precision open grip

Closing a zipper

Opening a chocolate bar

Precision closed grip

Taking a tissue from the package

Picking up a coin

Finger adduction

Holding a CD

Leafing through a newspaper/magazine

Grips in lateral position

Mouse grip

Using a computer mouse

Key grip

Folding a towel

Carrying a tray

Finger point (no active finger movement)

Using a keyboard

Pressing buttons on a remote control

Column grip

Pressing a button

Buttoning a jacket

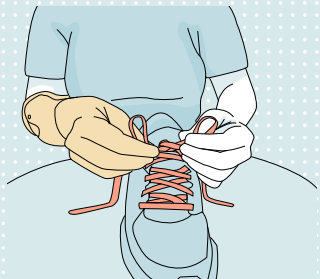
Relaxed hand position

Taking a walk with relaxed hand position (without tasks)

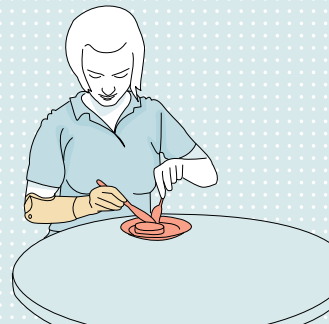
Hooking the hand or thumb in the trouser pocket

Open palm grip

Carrying or passing a plate



Tying shoelaces






Eating with a knife and fork

Recommendations for training with the bebionic hand




Training the primary grips

Please note: the primary grips (1 through 4) are used very often in everyday life.

Step	Training phase	Objectives	Procedure
I Manually changing the thumb position 	Control training	Using standard grips 1 and 3 in opposition and lateral position of the thumb	<ul style="list-style-type: none"> The thumb is in lateral position Open the hand in the lateral grip and close it in grip 3 The thumb is moved manually from lateral position to opposition Now the hand is opened and closed in opposition
	Repetitions	Grasping, holding and releasing objects in the two standard grips 1 and 3 in lateral position and in opposition	
II Switching with a muscle signal in lateral position 	Control training	<ul style="list-style-type: none"> Switching between the primary grips 3 and 4 in lateral position Actively using these primary grips 3 and 4 in lateral position 	<ul style="list-style-type: none"> The thumb is moved manually to lateral position Grip 3 in lateral position is active during opening/closing Switch to grip 4 with muscle signal (opening/closing or co-contraction) Grip 4 is active during opening/closing Switch back to grip 3 with muscle signal
	Repetitions	Grasping, holding and releasing objects in the two standard grips 3 and 4 in lateral position and in opposition	
III Switching with muscle signal in opposition 	Control training	<ul style="list-style-type: none"> Switching between the primary grips 1 and 2 in opposition Actively using these primary grips 1 and 2 in opposition 	<ul style="list-style-type: none"> The thumb is moved to opposition manually Grip 1 in opposition is active during opening/closing Switch to grip 2 with muscle signal (opening/closing or co-contraction) Grip 2 is active during opening/closing Switch back to grip 1 with muscle signal
	Repetitions	Grasping, holding and releasing objects in opposition grip 1 and 2	
Combine steps I-III	Control training	Switching between the four primary standard and alternative grips 1 and 2 or 3 and 4 in lateral position and opposition	
	Repetitions	Include objects suitable for the chosen grips 1 and 2 or 3 and 4 in lateral position and opposition (see list on page 17)	
	Everyday training	Include activities of daily life for the chosen grips 1 and 2 or 3 and 4 in lateral position and opposition (see page 17 for everyday examples)	
<p>Now combine steps I through III to practice confident and reliable control of the chosen grips. Please continue with step 4 only when reliable control of the bebionic hand in primary mode is assured.</p>			

Training the secondary grips

Please note: the secondary grips (5 through 8) are more likely to be used in special situations.

Step	Training phase	Objectives	Procedure
	Prerequisite	Press the program switch to access the secondary grips	To do so, press the program switch on the back of the hand for less than 2 seconds
IV Manually changing the thumb position	Control training	Actively using the standard grips 5 and 7 in lateral position and opposition	<ul style="list-style-type: none"> The thumb is in lateral position Grip 7 in lateral position is active during opening/closing The thumb is moved to opposition manually Grip 5 in opposition is active during opening/closing
	Repetitions	Grasping, holding and releasing objects in the two standard grips 5 and 7 in lateral position and in opposition	
V Switching with muscle signal in opposition	Control training	<ul style="list-style-type: none"> Switching between the secondary grips 5 and 6 in opposition Actively using grips 5 and 6 in opposition 	<ul style="list-style-type: none"> The thumb is moved to opposition manually Grip 5 in opposition is active during opening/closing Switch to grip 6 with muscle signal (opening/closing or co-contraction) Grip 6 in opposition is active during opening/closing Switch back to grip 5 with muscle signal
	Repetitions	Grasping, holding and releasing objects in grip 5 and 6 in opposition	
VI Switching with a muscle signal in lateral position	Control training	<ul style="list-style-type: none"> Switching between the secondary grips 7 and 8 in lateral position Actively using these secondary grips 7 and 8 in lateral position 	<ul style="list-style-type: none"> The thumb is moved manually to lateral position Grip 7 in lateral position is active during opening/closing Switch to grip 8 with muscle signal (opening/closing or co-contraction) Grip 8 is active during opening/closing Switch back to grip 7 with muscle signal
	Repetitions	Grasping, manipulating and releasing objects in grips 5 and 6 in opposition	
Combine steps IV–VI	Control training	Switching between the secondary grips 5 and 6 or 7 and 8 in lateral position and opposition	
	Repetitions	Include objects suitable for the chosen grips 5 and 6 or 7 and 8 in lateral position and opposition (see page 6 for grip examples)	
	Everyday training	Include activities of daily life for the chosen grips 5 and 7 as well as 6 and 8 in lateral position and opposition	

Please note: when the thumb is moved to a new position while the hand is in the secondary grips, the hand will be transferred directly to the secondary grips of the new thumb position. To move from the secondary grip of one thumb position to a primary grip of the other thumb position, the thumb must be moved and the program switch must be pressed.

Successful training with the bebionic hand

The most important therapy components at a glance

Objectives

Gaining independence, boosting self-confidence, preventing overuse.

Structure

Segmentation into four training phases with simultaneous individual adaptation of the degree of difficulty.

Motivation

Design exercises individually based on personal interests or hobbies.

Variation

Static and dynamic exercises with various objects in different positions.

Empathy

Gaining an understanding of the user's situation in order to assess their abilities and willingness to perform.

Coordination

Training muscles for strength, endurance and speed.

Repetition

Repetitive exercises offer a time for troubleshooting, experience building, and confidence enhancement for the user.

Feedback

Visual and audible feedback, along with proprioceptive awareness of the phantom hand, improve training success.

Concentration

Focused training requires frequent breaks for physical and mental rejuvenation.



Sharing Resources of Upper Limb Absence Worldwide

Ottobock is a partner of the Handsmart Group, an international and publicly accessible therapist platform to support rehabilitation in case of congenital malformations or loss of an upper limb.

www.handsmartgroup.org

ottobock.

Embrace
the Everyday

Quality for life



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