ÖSSUR®

ACADEMY

Webinar: Introducing the new Balance Foot S and Balance Foot S Torsion

Presented by Sarah Mulroy-Lang

Össur

Balance

Solutions

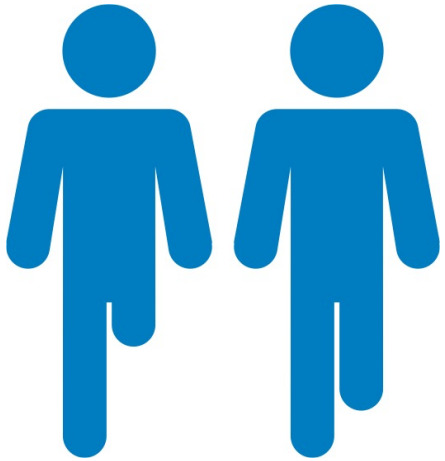
Introducing: Balance Foot S and Balance Foot S Torsion

- New C-Shaped **Glass Fibre** Feet
- Waterproof
- Lightweight
- Cushioning heel foam
- Smooth roll over
- Torsion version available
- Both Unity compatible

User Profile

- Transtibial, Transfemoral, Knee Disarticulation

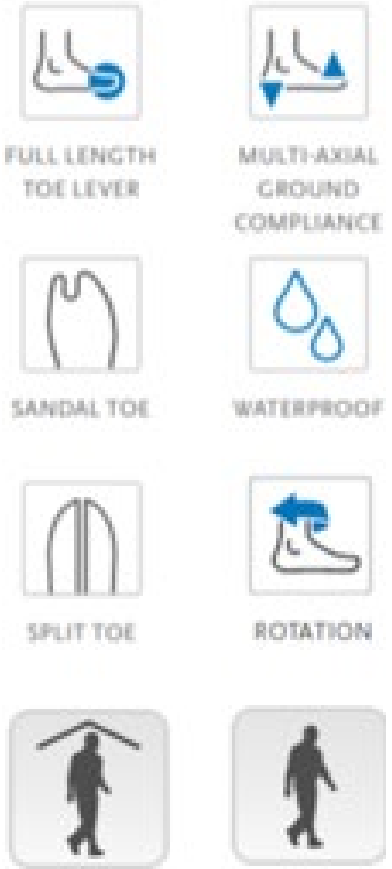
- Activity level: K2 – K3
- Impact level: Low
  - Household ambulation
  - Community ambulation
- User weight limit: 147 kg



Balance Foot S and Balance Foot S Torsion

Features and Benefits

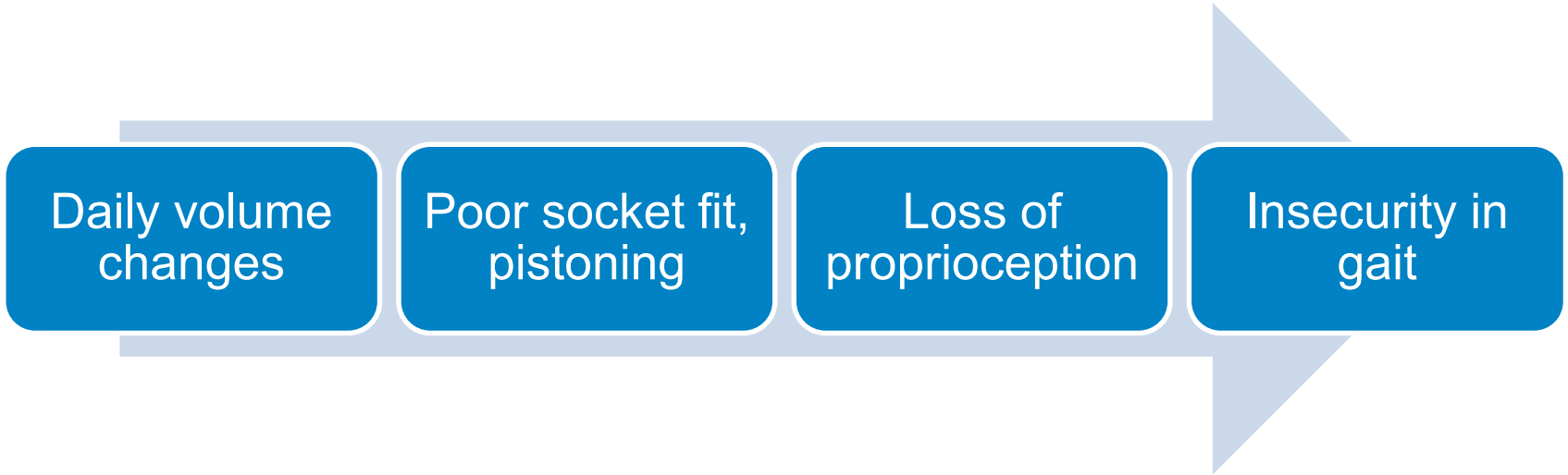
Features	Benefits
High Performance foam	Contribute to smooth rollover, multiaxiality and early stance comfort
Split Toe	Contribute to multiaxiality
Sandal Toe	Allow for a variety of footwear
C-Shape	Potentially contribute to good range of motion and good push-off in late stance
Wide foot blade	Possibly offer late stance stability
Torsion Unit	Reduce motion between socket and residual limb
Waterproof design	Allow use in more circumstances



Advantages of vacuum suspension

- **Very firm suspension** providing excellent security and improved **proprioception**
- Elevated vacuum tends to assist in maintaining more **constant limb volume**, therefore decreasing the need to add additional socks
- Elevated vacuum **assists with wound healing** by improving circulation through the residual limb
- Provides good distal comfort for bony and sensitive distal ends; as long as the socket fits properly with good **volume and length matching**

Medical Necessity: Active vacuum



Conclusion: Control of volume is a necessity[1]

[1]Board et al. (2001) J Int Prosth & Orth.

Medical Necessity: Active vacuum

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Evidence regarding increased safety:

- Activities-specific Balance Confidence scales (ABC test) were found to be significantly higher in participants using vacuum suspension with 95% confidence, indicating a lower predicted incidence of future falls

- Improved functional outcome[2]: 'skin problems (breakdown and blistering) seemed to be decreased in vacuum users and walking times increased in some users'

[2]Ferraro, C. Outcomes study of transtibial amputees using elevated vacuum suspension in comparison with pin suspension. J. Prosthet. Orthot. 23(2):78–81; 2011.

The Activities-specific Balance Confidence (ABC) Scale*

For each of the following activities, please indicate your level of self-confidence by choosing a corresponding number from the following rating scale:

0% 10 20 30 40 50 60 70 80 90 100%
no confidence completely confident

"How confident are you that you will not lose your balance or become unsteady when you…

1. …walk around the house? ____%
2. …walk up or down stairs? ____%
3. …bend over and pick up a slipper from the front of a closet floor ____%
4. …reach for a small can off a shelf at eye level? ____%
5. …stand on your tiptoes and reach for something above your head? ____%
6. …stand on a chair and reach for something? ____%
7. …sweep the floor? ____%
8. …walk outside the house to a car parked in the driveway? ____%
9. …get into or out of a car? ____%
10. …walk across a parking lot to the mall? ____%
11. …walk up or down a ramp? ____%
12. …walk in a crowded mall where people rapidly walk past you? ____%
13. …are bumped into by people as you walk through the mall?____%
14. … step onto or off an escalator while you are holding onto a railing? ____%
15. … step onto or off an escalator while holding onto parcels such that you cannot hold onto the railing? ____%
16. …walk outside on icy sidewalks? ____%

*Powell, LE & Myers AM. The Activities-specific Balance Confidence (ABC) Scale. *J Gerontol Med Sci* 1995; 50(1): M28-34

Medical Necessity: Active vacuum

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Evidence regarding volume control:

- The vacuum-assisted socket has been shown to eliminate daily volume loss[3]
- Vacuum-assist ensures a good fit during the day in ambulatory trans-tibial traumatic amputees with mature stumps[4]
- The combination of reduced pistoning and maintenance of volume is thought to account for the more symmetrical gait observed with vacuum[1]
- Elevated vacuum suspension systems manage limb volume fluctuation, a problem that people with limb loss are challenged with[5]

[3]Beil, T. L.; Street, G. M.; Covey, S. J. Interface pressure during ambulation using suction and vacuum-assisted prosthetic sockets. J. Rehabil. Res. Dev. 39(6):693–700; 2002.

[4]Goswami, J.; Lynn, R.; Street, G.; Harlander, M. Walking in a vacuum-assisted socket shifts the stump fluid balance. Prosthet. Orthot. Int. 27(2):107–113; 2003.

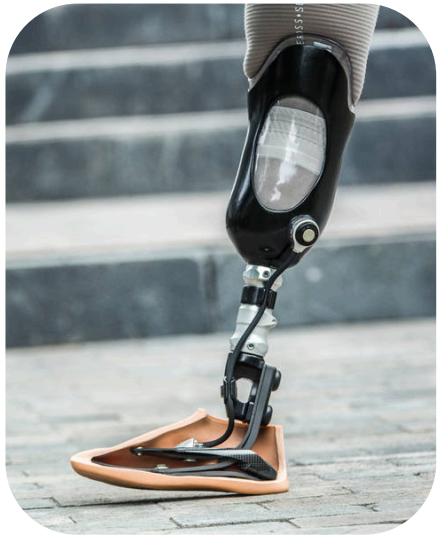
[1]Board, W. J.; Street, G. M.; Caspers, C. A comparison of trans-tibial amputee suction and vacuum socket conditions. Prosthet. Orthot. Int. 25(3):202–209; 2001.

[5]Sanders, Joan E., et al. Effects of elevated vacuum on in-socket residual limb fluid volume: case study results using bioimpedance analysis. Journal of Rehabilitation Research & Development, 2011, 48. Jg., Nr. 10.

Medical Necessity: Active vacuum

Evidence addressing fit, comfort and limb health:

- When limb volume decreases, the socket is loose-fitting, often causing pressure to bony prominences, which may result in pain and/or injury to the limb[1].



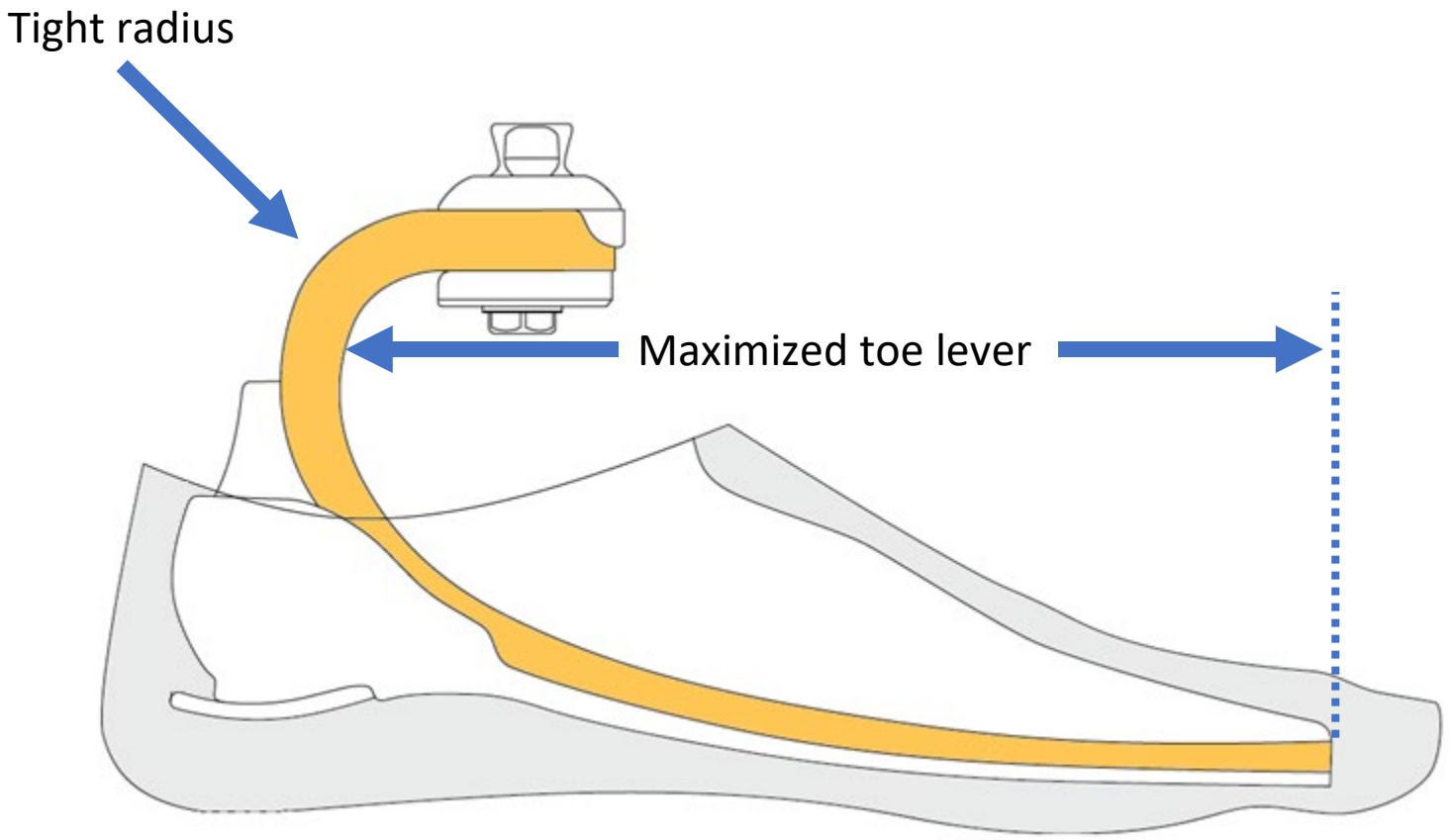
[5]Sanders, Joan E., et al. Effects of elevated vacuum on in-socket residual limb fluid volume: case study results using bioimpedance analysis. Journal of Rehabilitation Research & Development, 2011, 48. Jg., Nr. 10.

Primary benefits of the Unity™ system

- **Sleeveless:** Increased knee flexion range (TT) with greater comfort and user acceptance
- **Increased reliability:** Minimises risk of leaks and puncture issues associated with sleeve dependent vacuum methods
- **Light weight and discreet:** 130g added weight and housed within foot shell
- **Simple and efficient:** Quick and easy to elevate and release vacuum levels
- **Independent pump:** does not depend on shock mechanisms and can be added to a wide range of performance Flex-Foot and Pro-Flex systems to meet every mobility need.
- **Volume stabilisation:** Optimises socket stability, proprioception and comfort throughout the day while limiting the need to add socks
- Integrates **performance Flex-Foot and Pro-Flex** technology to meet all activity requirements

Product Characteristics: C-Shape

- Long toe lever
  - Maximize energy return
- Tight radius
  - Minimize build height



Product Characteristics: Glass Fibre

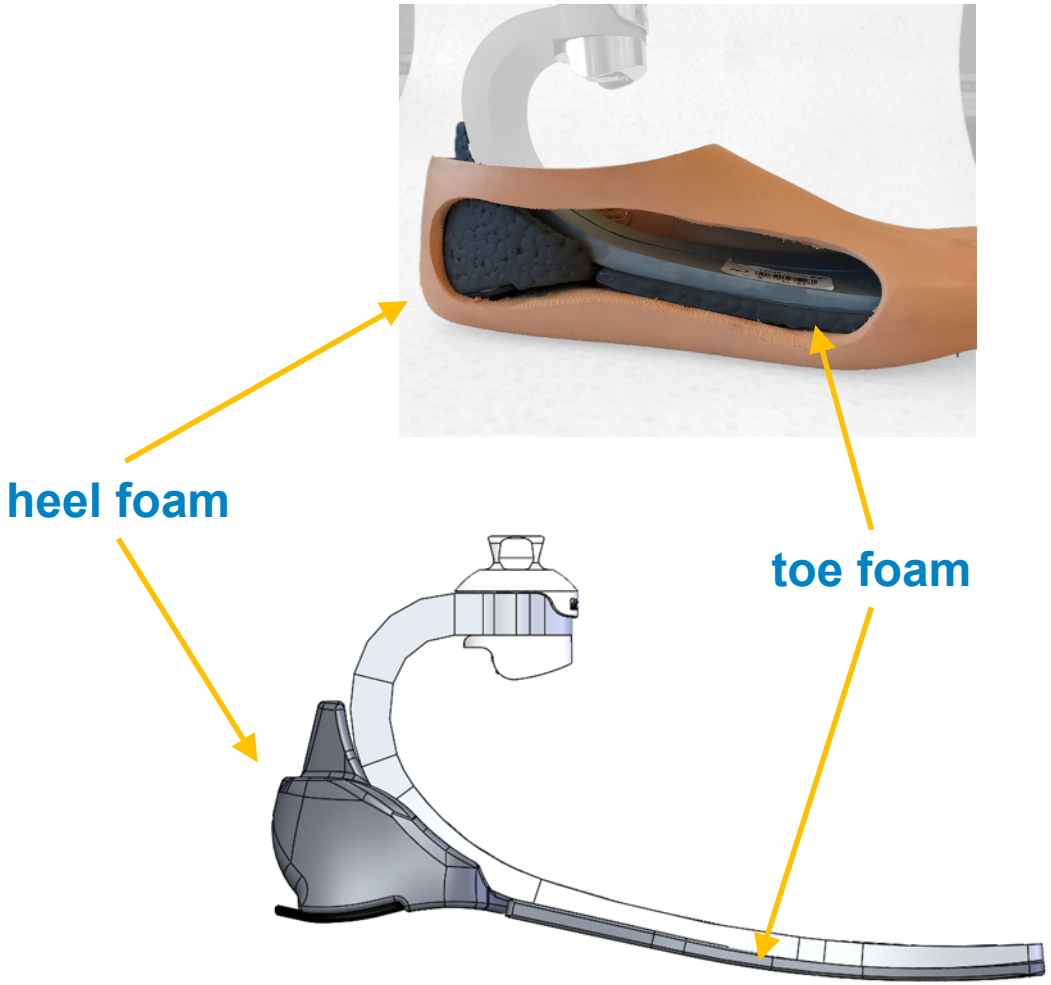
- Glass fibre – well-suited for low active users

- **Comfort**
  - Damping
  - Gentle energy return

- **Control**
  - Push-off with compliance
  - Expect feeling more balance

Product characteristics – Heel & toe foam

- **Heel foam** and **foot cover** function together for:
  - appropriate stiffness
  - progressive loading
- The **toe foam** improves:
  - multiaxial loading of the toes
  - smooth transition of COP from heel to toe



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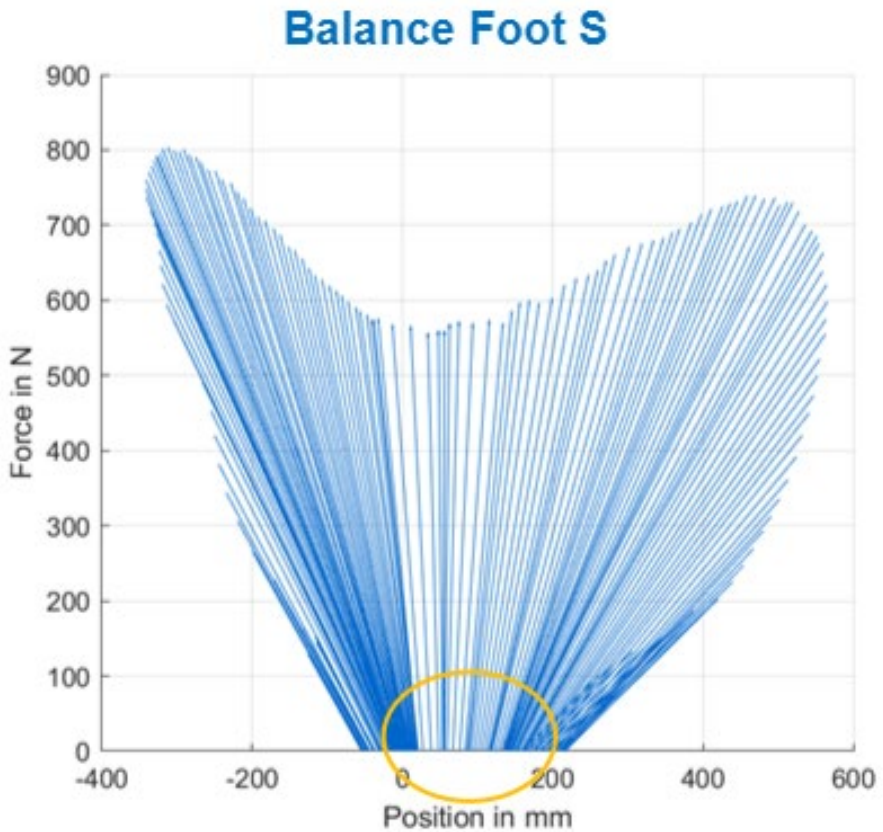
LIFE WITHOUT LIMITATIONS

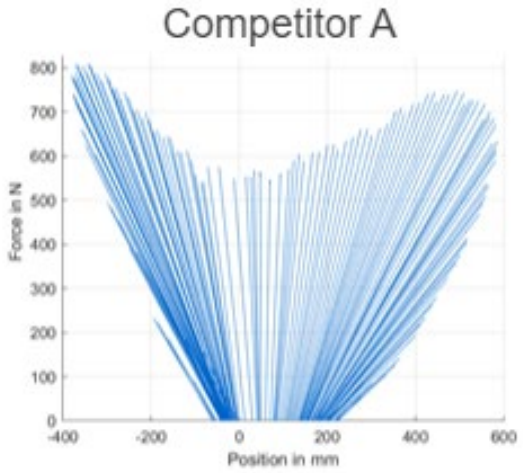
Balance Foot S: Walking

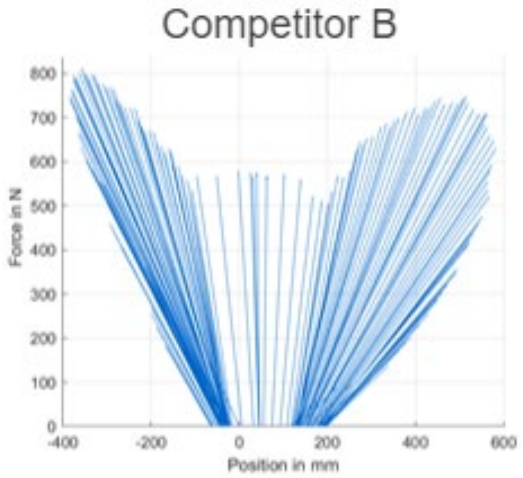
Balance Foot S

Force Vector vs. COP (Pedotti)

Smoothness of progression – machine based test

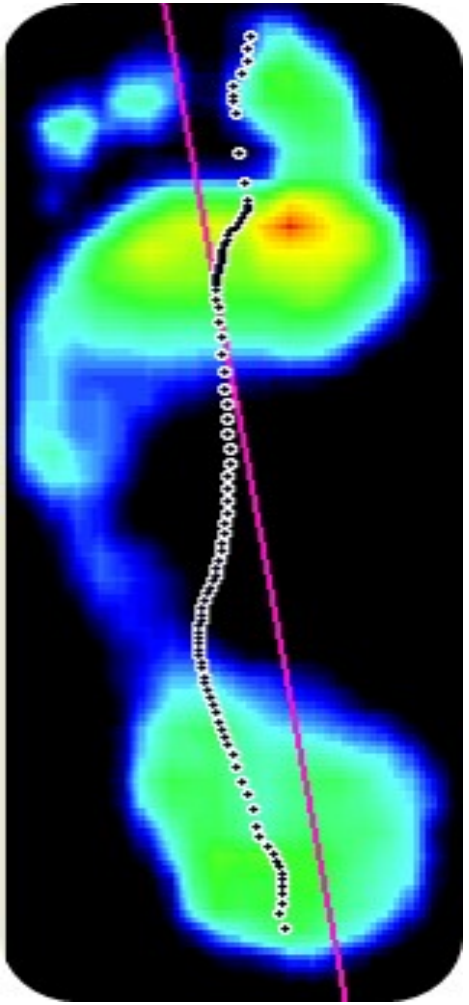






Center of Pressure

Sound side

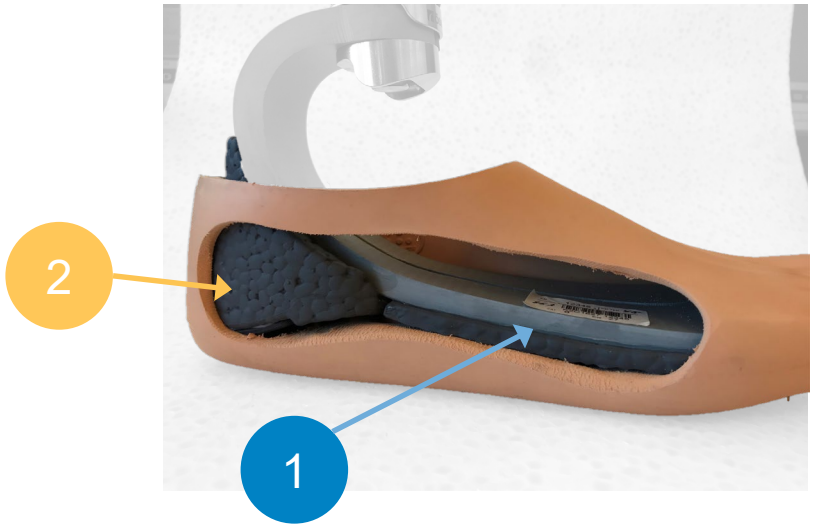


Balance Foot S

Product characteristics – Heel bumper & Foot blade category

- Heel bumper stiffness and foot blade matched for each foot category

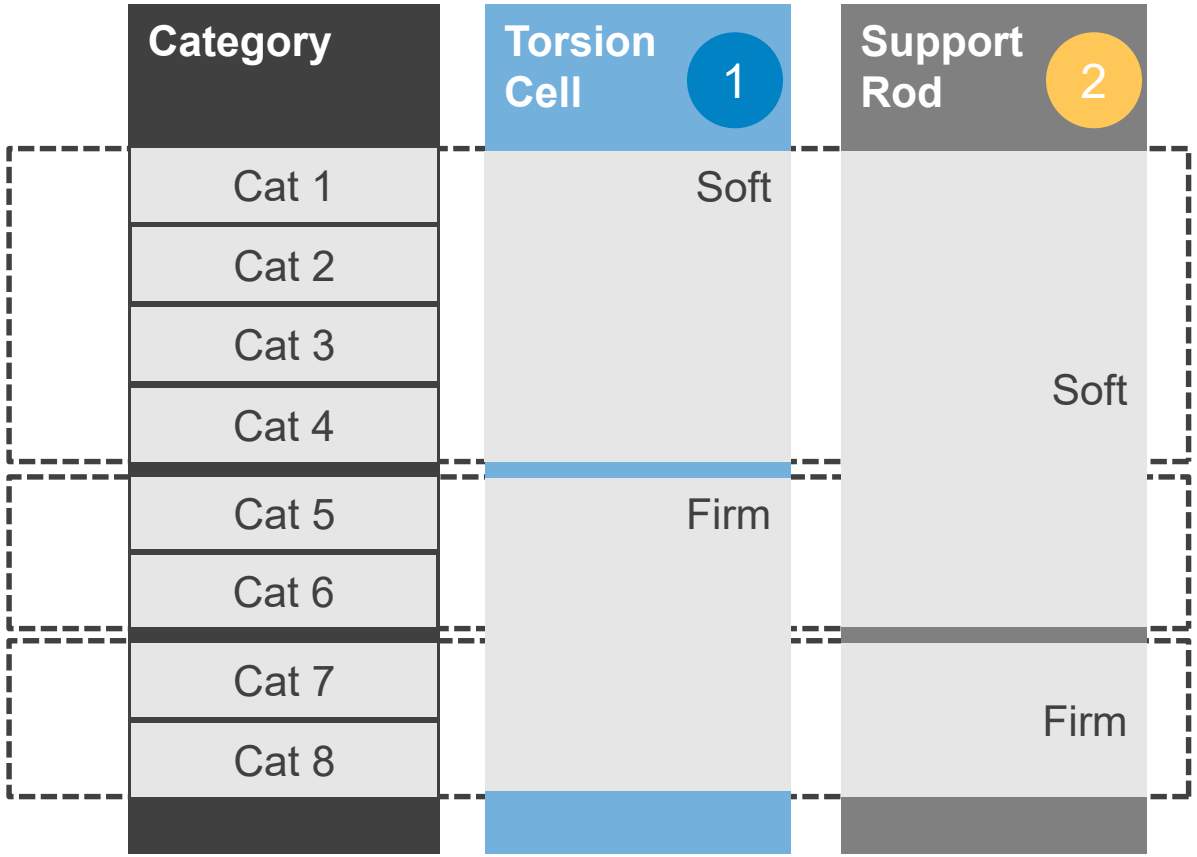
Category	Glass fiber blade 1	Heel Bumper 2
Cat 1	Cat 1	Cat 2
Cat 2	Cat 2	
Cat 3	Cat 3	Cat 4
Cat 4	Cat 4	
Cat 5	Cat 5	Cat 6
Cat 6	Cat 6	
Cat 7	Cat 7	Cat 8
Cat 8	Cat 8	

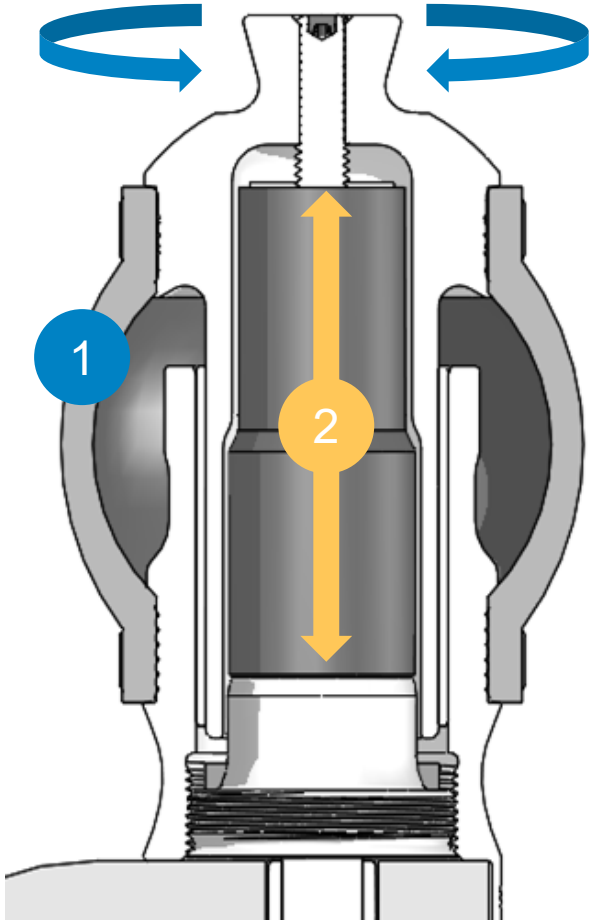


Product Characteristics: Torsion

- Rotation
- Shock absorption
- Similar design to other Össur torsion units
  - Grey colour
  - Softer vertical stiffness for low activities

Product characteristics – Category selection & Torsion cell

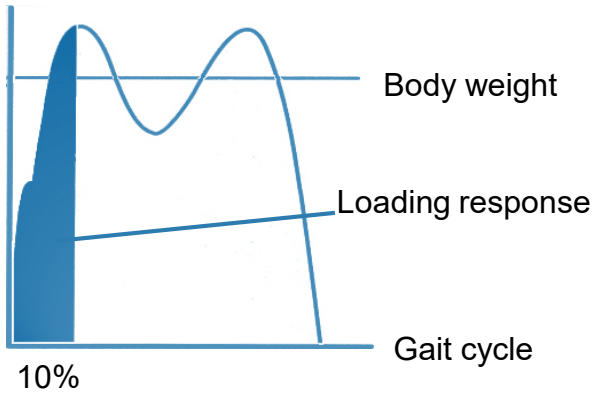




Medical necessity

Why shock absorption?

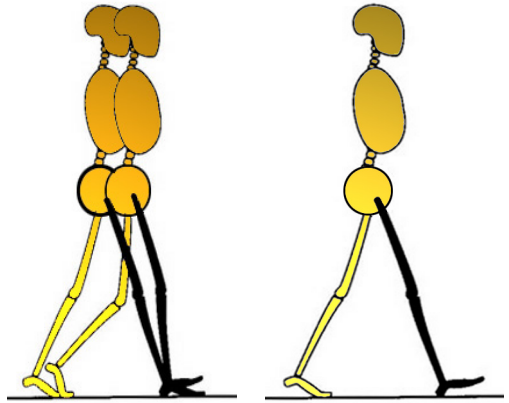
- Acceptance of body weight (loading response)
  - Controlled plantar flexion
  - Controlled knee flexion
  - Fat cushion under the heel
  - S-shape of spine



Perry J. Gait Analysis: Normal and pathologic function. 1992

Effect?

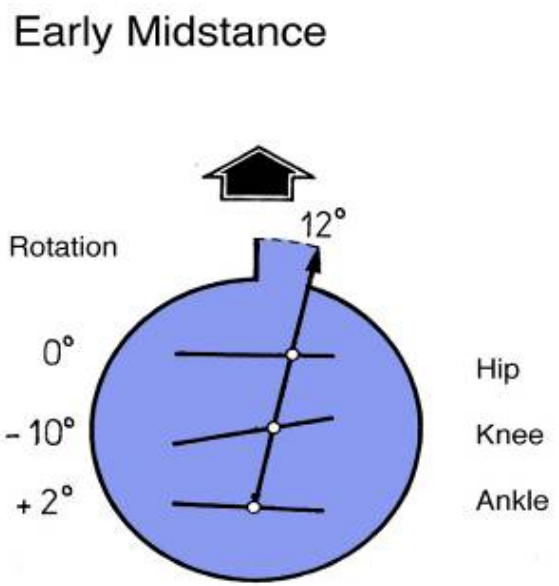
- Impact protection
  - Residual limb
  - Residual knee
  - Residual hip
  - Sound side
  - Spine

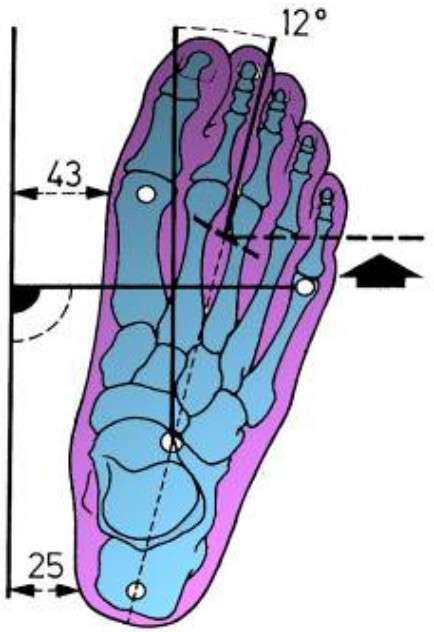


Medical necessity

Why rotation?

- All lower extremity joints contribute
- Without rotation, natural gait unachievable
- Higher level amputation, greater rotation loss





Hohmann, Dietrich, et al. Orthopädische Technik. Enke, 1990

Medical Necessity

If circumferencial and logitudinal directed motion of the socket were permitted by introducing transverse rotation and longitudinal translation, the resulting stresses may be reduced

PERMITTED ROTATION AND SHOCK MOVEMENTS REDUCE SHEAR STRESS

- Able-bodied: Ground reaction forces → anatomical foot
- Prosthetic users: Ground reaction forces → prosthesis → residual limb
- Only small amount of forces acts perpendicularly on the skin, causing the majority of forces to create shear stress

- Forces can be excessive because of shock impact

Twiste M. Transverse rotation and longitudinal translation during prosthetic gait – A literature review. Journal of Rehabilitation, 2003; 40: 9-18

Medical Necessity

If reduced transverse plane moments lower shear stresses applied to the residual limb, torsion adapters will likely reduce discomfort and incidents of injury experienced by lower limb amputees.

LOWER SHEAR STRESSES → REDUCED DISCOMFORT

- n=10 transtibial amputees
- 3 weeks acclimation
- Rigid vs torsion adapter

Segal AD, et al. Transtibial amputee joint rotation moments during straight-line walking and a common turning task with and without a torsion adapter. Journal of Rehabilitation R&D. 2009 46:375-384

Medical Necessity

The addition of a torsion adapter resulted in small improvements in functional mobility and self-perceived pain interference with activities.

SELF PERCEIVED PAIN REDUCTION

- n=10 transtibial amputees
- 6MWT
- Less pain interference with activities
- Evidence supports prescribing this device for amputees with difficulty navigating the household and community environments

Segal AD, et al. Does a Torsion Adapter Improve Functional Mobility, Pain and Fatigue in Patients with Transtibial Amputation? Clin Orthop Relat Res 2014 472:3085–3092

Medical Necessity

Shear stress at the stump in transtibial amputees induced by turning movements may be reduced with the use of torsion adapters in the prosthesis.

REDUCED SHEAR STRESS

- n=10 transtibial amputees
- Vari-Flex XC → Vari-Flex XC Rotate
- Shear stress at the stump may increase in stump–socket interface stiffness and may be the reason for residual limb problems. Torsion adapters therefore may be beneficial for comfort and stump condition in individual cases.

Heitzmann D, et al. Functional effects of a prosthetic torsion adapter in transtibial amputees during unplanned spin and step turns. Prosthet Orthot Int 2015; 1-8.

Waterproof – Balance Foot S / Balance Foot S Torsion

- Dry thoroughly after contact with fresh water
- Components used with foot should also be waterproof
- Excludes salt and chlorinated water

WATERPROOF

Waterproof

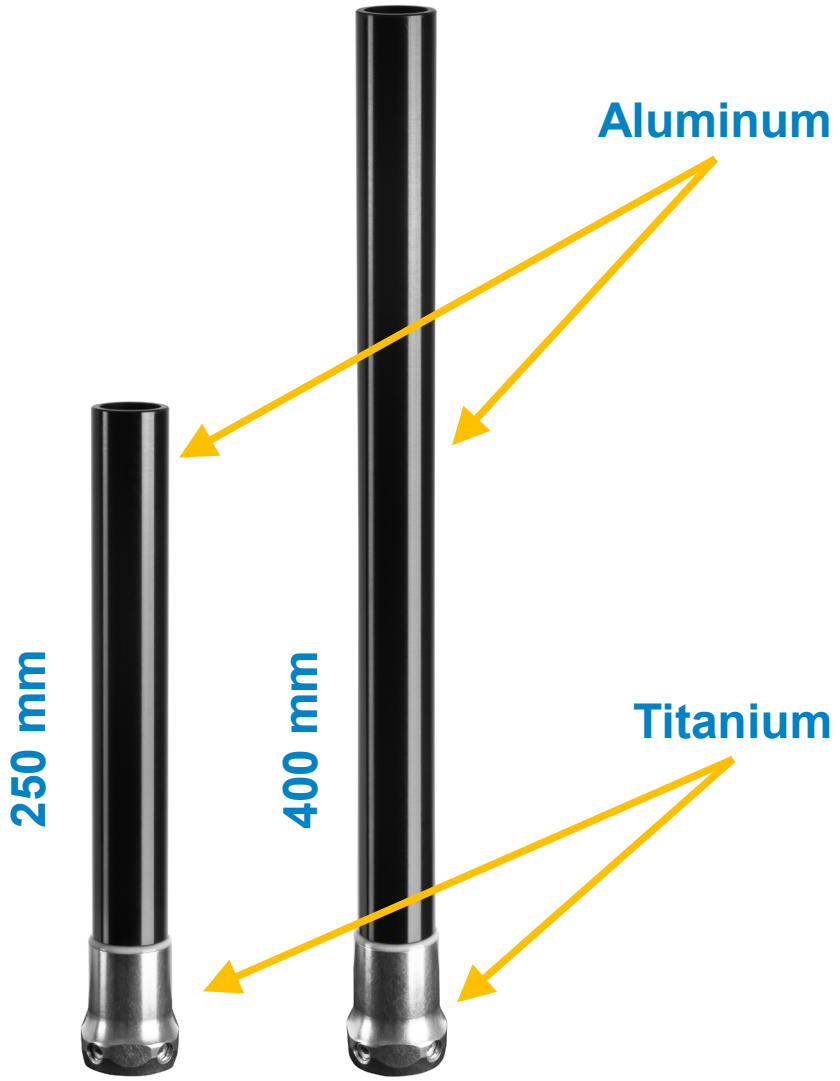
Allows use in a wet and/or humid environment and temporary (<30 mins.) submersion of up to 1 m in fresh water.

High strength pylons – Waterproof

- Two versions:
  - short (250mm)
  - long (400mm)
- Weight limit: 166kg
- Warranty: 24 months

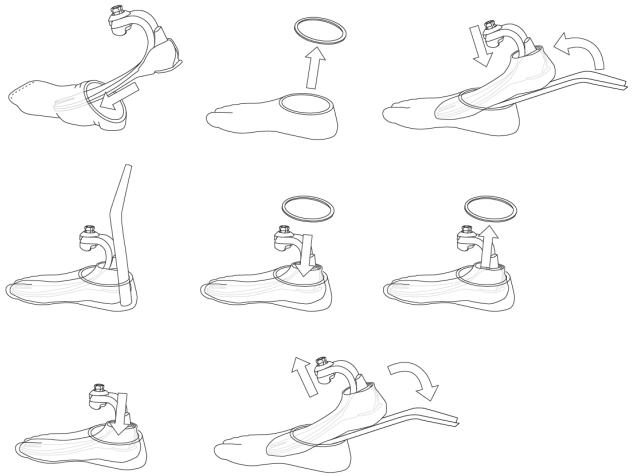
Waterproof

Allows use in a wet and/or humid environment and temporary (<30 mins.) submersion of up to 1 m in fresh water.



Footcover and Spectra sock

- Always use with foot cover and Spectra sock
- Use shoehorn
- Ensure foot fully seated in foot cover
- No folding of Spectra Sock over heel bumper



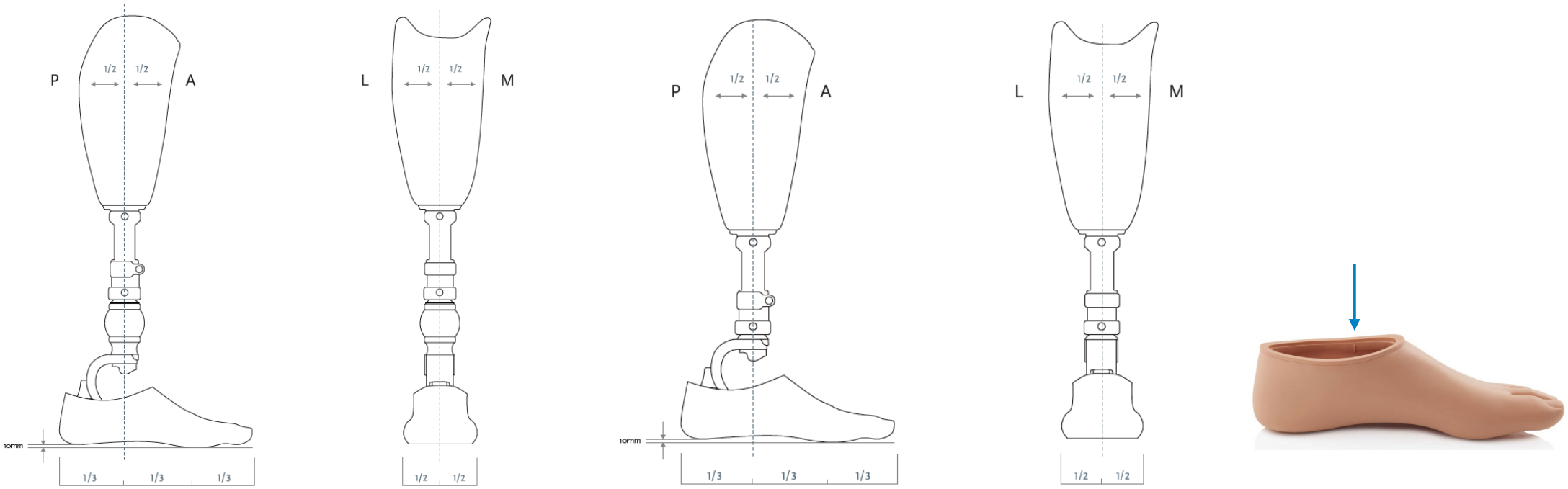
Troubleshooting – Foot Cover

Ensure foot cover fully donned

Edge of heel foam should not be visible

Bench alignment

- Adjust to correct heel height
- Set correct socket angles for flexion/extension and abduction/ adduction
- Align load line to posterior 1/3 portion on foot

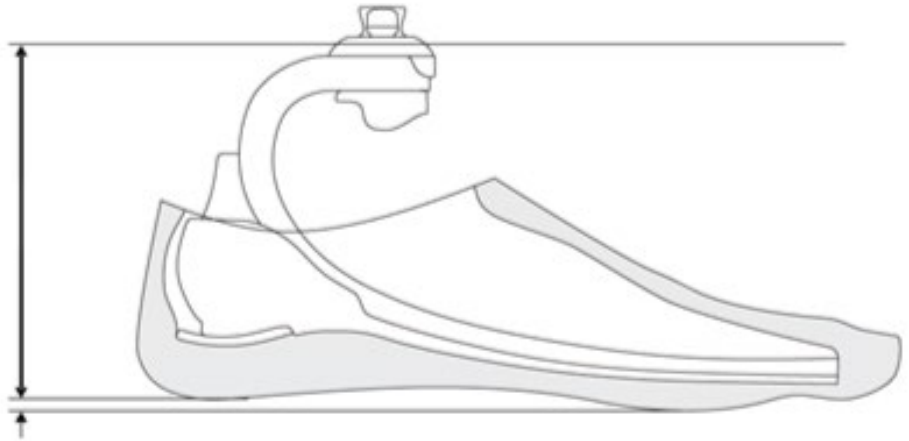


Dynamic Alignment

- Heel bumper:
  - Stores energy after initial contact
  - Gradual release at midstance
- The heel-to-toe action can be influenced by:
  - Anterior/posterior positioning of the foot
  - Dorsi-plantarflexion
  - Shoe performance

Balance Foot S

- Product weight: 622 grams
- Weight limit: 147 Kg
- Warranty foot: 3 years
- Warranty footcover: 6 months
- Sizes: 22-30
- Categories: 1-8
- Heel height: 10mm

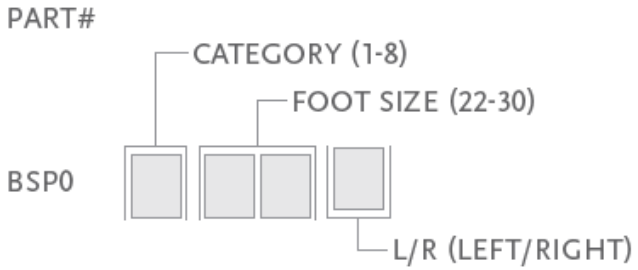


Weight kg	45-52	53-59	60-68	69-77	78-88	89-100	101-116	117-130	131-147
Weight lbs	99-115	116-130	131-150	151-170	171-194	195-220	222-256	257-287	288-324
Low Impact Category									
Size 22-24	1	1	2	3	4	5	N/A	N/A	N/A
Size 25-27	1	1	2	3	4	5	6	7	8
Size 28-30	3	3	3	3	4	5	6	7	8

Size	Build Height (mm)
22 – 24	122
25 – 27	126
28 – 30	145

Part Numbers: Balance Foot S

BALANCE FOOT S WITH MALE PYRAMID



Includes:

- Foot Module
- Removable Foot Cover* with a black Spectra Sock

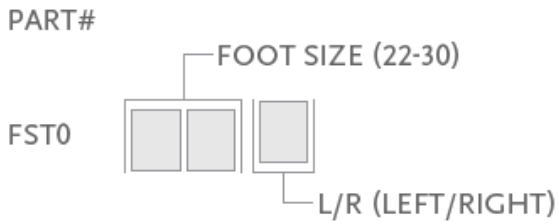
*When ordering brown covers, add "BR" to the end of the part number.

FLEX-FOOT SOCKS

Used to cover the composite foot module to protect the foot and eliminate noise between foot module and foot shell.

Part#	Description	Size	Color
FCX63022	FF Sock Small 1 pc	22-25	Black
FCX63025	FF Sock Large 1 pc	26-30	Black
FCX63022-15	FF Sock Small 15 pcs	22-25	Black
FCX63026-15	FF Sock Large 15 pcs	26-30	Black

FOOT COVER KIT, BEIGE AND BROWN*



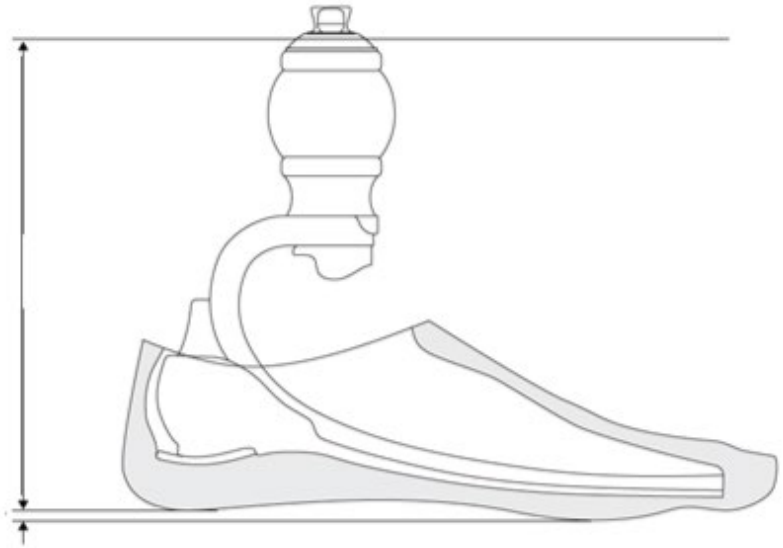
Includes:

- Foot Cover*
- Foot Cover Attachment
- Black Spectra Sock

*For brown foot cover please add a "BR" suffix to the part number.

Balance Foot S Torsion

- Product weight: 996 grams
- Weight limit: 147 Kg
- Warranty foot: 3 years
- Warranty footcover: 6 months
- Sizes: 22-30
- Categories: 1-8
- Heel height: 10mm



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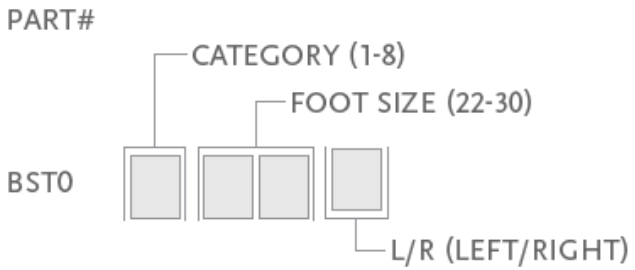
Size 25-27	1	1	2	3	4	5	6	7	8
Size 28-30	3	3	3	3	4	5	6	7	8

Size	Build Height (mm)
22 – 24	197
25 – 27	204
28 – 30	222

Part Numbers: Balance Foot S Torsion

BALANCE FOOT S TORSION WITH MALE PYRAMID



Includes:

- Foot Module
- Removable Foot Cover* with a black Spectra Sock

*When ordering brown covers, add "BR" to the end of the part number.

FLEX-FOOT SOCKS

Used to cover the composite foot module to protect the foot and eliminate noise between foot module and foot shell.

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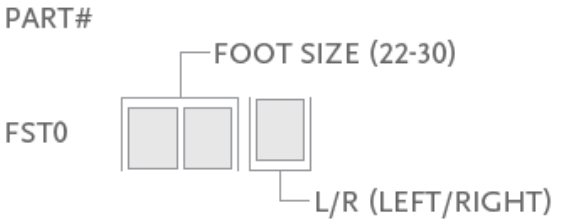
FOOT COVER KIT, BEIGE AND BROWN*



Includes:

- Foot Cover*
- Foot Cover Attachment
- Black Spectra Sock

*For brown foot cover please add a "BR" suffix to the part number.

Summary

- C-shaped **Glass fibre** design
- Lightweight
- Waterproof
- Smooth Rollover
- Stability
- Cushioned heel foam
- Unity compatible

WATERPROOF

WE IMPROVE PEOPLE'S MOBILITY

ÖSSUR®