Level I – Shoe Fitting

Shoe Fitting

- Understand goals and techniques for measuring feet
- Demonstrate the ability to properly fit shoes

Foot & Footwear Evaluation

- Evaluation of the foot
- Common deformities
- Physiological status
- Evaluation of worn footwear
- Hosiery & Socks
- Existing orthoses
Foot Evaluation

- Done before you measure
- Recognize challenges
- Aid in selecting footwear

Foot Evaluation

- Foot Shape & Type
- Arch Type
- Heel Type
- Flexibility
- Deformities
- Callusing or Corns

Foot Evaluation

- Temperature
- Pedal Pulses
- Level of protective sensation
- Skin appearance / Hair loss
- Wounds /Injuries
- Odor / Fungi
Foot Shape & Type

- Chubby / Fleshy
- Stocky / Muscular
- Lean / Boney
- Edematous / Swollen

Foot Shape & Type

- Normal
- Inflare – Metatarsus adductus
- Outflare – Metatarsus abductus

Toe Length

Morton’s Toe is a common forefoot disorder where the second toe is longer than Hallux. Morton’s toe leads to excessive pressure on the second metatarsal head. The square forefoot does not have the normal flex point from the 1st met head to the 5th met head. Normally the 5th met head is 10 degrees lower than the 1st.
Foot Shape & Type

- Rigid
- Flexible

Arch Type

Pes cavus is an excessively elevated toe-to-heel arch of the foot. Pes cavus feet generally make it difficult to fit shoes because of the high instep.

Pes planus is a condition where the arch or instep of the foot collapses and comes in contact with the ground. In some individuals, this arch never develops.

Heel Type

- Wide
- Normal
- Narrow
**Toe Deformities**
- Claw / hammer / mallet toes
- Crossover toes
- Missing or amputated toes
- Syndactylysm (Web toes)
- Bunion and bunionettes
- Polydactylysm (Extra Toes)

**Forefoot and Midfoot Deformities**
- Unusual prominences
- Subluxation or collapse

**Arch Deformities**
- Nodules, or hard lumps, occasionally form on the plantar fascia in the arch.
- The most common nodules which form in the arch are fibromas.
- The cause is unknown.
- The other method of treatment is to have custom orthotics made.
- Refer the individual to their physician.
Heel Deformities

• Rearfoot varus is an inversion deformity of the calcaneus when the subtalar joint is in neutral position.
• Haglund's Deformity, more commonly known as a pump bump, is the term used to describe a swelling on the back of the heel.
• A heel spur is a thorn shaped exostosis that forms on the plantar surface of the calcaneous.

Calluses or Corns

• Corns and calluses are usually caused by friction and pressure, particularly from tight or ill-fitting shoes.
• Hammer toe and other toe deformities are often responsible for the development of corns.
• Calluses often develop under the ball of the foot because of faulty foot positioning and poor weight distribution.

Temperature

• Taking temperature readings on both the plantar and dorsal surfaces of the foot may be a good indicator of foot condition. A wide difference of temperatures between left and right feet can indicate possible infection, injury or circulatory problems.
Pedal Pulses

- Pedal pulses are assessed by Palpation of the dorsalis pedis artery pulse and palpation of the posterior tibial pulse.
- Absence or presence of pedal pulses should be documented.

Protective Sensation

- Semmes-Weinstein 5.07 monofilament 10 Gram
- Risk of developing a neuropathic ulcer
- 128-Hz tuning fork

Skin appearance / Hair loss

- Skin appearance and hair growth can be an indication of foot health. Shiny, thin, fragile skin with little to no hair growth can indicate circulation problems.
Wounds /Injuries

- Bruises
- Cracks/breaks in skin
- Soggy skin
- Dry skin
- Ingrown toenails
- Blisters
- Sharp toenails
- Discoloration
- Ulcerations
- Previous surgeries

Odor & Fungi

Athlete’s foot or Tinea
- Treated with antifungal medications
- Keep the feet dry

Fungal nail infection or Onychomycosis
- Very common
- Nothing to do with hygiene
- Keep the feet dry

Worn Shoe Evaluation

- Outsole wear
- Counter shape
- Vamp shape
- Arch shape
- Lacing
- Interior wear
Outsole wear

- Normal wear outsole wear pattern begins at the lateral side of the heel. The weight is then transferred along the lateral side of the outsole to the head of the fifth toe. The weight is then transferred across the ball of the foot and out through the hallux.

Outsole wear

- Abnormal wear patterns often reflect findings from the foot evaluation.
- If the wear is excessive on the medial or lateral side of the shoe the shoe may be too narrow or the foot may be pronating or supinating.

Counter shape

- The counter shape can often be a good indicator of supination or pronation problems.
- The counter will look as if it is broken and the foot has rolled over the side of the shoe.
Vamp shape

- A wrinkled vamp often indicates a shoe that is too long.

Arch shape

- A wrinkle in the arch area often indicates that the arch shape of the shoe does not match the arch shape of the foot. It can also indicate pronation or supination problems.

Lacing

- Narrow lacing may indicate a shoe that is too large or too wide
- Wide lacing may indicate a shoe that is too small or too narrow
**Interior Wear**

- Excessive interior wear can indicate a shoe that is too loose fitting
- Excessive wear in the rear quarter of the shoe indicates that there may be excessive heel slippage
- Always remove and check the inlay for signs of wear and pressure

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**Measuring Techniques**

- Measure the foot, not the shoe
- Shoe sizes are NOT standard
- Feet continually change sizes
- Reasons for change include:
  - Standing or sitting
  - Type of activity
  - Time of day
  - Weight gain or loss
  - Aging

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**Measuring Techniques**

- Linear measurements
- Foot evaluation equally important
- Mix of art & science
- Measuring devices
  - Brannock
  - Ritz Stick
  - Computerized
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**Brannock® Device**

- The Brannock Device is the standard
- Models for men, women, athletic shoes and ski boots, and for children.
- Cup at either end to accommodate the left or right heel.
- Platform has calibrated lines
- Sliding bar for determining width
- Sliding pointer used to determine the heel to ball length.

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**Why Heel-to-Ball Is Essential**

- Two feet which are the same length
- Each require different size shoes.
- There are different fittings for short-toed feet and long-toed feet.
- Proper shoe-fitting incorporates not only overall length but also arch length. Shoes are designed to flex at the ball of the foot.

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**Without Utilizing Heel to Ball Measurement**

- Improperly fitted shoes can cause a variety of foot problems in addition to general discomfort and shoe breakdown
- If the arch of the foot is not positioned properly in the shoe, the foot may become fatigued and uncomfortable
**Utilizing Heel to Ball Measurement**

- The foot to the right is correctly fitted. The arch of the shoe and ball joint of the foot meet at the same point.
- The foot arch is correctly positioned in the shoe.
- The foot and shoe bend at the same location, with the arch fully supported, allowing the toes to remain straight.
- There is ample space in front of the toes to allow adequate ventilation. This will ensure a correct and comfortable shoe which will keep its shape.

**Weightbearing vs Non-weightbearing**

- Both weightbearing and non-weightbearing measurements should be taken.
- Measure both feet.
- The foot will expand ½ to 1 size upon weightbearing.

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**Using the Brannock Device**

- Prepare the Brannock Foot-Measuring Device as shown in the photo to the right.
- The width bar should be set to its widest position and the arch length indicator should be slid back, so the foot can be positioned easily on the device.
Position the Foot

- Have the customer remove their footwear and stand, placing their right heel into the right heel cup.
- The customer should stand with equal weight on both feet to ensure that the foot being measured has elongated and spread to its maximum size.
- Be sure the heel is properly located against the back of the heel cup, by grasping the customer’s ankle and device together, as illustrated in photo.

Heel-to-Toe Length

- Press the toes flat against the base of the device and look straight down over the longest toe (not necessarily the first toe) to read toe length.
- Make sure the customer’s socks are snug against the toes (without drawing the toes back) to yield an accurate measurement.

Arch Length (Heel-to-Ball)

- Place your thumb on the ball joint of the foot (as shown in the photo to the left).
- Slide the pointer (A on diagram) forward so the inside curve of the pointer fits the ball joint of the foot and the two high ribs come in contact with your thumb.
- When the pointer is properly located, the lower middle rib will be against the ball joint on the side of the foot (B on diagram).
- This yields the arch measurement. The arch length represented in the diagram is 8 1/2.
Determine the Correct Shoe Size

- Compare the arch length to the heel-to-toe length and use the larger of the two measurements as the correct shoe size.
- If the arch length and heel-to-toe length are the same, this will be the shoe size.
- If the heel-to-toe length is larger than the arch length, then fit to the heel-to-toe size.

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Determine the Correct Shoe Size

- If arch length is larger than heel-to-toe, then fit to arch length.
- It is important that both measurements be taken and compared to find the proper shoe size.
- Simply using the heel-to-toe length may result in an improper fit.

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Measure The Width

- Slide the width bar firmly to the edge of the foot. Locate the customer's shoe size (as determined in the previous step) on the sliding width bar. Find the width measurement which lines up to the shoe size on the width bar. If the shoe size falls between widths, choose a wider width for a thick foot, a narrower width for a thin foot.
- If the foot is extremely fleshy or has a high instep, it may be necessary to fit an extra width wider. If the foot is extremely thin, compress the foot slightly with the width bar and determine the size while holding the bar in this position.

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Measure the other foot

- Reverse the device end-for-end and measure the other foot following the steps described above.
- Be sure to measure both feet, then fit the larger foot. It is common to have feet of different sizes.

Remember the fitting process

- When used properly, the Genuine Brannock Foot-Measuring Device® is designed to indicate the correct shoe size.
- The fitting process often involves trial fittings to ensure that the proper size was selected.

Ritz Stick

- The Ritz Stick is a single device that quickly sizes women's, men's and children's feet.
- The Ritz Stick Foot Measuring Device measures foot width and foot length. The Ritz Stick Shoe Ruler is made of wood.
Ritz Stick

• The Ritz stick can be used to measure toe length by placing the foot on top of the stick and adjusting the slider to the length of the longest toe.

Ritz Stick

• The width of the foot can be measured by placing the foot across the device and adjusting the slider
• Arch length cannot be determined with this device

Computerized

• There are several computerized system on the market today to assist the clinician in measuring shoes.
• They typically consist of a pad upon which the individual stands. The computer senses the pressures and determines the length and width.
Shoe Sizing

US Shoe sizing
- Three barley corns = one inch
- 1/3 inch = one shoe size
- 1/6 inch = one half size
- Generally, American Women’s shoe sizes are the same as American Men’s shoe sizes plus 1/2.

### US, UK & Euro Sizing Chart

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- Width is a girth measurement
- Measure at the ball of the foot
- 1/8 inch between each width
- Thus, C width has a 1/4 inch more girth than a B width
- The width increases proportionally to the length
- 1/8 inch for each half size
- Example: 9D has 1/8 inch more girth than 8-1/2D
- Not all widths fit the same

Checking Shoe Fit
- Foot placement in shoe
- Assessing Fit
  - Standing
  - Walking
Foot placement in shoe

• Builds professional image
• Aid to checking shoe fit
• Open up any closures completely
• The use of a shoehorn is advisable
• Cradle the foot from just above and behind the ankle while you place the foot in the shoe
• If the foot is big or bulky, you may want to turn the shoe sideways and straighten it back out as the foot enters the shoe

Foot placement in shoe

• Be sure that the heel is seated snugly in the shoe
• Be sure to pull the tongue into position
• Remove any sock wrinkles
• Finally secure the closure by tightening laces from the bottom up or fastening the hook and loop closure

Assessing fit

Standing
• Shoe length
• Heel to ball
• Ball to toe
• Ball width
• Heel to outer ball
• Heel fit
• Top line
• Instep
• Arch fit
Shoe Length

- This check should always be made on the longest toe, which is not necessarily the hallux.
- On average there should be between 3/8 to ½ inch between the end of the toe and the end of the shoe.
- Adequate width for toes.
- Adequate depth.
- Space for 4th & 5th toes

Heel to Ball

- The hallux MTP joint should fit snugly into the ball “pocket” of the shoe

Ball to Toe

- There must be room enough for the toes in the end of the shoe when the ball is at the proper place in the shoe. Experimenting with different toe shapes in the last can help solve any problems here.
**Ball Width**

- Make sure that the width of the insole complies with the actual width of the foot. If the insole is too narrow, the foot will run over the sides of the shoe.

**Heel to Outer Ball**

- The last is built to accommodate the 5th MTP joint in a “pocket” the same way as the 1st MTP joint on the other side. The line between these two points is called the breakpoint.

**Heel Fit**

- The top edge of the counter should not bite into the tendon. There should be sufficient room to slip a pencil inside.
- The heel should fit snugly into the pocket.
Topline

- The top rim of the shoe should fit snugly against the foot
- Excessive gapping of the topline indicates a faulty fit

Instep

- The instep must fit snugly without wrinkles. Laces or hook and loop closure may be adjusted to accommodate proper fit. Too tight of fit can constrict blood flow and cause major problems.

Arch Fit

- A good fit in the arch hugs the foot
- A poor fit is often indicated by wrinkles in the arch area
Assessing fit

Walking
- Foot and shoe interaction
- Shoe and ground interaction
- Patient balance
- Heel slippage

Foot and shoe interaction

- Observe for signs of foot movement within the shoe during gait
- Excessive wobble indicates poor fit

Shoe and ground interaction

- Observe how the shoe interfaces with the ground
- Does it strike the ground and transfer the weight line properly
Patient balance

- Is the patient's balance positively affected by the shoes?
- Are shoe modifications required to enhance stability?

Heel slippage

- Some movement in the heel is normal.
- Excessive slippage will cause irritation and even injury.

Hosiery / Sock Considerations

Materials
- Cotton
- Nylon
- Wool
- Acrylic
- Performance synthetics
Hosiery / Sock Considerations

Activity considerations
• Sports
• Work
• Dress

Hosiery / Sock Considerations

Construction
• Socks are knitted
• Seams
• Length
• Restriction

Hosiery / Sock Considerations

Medical Conditions
• Diabetes
• Edema
• Allergies
• Sensitivity
Fitting over an AFO

- When fitting a shoe over an Ankle Foot Orthosis or AFO, you will need a longer, wider, deeper shoe to accommodate the device. Velcro closures will assist in donning and doffing the device.
- Remember to remove the shock insert. Some individuals don the device with the shoe attached, others put the shoe on after the device is on.

Fitting with Orthosis

- Remove stock inlay
- If orthosis is full length, no additional padding is needed
- Padding may need to be added to the forefoot if the orthosis is ¾ length.

Fitting Individuals

- As clinicians, we fit a wide variety of individuals including children, teens, adults, elderly, and athletes.
- Each of these groups have their own set of challenges.
- We most remember to treat each case as its own individual case with its own challenges and solutions.
Custom Molded Shoes

- Custom shoes are constructed from a cast of the patient's feet.
- Most custom-molded shoes made today are for individuals with diabetes, Charcot foot, arthritis, post polio and other deformities such as a major foot size differential in both feet.

Minor Modifications

- Stretching tools and how to properly soften leather and shoe components
- Pads
- Improving Comfort
- Lacing Techniques
- Required Adjustments

Stretching tools & Softening Leather

- Shoe Stretcher
- Ball & Ring Stretcher
- Shoe Stretch Spray
Roll-Eze

- A Roll-eze is a device that attached to a bench. It flattens seams and can be used to stretch out areas of the shoe.

Pads

- Adhesive pads may be Used to fine tune the shoe fit
- They come in a variety of materials and sizes

Neuroma Pad

Interdigital Morton’s neuroma

- A perfectly sized tear-drop shaped pad that will effectively spread the bones at the base of the toes to relieve the pinching on the nerve.
**Metatarsal Pad**

Metatarsalgia or localized callosities on the ball of the foot.
- Relieves pressure on the metatarsals.

**Tongue Pad**

Uncomfortable rubbing of the shoe on the top of the foot
- Holds the foot back into the heel of the shoe for a better shoe fit. Also cushions and comforts at the instep.

**Scaphoid Pad**

Additional support to the Scaphoid (navicular bone)
- This pad is correctly contoured for adding more support to the Scaphoid.
Horseshoe Heel Pad

Comforts irritations under the heel
• A uniquely designed heel cushion with a partially or fully removable center piece for relief of stone bruises and other sore, tender irritations under the heel.

Heel Pad

Heel pads are used for leg length discrepancy.
• Height adjustable heel pads allow the clinician to peel away thickness in 1/16 inch increments.

Heel Grips

• Holds your heel snugly in place so shoes don't slip causing blisters and other irritations.
Heel Straight

Prevents your foot from rolling in or out.
• Longer length controls the hindfoot and forefoot from inversion or eversion.

Lacing Techniques

• Cross Lacing
• Bar Lacing
• Lock Lacing
• High Instep
• Narrow Feet
• Wide Feet

Other Required Adjustments

• Heel fit and slippage
• Vamp tightness
• Forefoot problems
• Specific painful areas
• Malleoli topline irritation