

20th UITIC
INTERNATIONAL TECHNICAL
FOOTWEAR CONGRESS

Porto
2018
16th–18th
MAY

FROM FASHION TO FACTORY

A New Technological Age



Personalized Digital Last (a women's example) A Tool for Mass Customization

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Customers' Experience



- **Stylish** footwear - that fit and serve intended function
- Current Shopping Experience is equivalent to a “Wild Goose Chase”
- Customers will either over-consume (due to fast fashion) or not-able-to-consume (no sizes that fit)

In 1902, Gooding was recorded as saying

“Every woman has not a size 4B (UK) fitting foot, yet every woman is entitled to the same shoe appearance regardless of the size of her feet.”

- **The goal has not changed in 116 years, are we finally there?**

Customer's Confusion

- Customer Return Rate increased due to online sales as people cannot determine their sizes
- Brands have their own definition of size (example, US size 8)



Future of Digitalization



- IEEE 3D Body Processing (3DBP) Industry Connections group is a cross-industry effort to collaborate on exploring standardization of interactions across 3DBP technologies such as 3D body models and associated data.
- Standardization will improve interoperability, which will ease the development of innovative solutions using body models and accelerate the scalability of 3D body-model based solutions and applications including personalized digital fit.
- Understanding digital fit will become an attribute important to customers and will enhance a brand's image
- Footwear Technicians:
 - may want to proactively think about personalized digital fit and the impact to their roles and to the brands.

Fit Understanding Tools



- Tools will involve improvements to data processing and digitizing personalized last production.
- Using Virtual Fitting Algorithms (VFA) or Artificial Intelligence (AI) to understand customer data and their definition of it to interface with last software. Examples are listed in the paper.
- Scans before sales would help to understand customers' foot measurements and foot shape. Customer-related data can be obtained via smart phone apps, biometric scanners, or legacy and expensive scanners, which are subsequently applied to avatars, foot scans, or manually acquired data.
- Examples of smart apps, various foot scanners, and comparison apps between customers' feet and footwear are listed in the paper.

Fit Understanding

- Lasts should be designed for the heel-to-ball length and toe box shape
- Other characteristics are pertaining to: flat feet (lower longitudinal arch), slender feet (small volume or narrow widths), robust feet (large volume, wide and high), short feet (short hindfoot and long forefoot) and long feet (long hindfoot and short forefoot)
- The “bony,” “fleshy,” or “tenderness” of the customer’s foot is a factor to be considered. The “boniness” or slenderness of the foot can dictate the amount of “twist” on the insole shape

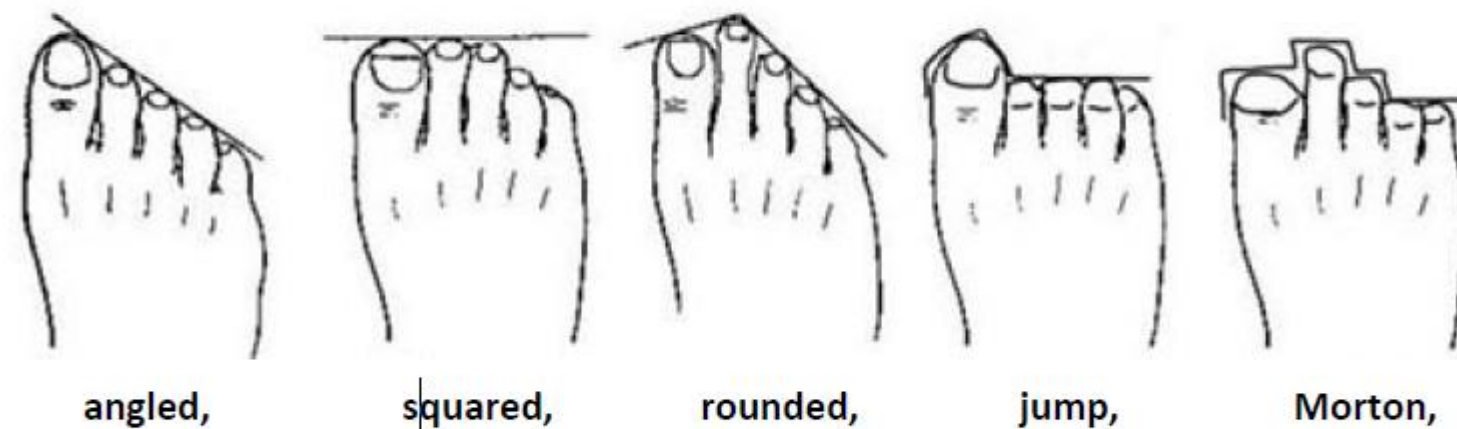



Figure 2 Common toe shapes⁴

Fit Understanding

- 
- Different foot shapes should be incorporated into the latest design “looks”
 - Longer sizes may not have the ball girth required for customer fit and shoe shape may not be correct for customers with wider feet
 - Range of measurements noted: seven statistics that are important to fitting or last designing may require as many as 35 measurements.

The best “last” is the one with a shape that reasonably matches the customer’s foot

Customer Fit Solutions



- Sizing –
Standard lasts – “Sell what you’ve created”
- Best Fit –
Virtual Fitting Algorithms (VFA) or Artificial Intelligence (AI) is used to pick among standard lasts , “Design what can be sold”
- Temporarily Modified Last –
VFA or AI to note the slight modifications to standard lasts to work for the customer.
Lasts and patterns are modified before footwear fabrication, “Design what can be sold”
- Bespoke/ Orthopedic –
Truly custom last, high end or orthopedic, “Design what can be sold”

Sizing



- Various Sizing Systems:

U.S. and Canada, Europe, UK and South Africa, Japan, China, Korea, Mondopoint, Australia, Mexico, Brazil, and Russia

- In addition, every brand/style is different for lengths and widths

- Customers have to search every time to buy footwear to find the footwear that fits

- Brands are training customers what to buy and what not to buy

- Footwear Technicians' job:

Tech pack responsibility

Quality of manufacture from factories

Footwear fits, foot form or fit tester

Fit Recommendations and Availability



- Fit Recommendations (from Runner's World)

Heel should be snug, but not tight

Shoe upper should feel snug and secure around the instep

Foot should be able to move side-to-side, pinch 6mm at widest part of foot

Thumb width of space between the longest toe and end of shoe

Shoe should bend and crease along the same line the foot flexes

Pinpoint shoes that match foot contours and movements

- SATRA

Standard Medium Sizes over usual lengths: only fit 24.5% of customers,

If have inventory of widths over narrower number of lengths, then 47% of customers can be fitted

- Availability of Styles (Three US websites)

Medium – 88% to 98% of offerings

Wide Widths - 6% to 13% of offerings, Narrow Widths – only one has 4% of offerings

Best Fit



- Last comparison software, such as ELSE Corp, described by VFA or AI for best fit and best style matching - Digital file of customer's foot is compared to digital file of lasts
- Brands can provide multiple lasts for the same style
- Customer personal preferences, such as sensitivity of feet, compression differences (bony versus fleshy) will need to be understood
- Footwear Technicians' job:
 - Tech pack responsibility
 - Quality of manufacture
 - Footwear from factory, fits foot form or fit tester
 - Maintains a library of lasts per style
 - Quality of manufacture for various lasts
 - Provide recommendations to AI software for fit – information that scans cannot provide such as usage of footwear, flex location and material used

Temporarily Modified Lasts

- By using the Last comparison software and after comparison, Lasts are modified for the customer in the Made to Measure (MTM) zones - localized zones that don't fit;
For example - bunions, v – shape versus u- shape feet
 - Temporarily Modified Lasts are for limited usage that survive the rigors of production
 - Customer personal preferences, such as sensitivity of feet, compression differences (bony versus fleshy) will need to be understood
 - Footwear Technicians' job:
 - Tech pack responsibility
 - Footwear from factory, fits foot form or fit tester
 - Quality of manufacture for various lasts
 - Provide recommendations to AI software for fit – information that scans cannot provide such as usage of footwear, flex location and material used
 - Make sure footwear factory can handle temporarily modified lasts in production and quality is maintained
- Quality of manufacture
Maintains a library of lasts per style

Bespoke



- This segment may not change for the very high end or orthopedic footwear
- Lasts are modified / fabricated for the customer
- Digital file of customer foot scans, may provide the starting point for digital last
- Customer personal preferences, such as sensitivity of feet, compression differences (bony versus fleshy) will need to be understood
- Share digital file of last for stylish shoes – expand styles available to customer
- Currently for orthopedic footwear, the styles are very limited
- Footwear Technicians' job:
 - Tech pack responsibility
 - Quality of manufacture
 - Provide recommendations to AI software for fit – information that scans cannot provide such as usage of footwear, flex location and material used
 - Make sure footwear factory can handle bespoke lasts in production and quality is maintained (if applicable)

Training Modules Additions for Footwear Technicians



- **SATRA Accredited Footwear Technologist**

- Fitting and Comfort – Expand fit to include Personalized Lasts

- Testing – Factory able to hand Personalized Lasts

- Lean Manufacturing – From Batch Fabrication to Individual Fabrication

- **German College for Footwear Design and Technology**

- Work Methodology – Add in Best Fit and Temporarily Modified Lasts

- Project planning with CAD systems – Utilize for fit determination

- Operation Sequences – Include Pattern modification

Summary



- Digital Fit will enhance a brand's image
- Footwear Technicians' role will expand with mass customization as the model of "sell what you've created," based on standard sizes (and standard styles) pivots to "design what can be sold"
- Footwear Technicians' role will
 - Be the owner of the customer important attribute of digital fit for the brand
 - Maintain libraries of different lasts, and
 - Maintain quality safeguards for mass customized footwear

Thank you,
Questions?

