

Technology and Custom-made Foot Orthoses

“For a successful technology, reality must take precedence over public relations, for Nature cannot be fooled. “

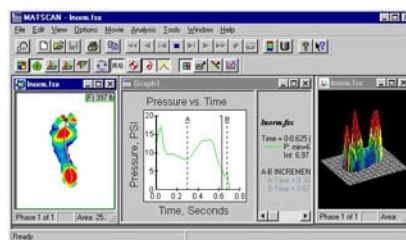
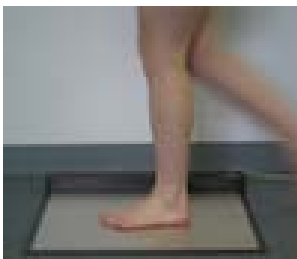
-Richard P. Feynman

No technology is actually “bad technology”. There are, however, companies which use creative marketing to overstate a technology’s capabilities regarding foot orthotic fabrication. Plantar pressure and photo data are examples of those technologies.

Tekscan (www.tekscan.com) and EMED (www.novel.de) are the two companies that manufacture the most popular pressure analysis systems for the purposes of research, plantar pressure screening and pressure distribution evaluation. Accordingly these are the two most researched systems available. Despite dozens (possibly hundreds) of independent accuracy and reliability studies, outcomes have been somewhat variable. (Ahroni, 1998, Kernozek, 1996, Hsiao, 2002, Quesada, 1997, Hurkmans, 2006, Mueller, 1996)

To date, pressure data is not used with complete confidence in a research environment. Clinically, pressure mapping may have utility in conjunction with a proper physical assessment in the “at risk” populations - diabetes and rheumatoid arthritis (Randolph, 2000). Where multiple steps, in a controlled environment, are used for research, most clinical settings do not capture data as rigorously. In addition, system calibration by comparison with a standard is rarely undertaken other than in a research setting due to time and cost considerations. (Barnett, 2001)

Regardless of the system being used, data from pressure analysis is 2-dimensional and cannot provide exact information in the third dimension in order to fabricate a truly custom-made foot orthosis. Unfortunately this is not how pressure data is being marketed and used by some orthotic companies.



Pressure plate and resulting pressure data.

True custom-made foot orthoses are fabricated from a volumetric (3-dimensional) model of the patient’s foot that duplicates the unique plantar anatomy over which raw materials are vacu-formed to create the orthosis. Casting methods for obtaining an anatomical model include direct plaster or foam impressions, 3-D

laser scanners and stereophotogrammetry (digital images taken from multiple angles).

“Customized” foot orthoses use an “extrapolated” model of the patient’s foot in the manufacturing process. Examples of these techniques are pressure plate mats and photographs or ink imprints which use pressure and light data to select an approximate foot model. Laboratories using these technologies often rely on a library of pre-manufactured shells, molds and/or digitally stored foot shapes to create the customized orthoses.



Photo scanner and light data.

Custom-made is not the same as customized. Unfortunately, many clinicians rely exclusively on a pressure plate and photo scanner systems to “diagnose” for them. In reality, the only “diagnosis” resulting from having a patient walk across a pressure plate or stand on a photo scanner is which pre-manufactured orthotic model the computer should select for their patient.

The technology itself is not “bad”. It is however not the most anatomically accurate and it is incapable of providing the patient with a true custom-made orthosis.

Sole Supports makes only true custom-made orthoses. We also take custom-made one step further by being the only manufacturer of foot orthoses with a proprietary calibration system. Each orthotic controls the passage of weight through the foot based on body mass, medial arch characteristics and forefoot-to-rearfoot flexibility indices. Because there are an infinite number of combinations, it is impossible to use an extrapolated modeling system. Each orthosis must be uniquely fabricated for each foot because left and right feet can differ within the same person.

In review:

1. Pressure data can assist in formulating a diagnosis and a treatment plan for “at risk” patients but it alone will not result in a custom-made orthosis.
2. Not all orthotic laboratories provide true custom-made orthoses. Through creative marketing, it can be hard to discriminate facts from semantics.
3. There is no secret process to fabricating an orthotic. If your laboratory can’t (or won’t) allow you to review their manufacturing procedure, this is a cause for concern.
4. Most insurance policies state that foot orthoses must be custom-made. The current working definition of custom-made requires a 3-dimensional cast of the foot and the use of raw materials formed over the cast.
5. Practitioners have a fiduciary responsibility to their patients to ensure that they are getting what they paid for. If you provide an invoice to the Insurer stating that the orthoses are custom-made, you must ensure that they are custom-made according to the industry definition.
6. Practice what you know, and know what you practice.

Your research staff at Sole Supports,

Leslie Trotter, **DC**, CPed(C), MBA

Stuart Currie, D.C

“Guaranteed to be as unique as each foot.”

References:

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