

# To Scan or Not to Scan?

This DPM was skeptical about digital foot scanners until she actually began to use one.

BY DIANNE MITCHELL, DPM

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**Author's Note:** Dr Mitchell wishes to clarify that she is not specifically endorsing the Sharp Shape scanner in this article. This scanner is the one she used for her evaluation but she states that her primary goal here is to delineate the similarities and differences between digital scanning and traditional plaster casting.

I have long been a skeptic regarding functional foot orthotic scanners. I did not think a scanner could capture a good foot image, nor did I believe an acceptable orthotic device could be constructed from a scan. Unlike many of my colleagues, I enjoy casting the foot in plaster. I am proficient

and like having a mold to discuss with patients.

Investigating scanners started as more of a curiosity than a need. Several months ago, I started evaluating the Sharp Shape Laser scanner. My first official hands-on experience was

mold for bisection purposes and fore-foot-to-rearfoot relationship, a straight lateral border, and the first metatarsal plantarflexed. To maintain these evidence-based standards, you want to make sure that you could accurately replicate this with your scans.

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on a non-patient day. I discovered very quickly that there is a learning curve to scanners if you want to maintain the quality of your cast and the integrity of your orthotics.

**Lesson #1:** A laser scanner does not make you a better orthotic negative cast maker. A scanner will not make up for weaknesses in casting technique. In fact, it may even emphasize any bad habits you have developed. You must identify the poor scans and discard them.

**Lesson #2:** Just because you make nice plaster casts does not mean you will immediately scan beautiful images with the scanner. I know what I want in a plaster mold. I want the subtalar joint in neutral, a good heel

**Lesson #3:** You must know how to discern a good plaster mold from a poor one before attempting to use a scanner. Then, you must be able to look at the computer screen and know if your scanned image is good or poor. For me, I could quickly see that despite holding the foot in subtalar joint neutral and plantarflexing the first metatarsal to its end range of motion, my scans did not match what I was looking at clinically. It became an issue of holding the foot the appropriate distance from the scanning screen and angling the unit parallel to the foot. It seems easy enough, but you must be aware and suspicious about why your images

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look good or bad and make corrections before sending the image to the lab for an orthotic device to be constructed.

Once I became more proficient, I decided to scan six patients in the office and take my measurements and order functional foot orthotics. The plan was to evaluate the completed orthotic versus the patient's foot clinically,

and ensure I was obtaining an appropriate orthotic device. I was really happy with the outcome, as the devices all contoured patients' feet well and offered appropriate pain relief as planned. Again, there was a learning curve in the office.

**Lesson #4:** Scanners require you and the patient to be still; otherwise your image will show motion that you need to recognize and throw out and re-scan. I simply explained what I was doing with each patient and rescanned if I needed to. It is very important to capture the foot non-weightbearing with the subtalar joint in neutral and the first metatarsal plantarflexed. Also, the posterior heel must be completely scanned for bisection purposes in order to balance the forefoot to the rearfoot and capture the full three dimensional contour of the plantar surface of the foot. Scanners can also be sensitive to the amount of light in the room and skew the image; this needs to be identified and corrected.

**Why non-weightbearing?** Literature has shown that partial weight-bearing molds, foam box impressions for example, allow first metatarsal dorsiflexion and therefore have a poor forefoot-to-rearfoot relationship due to an artificial forefoot varus.<sup>1,2</sup>

**Why plantarflex the first metatarsal?** The more the first metatarsal is dorsiflexed, the less motion is available at the metatarsal phalangeal joint in gait. Again, literature has shown that by plantarflexing the first metatarsal,

the available first MPJ range of motion increases.<sup>3</sup> This results in less functional hallux limitus, for example. By casting NWB this allows you to plantarflex the first metatarsal to its end range of motion.

**Why capture the posterior heel?**

The calcaneal bisection is needed in order to balance the forefoot to the rearfoot for the best custom function-

al device to be constructed. So, by holding the subtalar joint neutral, maximally pronating the midtarsal joint, and plantarflexing the first metatarsal combined with capturing the posterior heel in the scan, you can best bisect the heel.

**Why a full, or true, 3-D foot image?** The better the contour of the device to the foot, the better is the redistribution of plantar pressures for pain reduction and mechanical support. For example, in a pes cavus patient with forefoot pain, you want your completed functional foot orthotic to contour the patient's foot like a glove. This will allow pressure redis-

tribution from the forefoot and heel into the arch. Also, tension through the plantar fascia is reduced with better contact of the orthotic to the arch. The literature has found that the most effective way to decrease plantar fascial strain is by eversion of the forefoot.<sup>4</sup> This is easily done by plantarflexing the first metatarsal.

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able? And, what should you additionally be looking for in a scanner? First, it is important to determine what type of scanner you are looking for. Some units are comprised of pressure plates and mats which are weight-bearing, and others which are non-weightbearing devices. It is important to contact the vendors of the various units and schedule on-site visits. This will allow hands-on learning about the various units and time to ask questions to learn as much as you

can. So, you ask, what scanners, or digitizers, are out there and avail-

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can about what each unit has to offer. This, in turn, allows you to make an informed decision as to the technology that works best for

my patients. I want great scans to make great orthotics with and, if that meant staying with plaster, then I would do so. I want great orthotic re-

sion of the foot. *J Am Podiatric Med Assoc.* 92(5):261-8, 2002.

<sup>3</sup> Roukis TS. Position of the first ray and motion of the first metatarsophalangeal joint. *J Am Podiatric Med Assoc.* 86(11):538-546, 1996.

<sup>4</sup> Kogler GF. The influence of medial and lateral placement of orthotic wedges on loading of the plantar aponeurosis. *J Bone Joint Surg Am.* 81(10):1403-13, 1999.

<sup>5</sup> Huppin LZ, Scherer PR. Evidence Based Medicine: Foot Imaging for Custom Functional Foot Orthotics <<http://www.lowerextremityreview.com/article/technology-choosing-a-digital-foot-scanner>>

**I am enjoying the scanner and  
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you and your office.

Other things to look for in a scanner include ergonomics for you, the practitioner, in collecting the scanned image, the speed of the scan, the charge per image sent in for orthotic construction, the support and software usability, and how many labs are using the device.

In conclusion, for me, it was never about technology making me look better or more “cutting edge” to

sults for patients to best treat them.

So far, I am enjoying the scanner and am very much satisfied with the results I am seeing. I look forward to more use. **PM**

**References:**

<sup>1</sup> McPoil TG et al. Comparison of three methods used to obtain a neutral plaster foot impression. *Phys Ther.* 69(6):448-52, 1989.

<sup>2</sup> Laughton C. A Comparison of four methods of obtaining a negative impres-



**Dianne Mitchell,** DPM is a Fellow of the American Academy of Podiatric Sports Medicine (AAPSM) and the American College of Foot and Ankle Orthopedics and Medicine (ACFOAM). She practices in Sacramento, California with the Medical Group, Inc.