

Pursuing Professional Excellence in Orthotic Automation

By Alex Shang, PhD, Director of Sharp Shape

Sharp Shape™ has been pursuing excellence in orthotic automation since 1993. By conservative estimate, tens of millions of orthotics have been produced from our Automated Orthotic Manufacturing Systems (AOMS®) installed worldwide. Despite our limited resources, our business with the AOMS has outlasted many tech companies and their products in the orthotic automation field.

One key to our success has been our commitment to make all critical components in-house, while not reinventing the wheel in making off-the-shelf products. This allows us to control quality, cost, and availability, and we pass the benefits on to our customers.

Behind our success, our history also shows big challenges coming from many directions. The CAD/CAM software and 3D laser scanners require multiple disciplines in mathematics, computer programming, optics, electronics, mechanics, and some knowledge of podiatry. As a small company competing with several larger companies, Sharp Shape has had to make the right moves in every critical turning point.

Challenges in Design: Functionality and Cost

Our first challenge was to decide what type of scanners to design. We decided to make a 3D scanner with lasers and a CCD camera. There are some choices as indicated in Figure 1 below. Method A utilizes a laser dot; Method B utilizes a laser stripe; and Method C utilizes laser zebra-stripes. Each method has its own pros and cons. Method A has the advantage of being most accurate, but the disadvantage is that it is too slow. Method C is hard to implement. We chose Method B for its practical

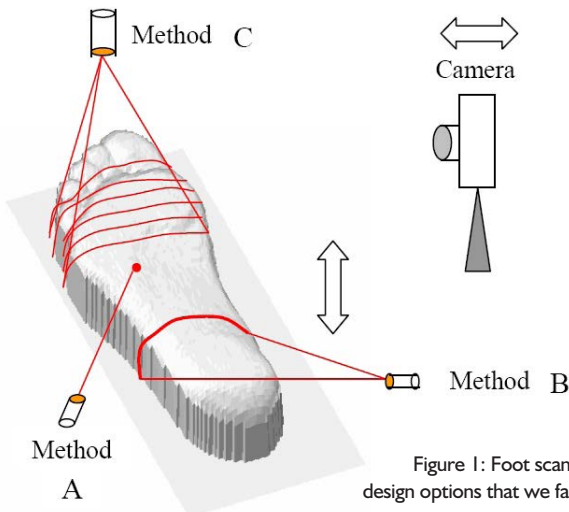


Figure 1: Foot scanner design options that we faced

With our software design, traditional podiatric treatments on plaster—such as plaster expansions in medial/lateral/heel, intrinsic posting, heel skive, and inverted cast—can be applied easily to the cast corrections.

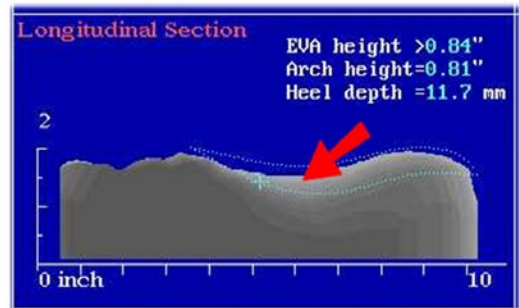
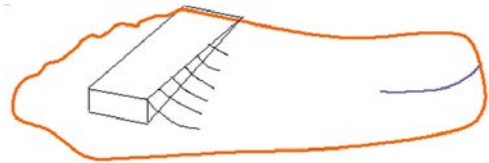


Figure 2: Comparison of traditional plaster blending and software blending

implementation in scanning feet. Besides that, in order to widen the angles for imaging the feet, we chose to use a dual-view design. We used dual lasers and we could either choose a dual camera or single camera with split view through mirrors. We chose the single-camera design for its lower cost, passing the savings on to our customers.

The second challenge was to design the CAD/CAM software adequately for the foot. As a proud Professional Partner of PFOA (www.pfola.org), we tried hard to follow its standards closely. Several podiatrists helped us design a software package that is simple and intuitive. Lab technicians are able to understand and use the software without second guessing the results. With our software design, traditional podiatric treatments on plaster—such as plaster expansions in medial/lateral/heel, intrinsic posting, heel skive, and inverted cast—can be applied easily to the cast corrections. A sample view of our software and the comparison with the traditional cast correction is shown in Figure 2 above.

Orthotic Automation *(continued)*

Not many software packages can do what we do. Several customers have tried different software packages and found that Sharp Shape's AOMS software is the most suitable one for their needs. After 15 years, many customers are still using AOMS.

The third challenge was to decide what to do with the CNC machines that are used in the systems. We dismissed the idea of creating a CNC machine by ourselves since we had to concentrate our strength in scanners and



Figure 3: During a recent AOMS system setup

CAD/CAM software. We use off-the-shelf CNC machines and provide a wide-range of interface to all kinds of CNC machines. I have personally set my feet in more than 80 orthotic labs to integrate the systems and provide training. Figure 3 illustrates one of the many setups. Integrating the

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CNC machine is a tough job. The work has to be done in a fixed time period, and there are many unknowns with the CNC machine, tooling, and the manufacturer's software. Sharp Shape's setup experience tells us what the most common lab needs are. Through communication with a customer, we can soon understand exactly what the customer needs. We are not just vendors to our customers; to many of our customers, we have become friends.

Wide Range of Products and Choices

Our systems are capable of carving wood molds, EVA insoles and polypropylene orthotic shells (see Figure 4). With these choices, customers can choose the device they want to carve, based on their preferences in materials,



Figure 4: Samples of the carved mold, orthotic, and insoles

labor cost, and their patients' preferences.

To satisfy the needs of podiatrists, pedorthists, orthotists, and shoe makers, we added USB foot scanners to our product line (see Figure 5). Multiple colors are now offered. These scanners can be integrated seamlessly with our AOMS.



Figure 5: Foot scanners with different colors

The Orthotic Market Place

To make it easy for customers to order orthotics, we created a page called "the orthotic marketplace" on our website (www.sharpshape.com) to let doctors pick a lab. To make it easy for customers to use our scanners, we recently created a computer app that can make the ordering, scanning, and sending very easy. Because of the popularity of the Sharp Shape AOMS, it is not difficult to find a lab that currently uses the AOMS.

Priorities: Customer and Patient Satisfaction

Sharp Shape is a privately owned small business. We do not have stock options. We survive only after we have satisfied our customers, so we work harder. Based in Silicon Valley, we stay on the forefront of new technology and continuously pursue excellence in what we do. What makes us feel good is the fact that AOMS helps orthotic labs and podiatrists who, in turn, can help millions of patients.

For more information on Sharp Shape and AOMS, please visit www.sharpshape.com, call 408-871-1798 or [click here](#).