

## Using the Cast Scanner to Scan Foam Impressions

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Our cast scanner can scan plaster casts (slipper casts) and foam impressions. Because of the differences between these devices, the scan techniques are somewhat different. This document concentrates on the techniques for scanning the foam impressions. Foam trays come with different thickness and colors. Figure 1 illustrates some foam trays. Dark blue and pink colors are common. 2-inch and 1.5-inch foams are popular.



Figure 1

Foam impressions are created differently depending on the person who steps into the foam. Some of them are too shallow (the one on the right), some of them are not properly oriented (the one in the middle), and some of them are made with toe-heel / lateral-medial tilted (the one on the right). ‘Tilt’ means unevenness (from toes to heel and/or from lateral to medial). A good foot impression for the purpose of being scanned is the one pressed deeply, evenly balanced and properly oriented (the one on the left).

If you are able to control the pressing process, please pay attention to the following points.

1. Depth: The impression should be pressed deeply into the foam.
2. Location: The impression should be in the center of the foam.
3. Orientation: The impression should line up with the long axis of the foam.
4. Tilt: The impression should be evenly pressed (toes to heel, lateral to medial).

In order to get higher quality scans, this document explains how to properly treat the foam boxes during scan. If the foam is pink or any light color, no coloring is needed for scan. If the color is dark, white powder needs to be added as shown later in the document.

A good foam impression (as shown in Figure 2) can be scanned 'as is' (just slide the foam in and make a scan). Because of the irregularities, preparation is needed for most of the foam impressions. Preparation includes checking the orientation/location and make necessary cuts. Unfortunately, we can't do much on the depth and tilt. What happens if we don't make such preparations? If we scan the foam shown in Figure 3 'as is' (scan is shown in Figure 4), we will get an image as shown in Figure 5. The problem with this image is that it will cause difficulties in the cast correction program and hence lower the quality of the orthotic. Problems happen with wrong depth and tilt too.



Figure 2



Figure 3



Figure 4

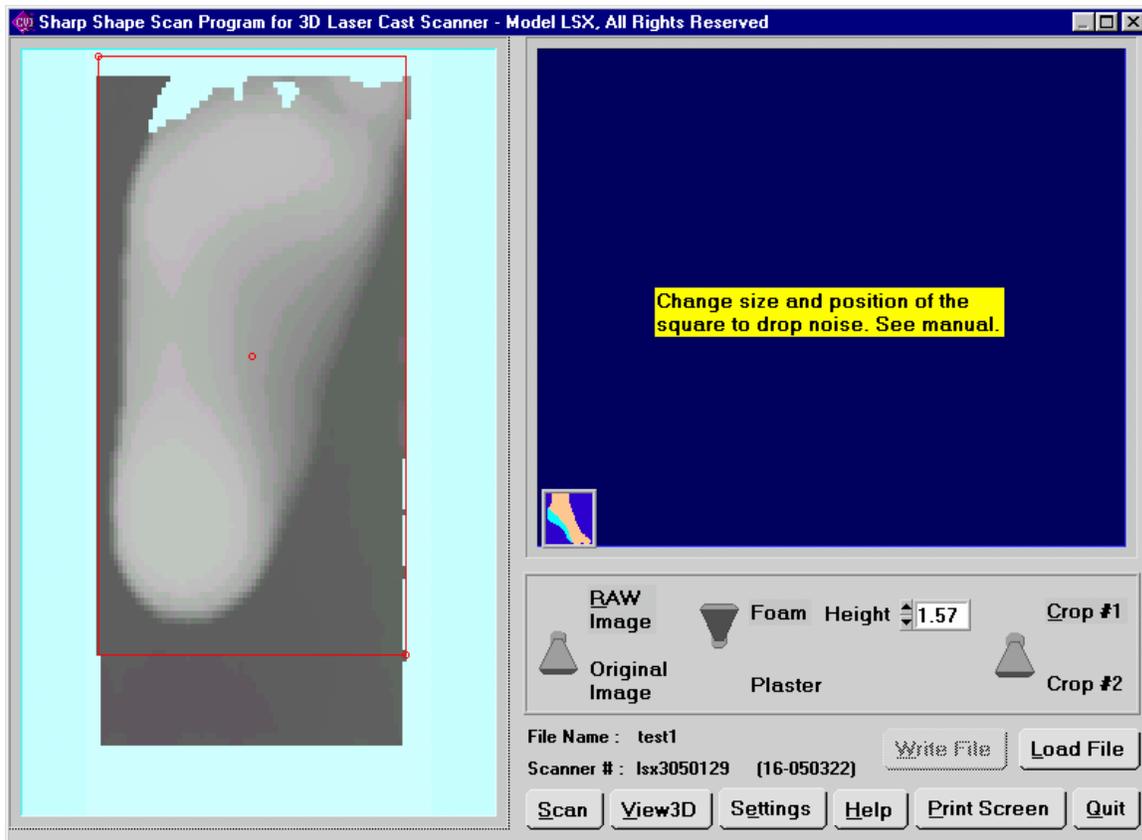


Figure 5

Foam impressions need to be examined and prepared before they are scanned. First, the heel of the foot should be very close to the bottom edge of the foam. When the foam is placed on the scanner cart, this edge should be very close to the back fence. The scan starts from there. The reason we can't press the impression too close to the bottom edge is that foam tends to crack. If the heel is not close to the edge, cut the foam behind the heel with a butter knife and leave about 10mm. Second, if the foot impression is not properly oriented, cut the sides (later and medial). Figure 6 shows the original foam impression and Figure 7 shows the foam that has been cut. Doing so allows the foam be scanned with long axis lineup with the cart. You may also want to press the area in front of the toes so there is a gradual slope to allow the laser and camera to work inside. So the toes can be scanned and viewed in the scanned image. It helps to determine the locations of the met heads. The scan of the prepared foam impression is shown in Figure 9.



Figure 6



Figure 7



Figure 8

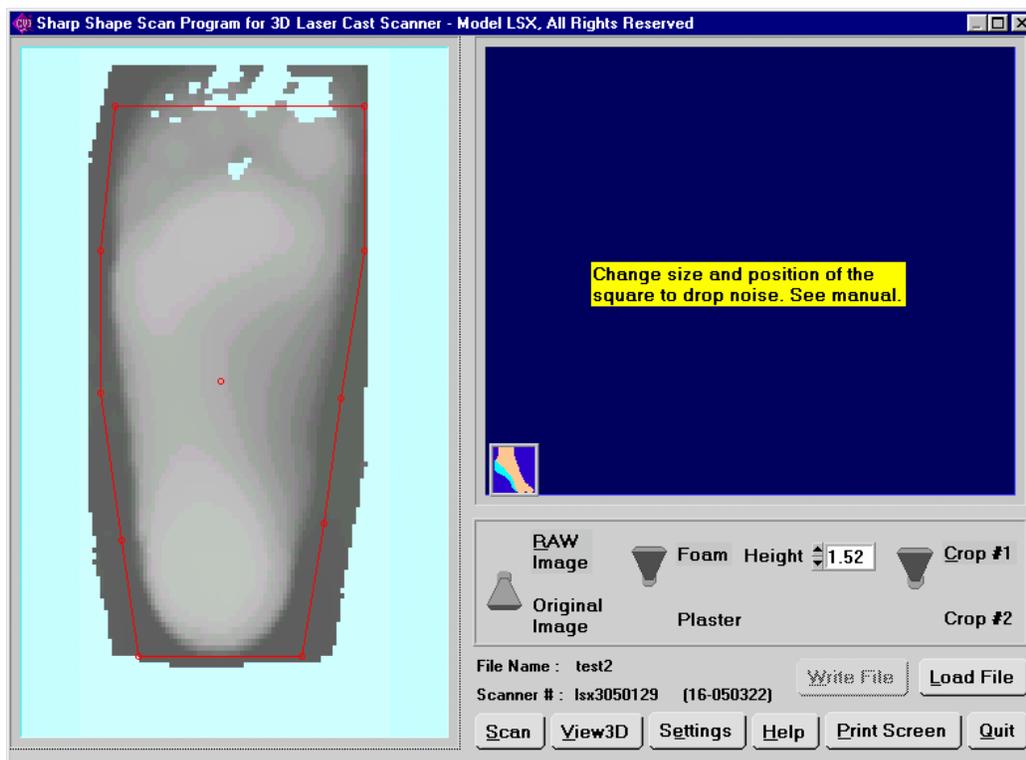


Figure 9

In comparison with scanning plaster casts and foam impressions, the images of the foam impression usually have a dark shadow surround the foot as shown in Figure 9. This dark area is not considered as ‘noise’ because it is the real data coming from the top surface of the foam. This dark area should be eliminated for cast correction purpose. It is not very harmful to leave this dark area in the image. However, to eliminate this dark area will help the correction technician to do better work and you will get better orthotics. So try to eliminate the dark area. What happens if we keep this dark area? The result is shown in Figure 10 below. It is somewhat different than the image from a plaster.

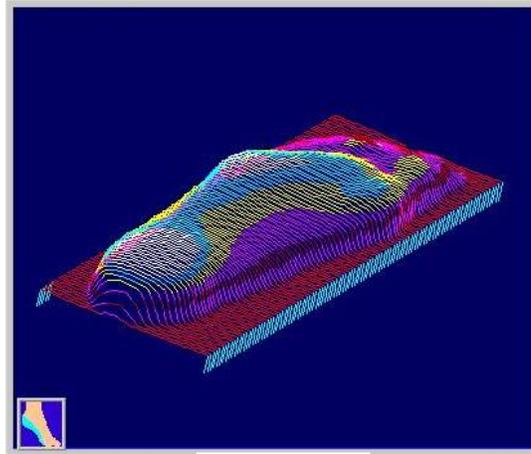


Figure 10

To eliminate the dark area with the new scan software is easier than with the old software. Refer to Figure 9, you need to choose ‘Foam’ instead of ‘Plaster’. It is controlled by the toggle switch. Then you will need to set the height of the foam properly. This step needs a few experiments. You can start with the same value as the foam tray thickness. The key is to set the height a little bit lower than the height of the dark area. In Figure 9, we used 1.52-inch valve value to process a 1.5-inch foam and the result is shown in Figure 11. Note that you need to click the RAW toggle switch to get this page.

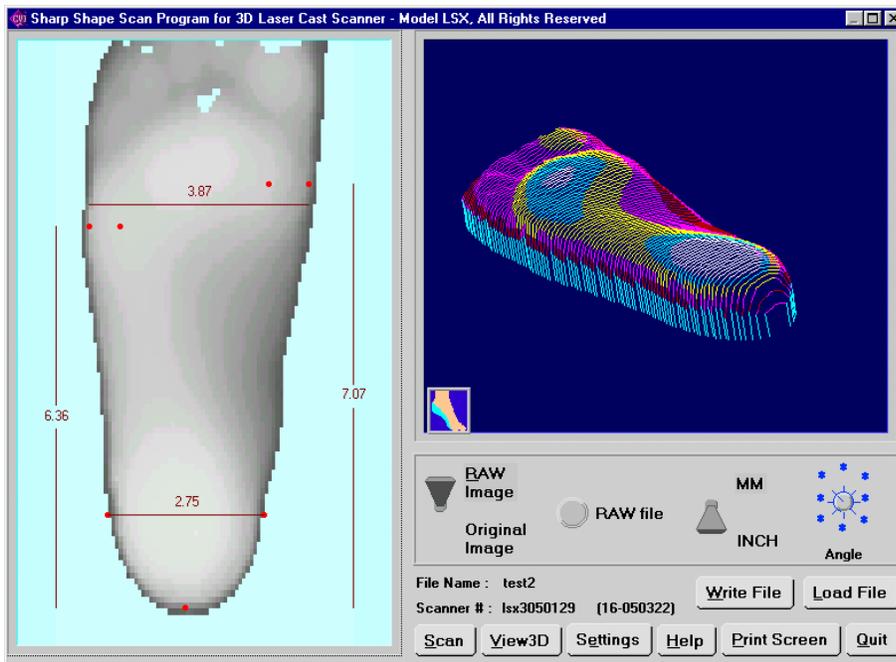


Figure 11

What happens if we leave the 'Height' value a little high, say 1.64 as shown in Figure 12? The result is shown in Figure 13. Some dark area begins to show up on the lateral and medial sides. What happens if we leave the 'Height' value a little low, say 1.4? You will lose some useful data on the foot itself. That is why we need a few tests to find the best value. This method has to be used with the cropping methods explained later.

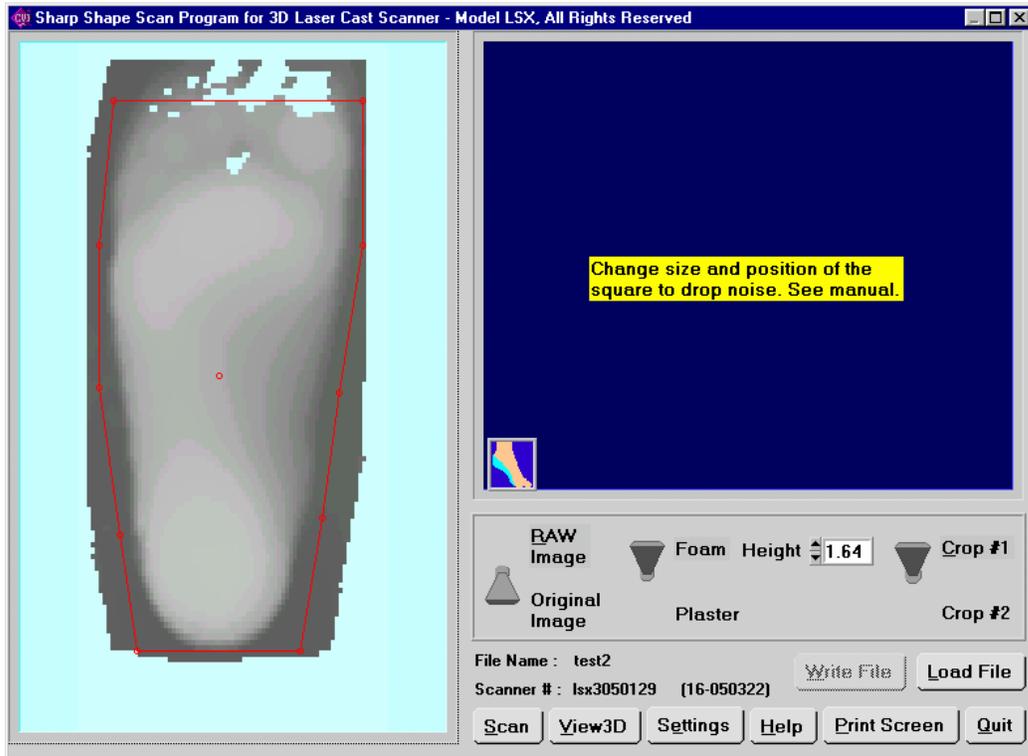


Figure 12

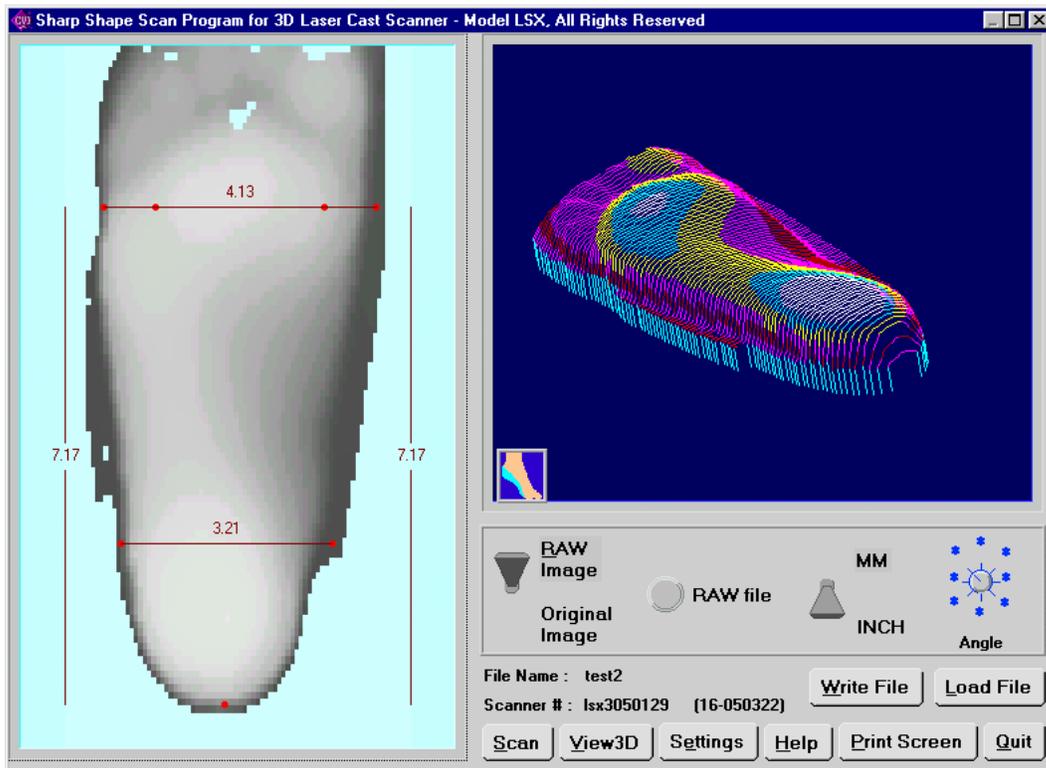


Figure 13

If you need to scan a dark foam impression, you will need to add some light powder as shown in Figure 14. Baby powder or regular plaster powder work fine. You need to put some powder inside the impression and shake the foam. After the powder is evenly spread, it is okay to make a scan. The scanned image is shown in Figure 15. Note that this foam tray is about 2-inch high. In this case, we used 1.8-inch to get rid of the dark area as shown in Figure 15. The result is shown in Figure 16.



Figure 14

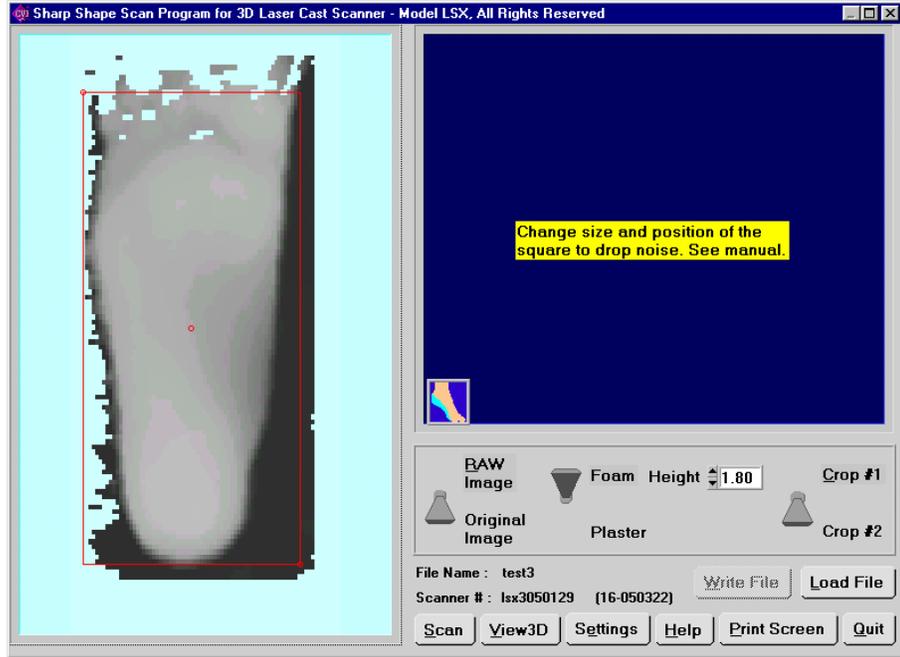


Figure 15

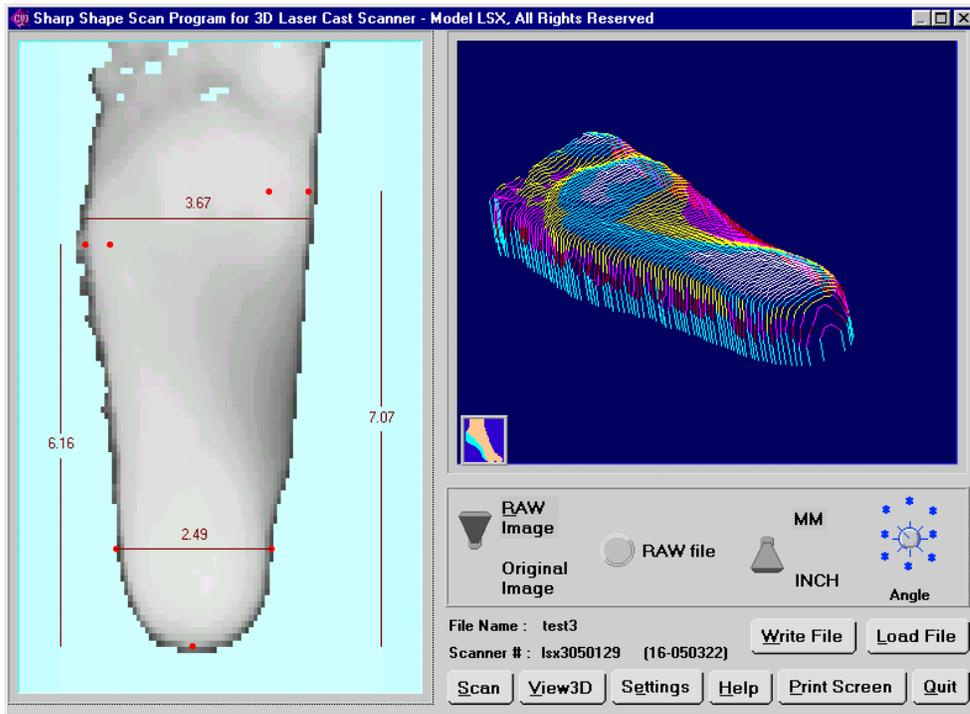


Figure 16

To illustrate how to get rid of noise with the cropping methods provided in the scan program, we scanned a plaster cast with some dirt on the cart as shown in Figure 17. The reason that we don't use foam as example is that such noise doesn't happen often on the foam images. The scan is shown in Figure 18. Note that there are two small spots (so called 'noise') near the forefoot. In the case of plaster, we click on the toggle switch so it points to 'Plaster'. If we use cropping method #2 as shown in Figure 18, we will see a red rectangular with three adjustable dots (upper-left, lower right, and middle) surround the foot. Move the three dots to control the square. Method #2 can not totally get rid of the noise (in some cases it can) and the result is shown in Figure 19. Sometimes, these cropping methods are also used to get rid of the dark area on foam, for example, if the top surface is not even (dent or slope) and the valve value can't do the job.



Figure 17

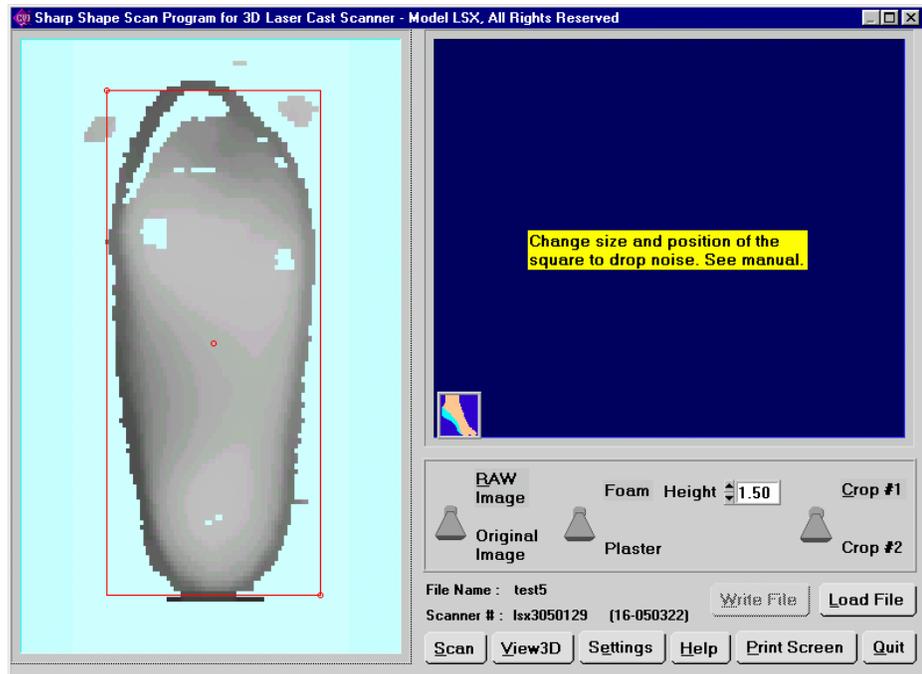


Figure 18

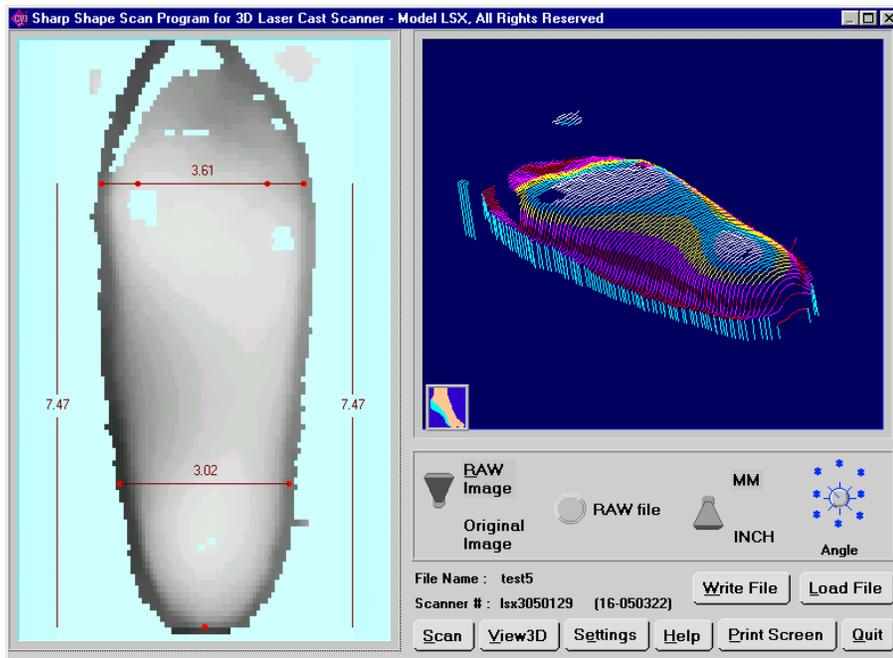


Figure 19

Notice from Figure 19 that there are some noises (artifacts) that can not be eliminated by cropping method #2. To treat this case, we will need to get into some details. Toggle the switch so it points to 'Crop #1'. There will be more controllable dots on the red squares. The idea is to keep the foot inside the red lines and leave the artifacts outside as shown in Figure 20. After toggling the RAW switch, you will see the result as shown in Figure 21. Comparing with Figure 19 and 21, the image is much cleaner on Figure 21.

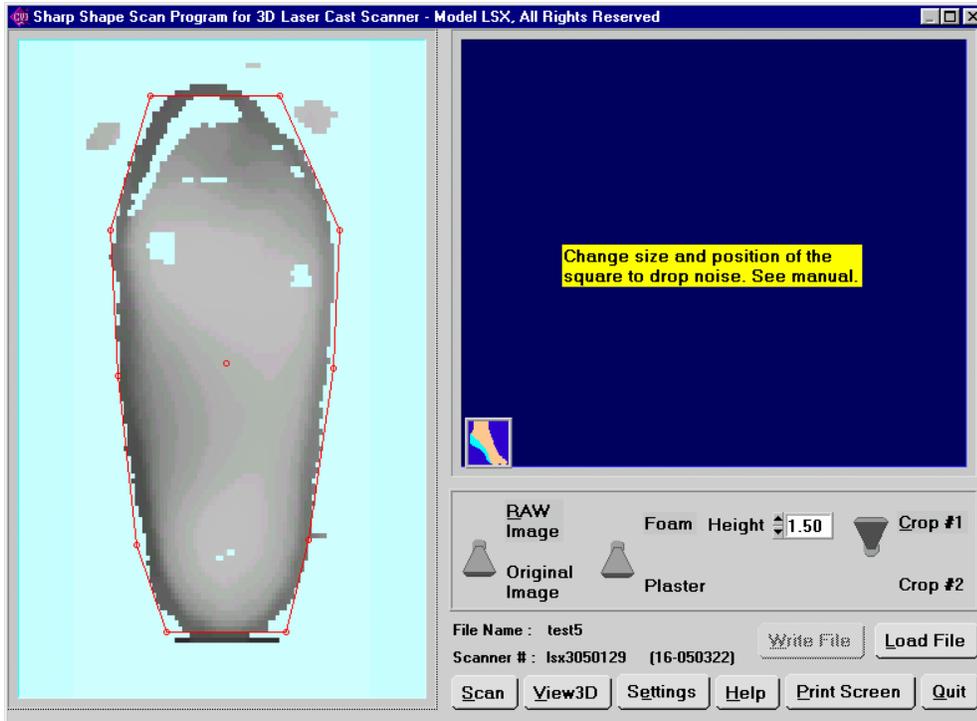


Figure 20

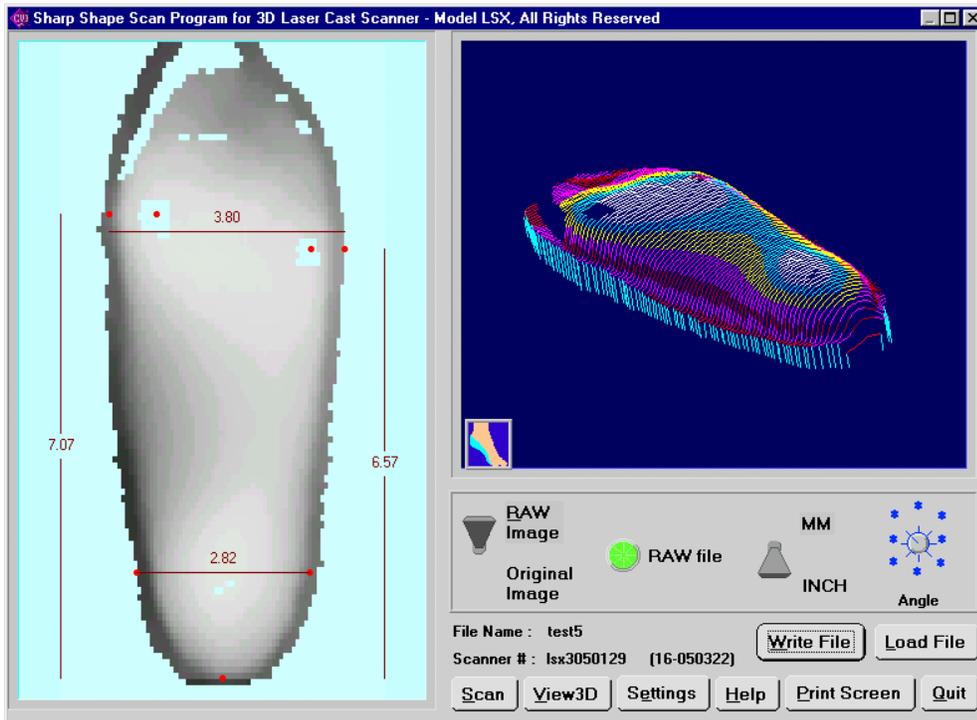


Figure 21

There are a few reminders in the following. If you scan foam, please take the black rubber foam pad out of the cart. If you scan plaster casts, please put the back rubber foam pad in the cart as shown in Figure 22. These steps are adopted to provide better scans and easier maintenance of the scanner.



Figure 22

You can view the 3D foot in the program. The screen shot is shown in Figure 23. You can do something about it (to view the image). Press 'H' for help.

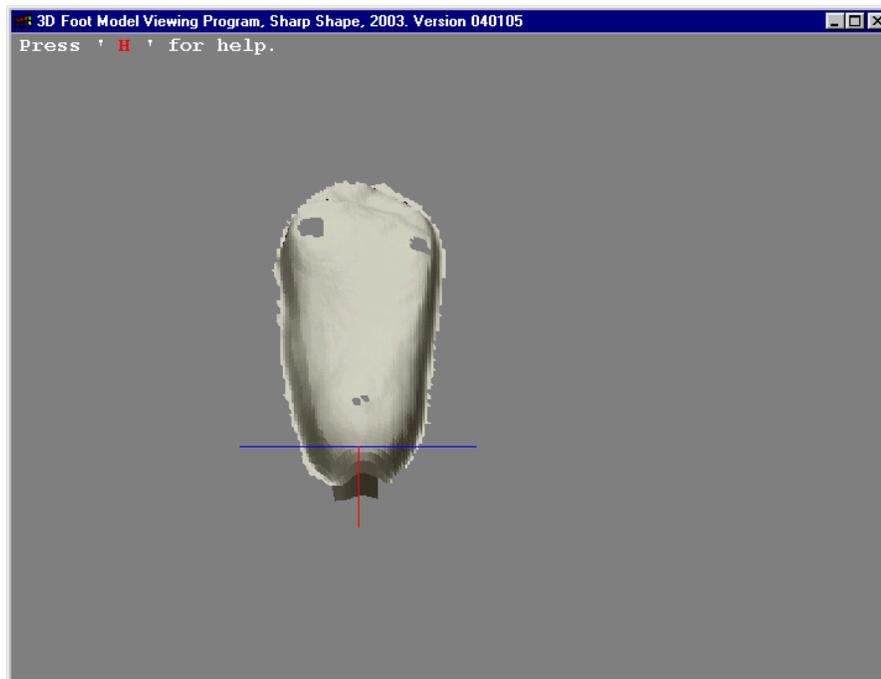


Figure 23

The seven 'landmark points' should be properly placed as shown in Figure 24. These dots help the correction technician to determine the foot width, length, and the locations of the met heads. Remember to click 'Write File' to save the image. A green dot will appear as shown in Figure 21. Figure 25 illustrates the results of tilted foot impressions (deep toes or deep heel). Special treatments are needed in the cast correction programs. It is better to make an evenly pressed foam impression at the first place to avoid correction complications.

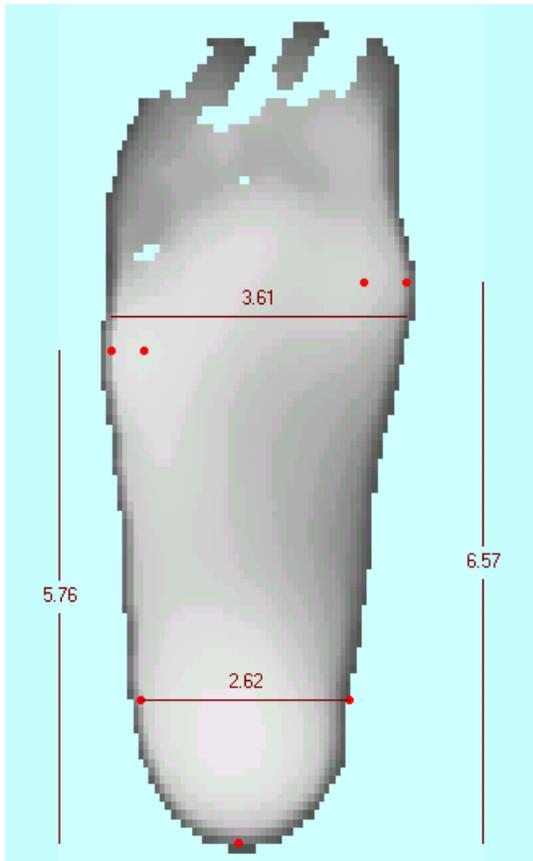


Figure 24

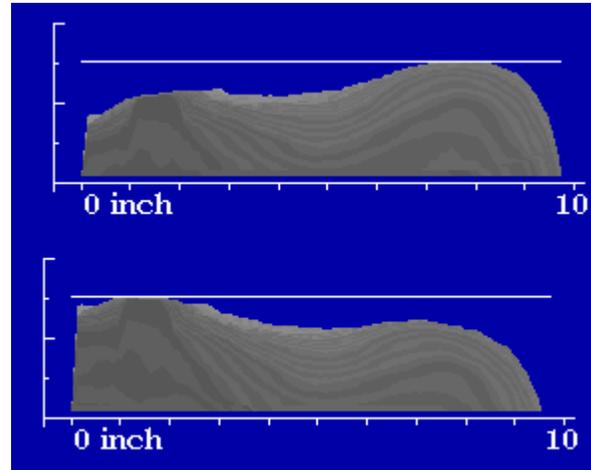


Figure 25

If you have any questions, please contact us at [sharpshape@comcast.net](mailto:sharpshape@comcast.net). *End of file*