# AOMS Cast Correction Techniques

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In this article, we try to explain the advanced topics in the AOMS cast correction software. Since we are not experts in foot pathology, you may want to use this article as a reference and consult with a podiatrist to confirm the techniques.

We have three software packages, i.e., mold, insole, and orthotic. We don't want to go into a specific package in this article. Instead, we extracted the common features from these software packages and explain the soul behind the software designs. We will use the word 'device' to replace mold, insole, and orthotic in the article.

A good device design should follow two rules. Rule #1: the shape should be smooth and without zigzags. Rule #2: the shape should provide comfort and control in the view of foot biomechanics. Rule #1 is very basic and should be picked up soon after the system is set up. Rule #2 cannot be mastered in a short period of time and should be improved along with time. Figure 1 and Figure 2 are examples of a 'good design' under Rule #1.
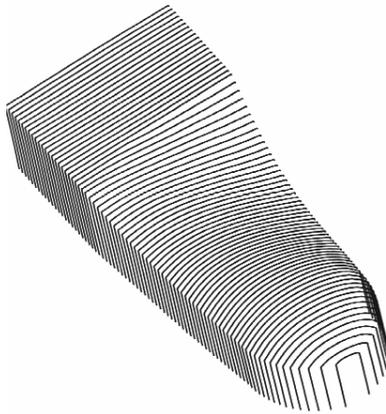
Figure 1
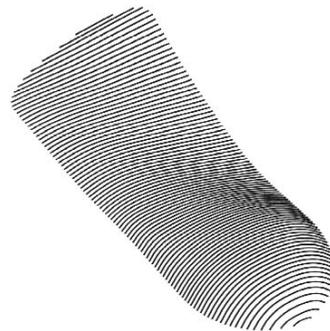
Figure 2

From the traditional orthotic manufacturing technique to the recent CAD/CAM approach, it is a big change to many lab technicians. Sharp Shape tried very hard to bridge the two approaches. The device design in the AOMS is a combination of science and art. After all, the designers are controlling a net of control points. These control points form control lines and eventually surface of the device. Lab technicians can design almost anything they want with some restrictions.

In an X-Y layout, the map of the control points is illustrated in Figure 3. This map is viewed from the top of the foot. The control lines (A thought E) and control points on them are plotted in the figure. By adjusting the control points on these control lines, the desired shape of the mold, insole, and orthotic can be achieved. The number of control lines and the number of control points are a design-compromise of balancing the easiness of use and the ability of control. Tip: Pressing '4' and '6' in the forefoot menu in the cast correction program can change the locations of line B and C. However, we do not recommend doing so if you don't feel comfortable with it.
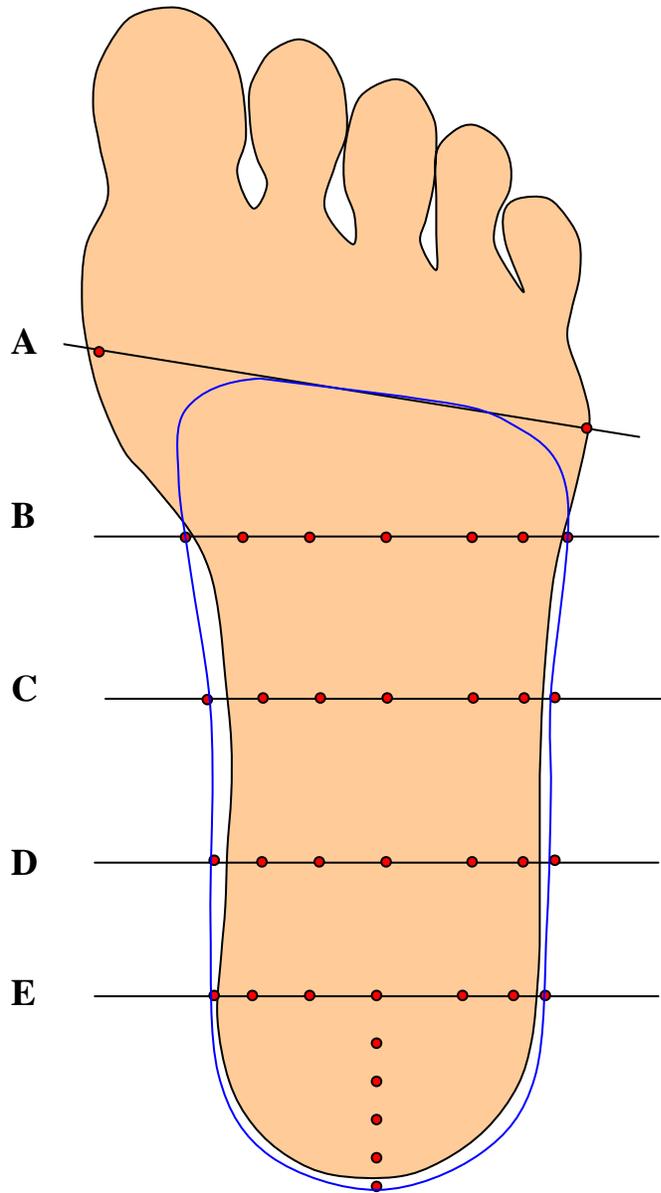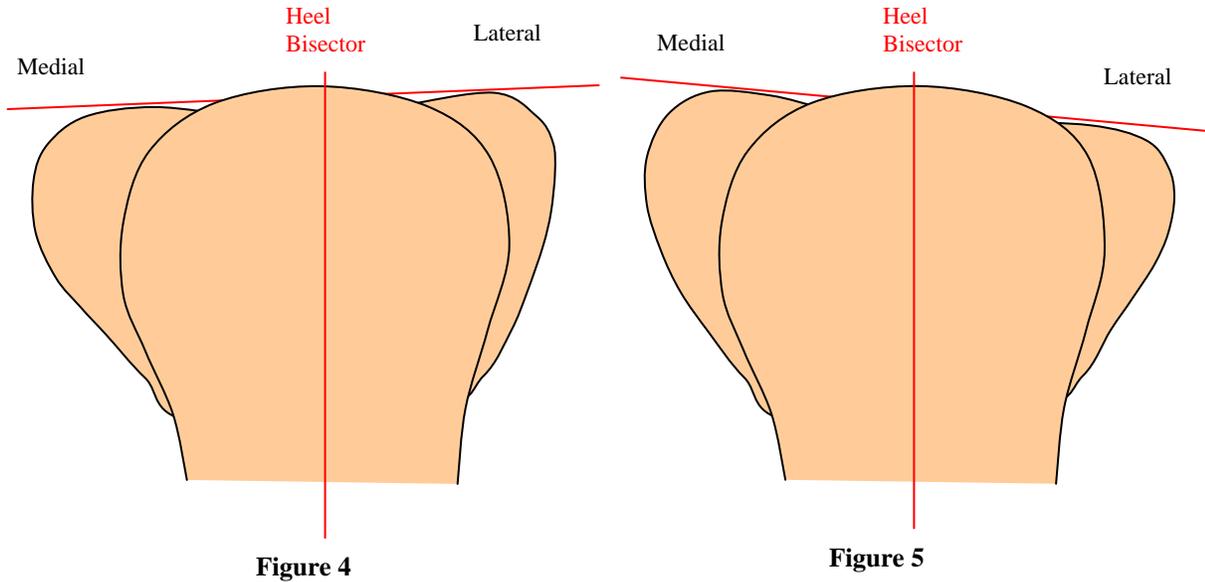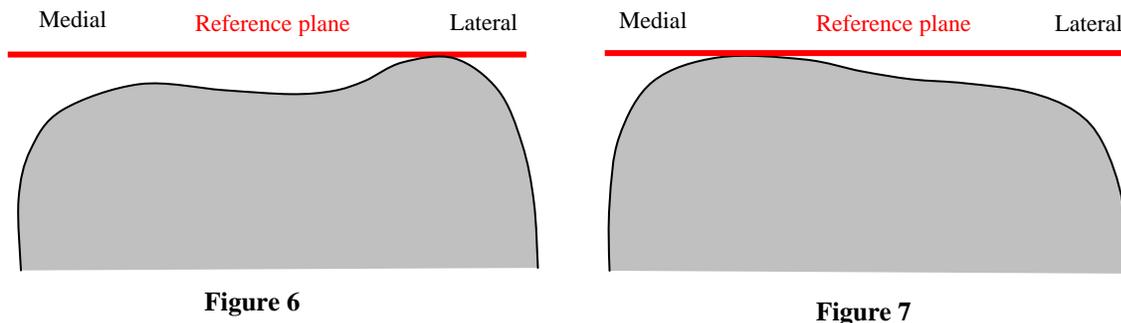

Figure 3

Figure 4 and Figure 5 illustrate the scenarios of how the foot is loaded at neutral position for scan. We require that the image is taken with the heel bisector vertical to the scanner reference plane. The reference plane is the scanner cart surface if cast scanner is in use or the front-glass if foot scanner is in use.
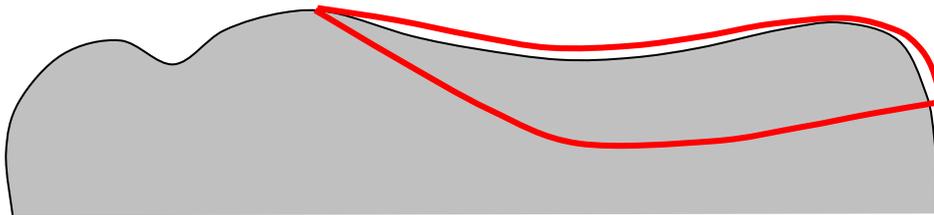
Figure 4

Figure 5

The way to tell forefoot varus or forefoot valgus in the correction software is through the upper-right quadrant of the forefoot menu. Figure 6 shows a forefoot varus and Figure 7 shows a forefoot valgus. The loading position of Figure 4 will produce the image shown in Figure 6. The loading position of Figure 5 will produce the image shown in Figure 7. Please pay special attention to the medial and lateral side of the foot.
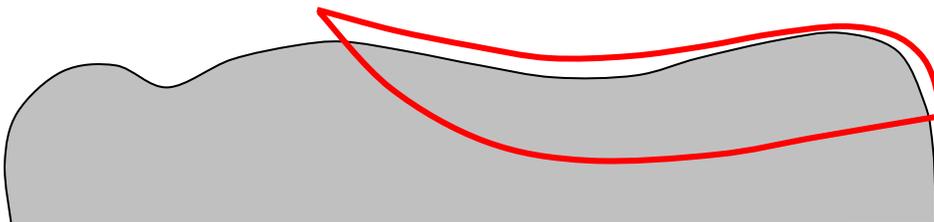
Figure 6

Figure 7

If a foot is scanned without neutral position in consideration (when foot is placed on scanner glass flat), the forefoot should be leveled and without varus and valgus shown in Figure 6 & 7. When a foam impression is scanned, the forefoot angle (in Figure 6 & 7) should not be considered as forefoot varus or valgus. These are very important.

The medial side of the foot is shown in the lower-left quadrant of the forefoot menu (longitudinal section) in the cast correction software.

If the forefoot is neutral (no varus and no valgus), the correction curve at the medial side should look like Figure 8. Make sure the curve is smooth and the peek of the curve fits the center of the arch. For a forefoot varus, the curve on the medial side should look like the one shown in Figure 9. The supporting curve on the medial side abruptly takes off from the ground and props the medial side of the forefoot, which helps the heel be in vertical position. For a forefoot valgus, the medial curve should look like the one shown in Figure 10. Comparing Figure 10 with Figure 8 & 9, the medial curve takes off from ground slowly to allow the rolling of the foot to the medial side. As a result, it has less support on the medial side. When a foam impression is scanned, the forefoot angle (in Figure 6 & 7) should not be considered as forefoot varus or valgus and the curve should not be compensated as such, unless the prescribing person explicitly asks for.
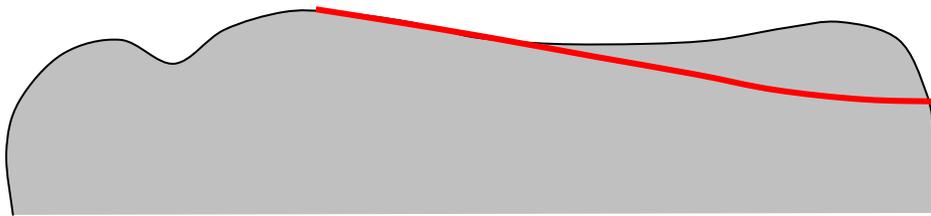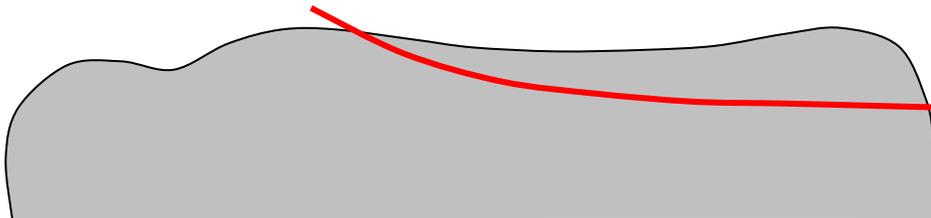

Figure 8

Figure 9
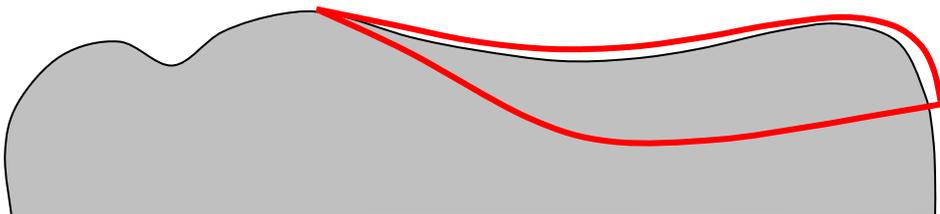
Figure 10

The lateral side of the foot is also shown in the lower-left quadrant of the forefoot menu (longitudinal section) in the cast correction software. On the lateral side, we can see a picture similar as the one shown in Figure 11 and Figure 12. The gray object is the original foot image viewed from the lateral side of the foot. The curve is the lateral edge of the device. Remember that Rule #1 is to make sure this curve is smooth and without zigzags. Some novice operators tend to forget to check this curve before he accepts the cast correction. The cast may look ugly if it is left unchecked.

If the foot doesn't present forefoot valgus, the correction curve should look like the one shown in Figure 11. In this case, the lateral side of the device will allow the expansion of the foot. If the foot does present forefoot valgus, the correction curve should look like the one shown in Figure 12. In this case, the lateral side of the device props up the lateral side of the foot helping the heel perpendicular to the ground. In some occasions, a bone protrudes from the lateral side of the foot. The lateral curve should compensate this bone to allow it to drop as shown in Figure 13.

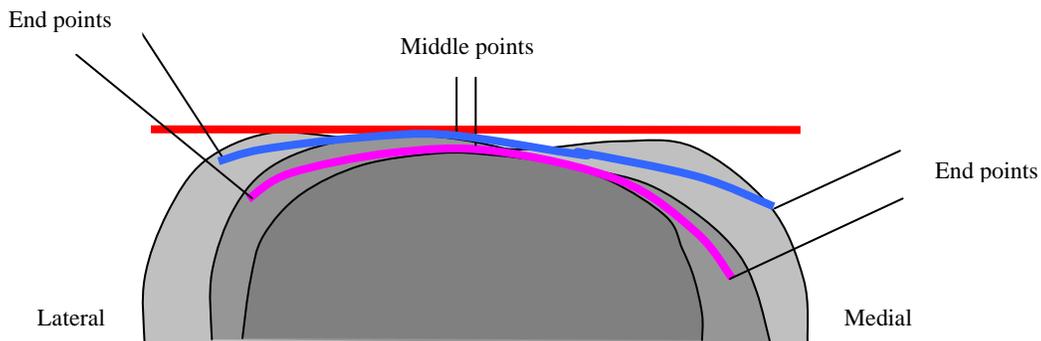**Figure 11**

Figure 12
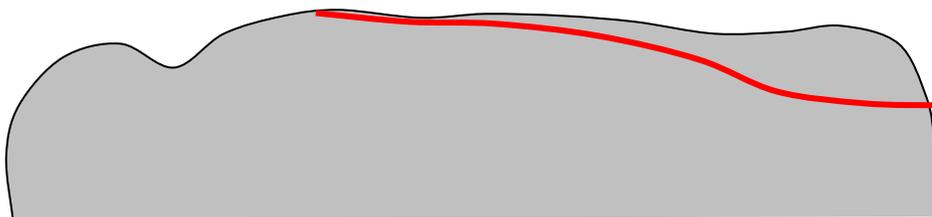
Figure 13

Put medial curve and lateral curves together, the outlines of the device will look like the one shown in Figure 14. This figure is not shown in the program. However, it should be in designer's mind. Once the sides curves are adjusted, the operator should go to the upper-right quadrant of the forefoot menu (latitudinal section) in the cast correction program. The view is illustrated in Figure 15. That view requires some imagination to be truly understood, because three cross-sections are overlaid together in order to make comparisons in height differences.

Although any work order is allowed in the AOMS cast correction program (for example, from rearfoot foot to forefoot). It is recommended to follow a fixed sequence because it will speed up the cast correction process. This recommendation is especially useful for novice operators. The suggested sequence is as following:

1. Go to the lower-left quadrant of the forefoot menu to fix the two curves, i.e. the medial and the later curves. Examples of the two curves are shown in Figure 8 through 11. Figure 14 illustrates the combined view. The two solid curves are from the medial side and the one dotted curve is from the lateral side.
2. Then go to the upper-right quadrant of the forefoot menu as shown in Figure 15. It is very important that you do not modify the end points and the middle points, because these points are the ones that you have fixed in Figure 14. You can modify them if you know what you are doing. In order to make the curve desirable you want to adjust those control points, which are not in the middle and not at the ends. Without doing so, you will end up with going back and forth between view ports. An example of the correction screen is shown in Figure 15.
3. Then go to the rearfoot menu. Remember to reach the section D as shown in Figure 3 & 16. The same principle applies: do not modify the end points and the middle points, because these points are the one that you have fixed in Figure 8 through 13.

Figure 14

Figure 15

The locations of the control lines relative to the foot are shown in Figure 16. Lines A, B, and C are adjusted in the forefoot menu in AOMS. Lines D and E are adjusted in the rearfoot menu in AOMS.

Some novice operators tend to forget to check the curve D before he accepts the cast correction. The cast will look ugly if curve D is left unchecked. The way to reach curve D is to go to rearfoot menu and press Enter. That curve plays an important role in controlling the heel.

An example of such a curve is shown in Figure 17. Figure 17 also tells another important point: each cross-section (including the ones shown in the forefoot menu) has seven control points on it (from F to L). Point F and L are called 'end points' and point I is called 'middle point'. Note that these points are not equally spaced.
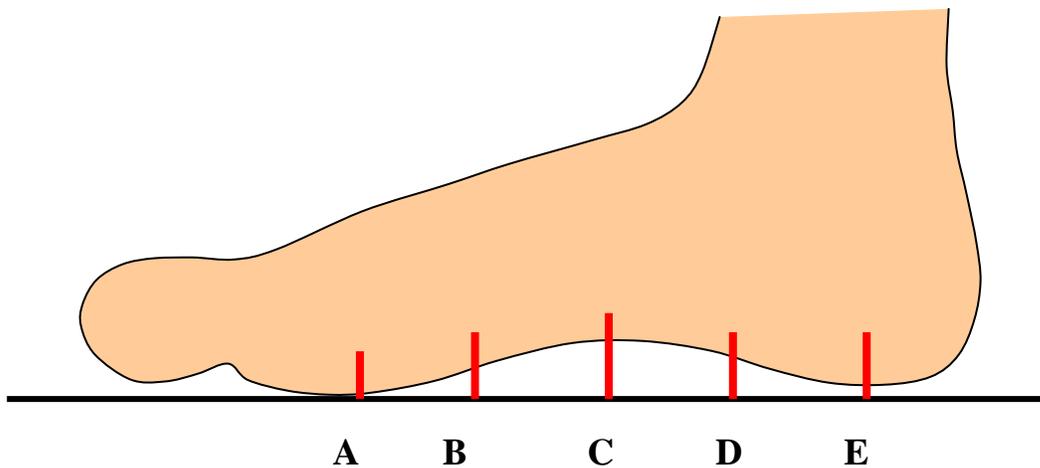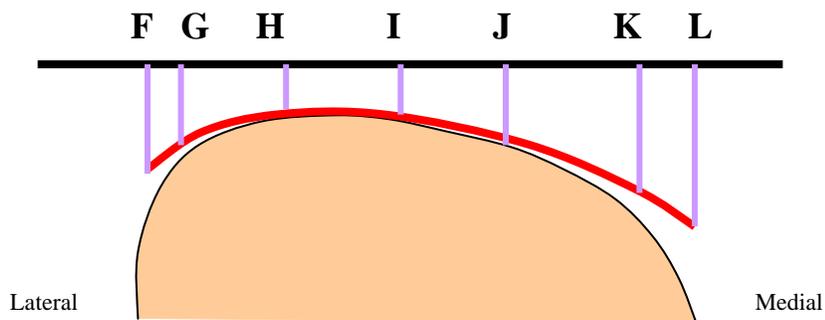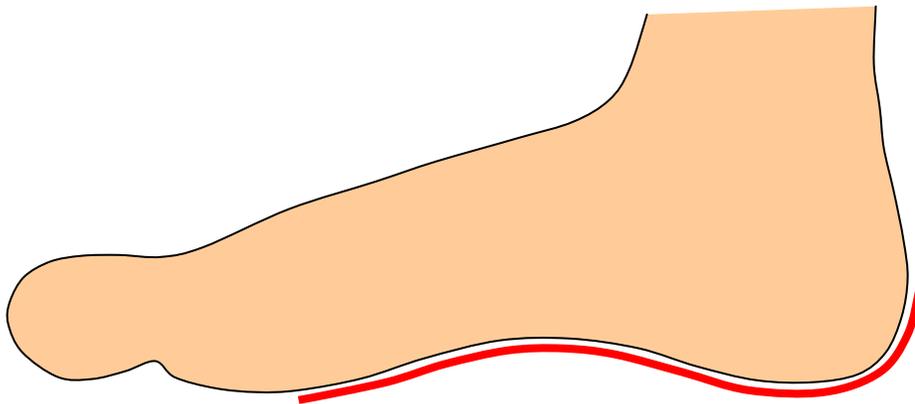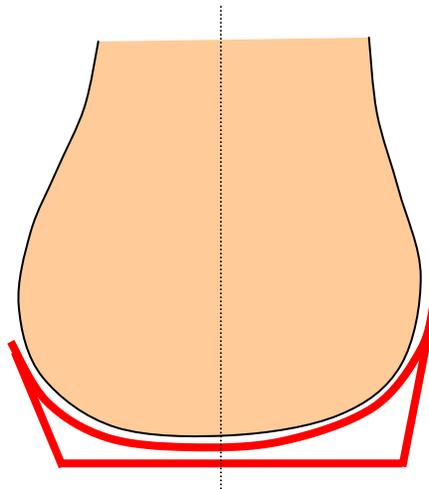

Figure 16

Figure 17

The device design should be carried out with a purpose or purposes in mind. The orthotic should serve as either a control device or a comfortable device. Sometimes it is the combination of both.

Using the AOMS software, we are able to archive these purposes. The length, width, 'plaster fill' of the device can be adjusted in the cast correction program. After the device is made, the device should end a little below the 1st met head as shown in Figure 18. The arch fill may vary depending on the needs. The orthotics can be made with or without posts. Figure 19 shows an example. If with a post, the angle can be specified in the program.

Figure 18

Figure 19

As an example, we want to design an orthotic for a collapsed arch using the AOMS software. We assume that the collapsed area is indicated in the dark region on the foot as shown in Figure 20. Note that in many cases, the collapsed arch is not very visible in the plaster cast. Sometimes the arch collapses in the walking process and the casting can't catch the protruded bone. In that case, the doctor has to mark the area on the cast. Very often, the problem only happens on one foot.

The curve on the medial side should be design as shown in Figure 20 to allow room for the bone to drop. The C control line (refer to Figure 3 & 16) should look like Figure 21. The D control line (refer to Figure 3 & 16) should look like Figure 22. As a result, the milled orthotic or mold will have extra space in that region to allow bone-drop.

Figure 20

Special compensation

Figure 21

Special compensation

Figure 22

If you have any questions, please contact us at sharpshape@comcast.net. -- End of File --