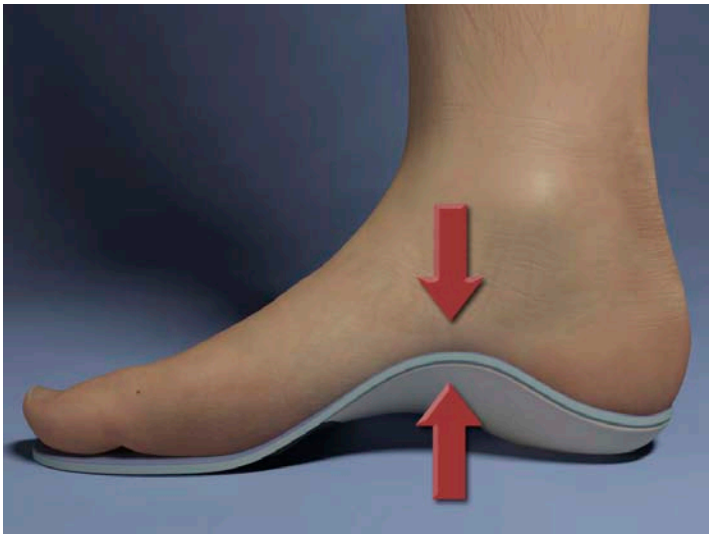
Custom Calibrated Shell Flexibility
The Missing, Essential Custom Component



The amount of force an orthotic needs to deliver to the foot depends on the forces coming down from that particular body and the inherent structural stability (flexibility) of the individual foot. When the shell support is properly customized it should allow a net small, functional amount of pronation after heel strike.

One of the most hotly debated questions in orthotic foot management is: should an orthotic be rigid or flexible? Of course, to pose the question like this is to imply that they should either always be rigid or always flexible. The question, as such, is entirely misstated. The pertinent question is: how much supportive force should an orthosis supply to any particular foot? The answer to that question is a custom factor for every foot. People who weigh more need more support to overcome their added weight; feet that are more flexible need more support because the inherent structural stability is less; people who are more active need more support to resist higher impact loading. This should be intuitively obvious, yet the battle between the rigid and flexible orthotic prescription camps continues.

This is largely due to three things:

1) the lack of reliable methods for determining the custom amount of force necessary;

2) the lack of function-based analysis or agreement about the corrective goal for foot posture;

3) the lack of agreement on how and where to deliver the corrective force to the foot.

We have answered numbers two and three elsewhere: MASS position is the logical corrective goal and full, custom-shaped contact to the plantar foot is how to deliver the corrective force. The answer to number one is evaluating foot flexibility, recording body weight and activity levels as custom data on the order form, and custom calibration that accounts for these custom factors during orthotic manufacture.

The orthotic industry has been content to ignore these custom factors largely because, to account for them, the entire process of custom orthotic data collection and manufacture would become much more complicated and expensive. They have also been very willing to continue Neutral STJ Position technology because it is a useful excuse to maintain the simplicity and profitability that technology dictates. With our new methods and goals, however, Sole Supports has had to be the first to develop entirely new processes in order to create a truly custom orthotic.

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Digital calibrator developed by Sole Supports (above) and detail of orthotic in the test chamber with pin sensor aligned to the Calibration Reference Point.

One of the most important inventions in our new way of doing orthotics is the calibration device. Actually there are two proprietary devices we developed to arrive at custom, calibrated shell flexibility. The first is a device that creates a "calibrator reference point" (CRP) on the bottom of every plastic shell. This insures that the calibrator is always evaluating the same point on the orthotic, both for re-tests of the same orthotic and for new pairs. The second and most complex device is the calibrator itself. This device uses a pin placed directly under the CRP whose deflection is computer monitored in thousands of an inch increments. An air bladder is designed to envelop the orthotic surface from above and uniformly push the orthotic shell downwards to simulate actual foot loading of the shell during stance phase. How much shell deflection at what amount of force gives us a number that determines the correct amount of shell flexibility for that patient's weight, foot flexibility and activity level.

Before we were able to match calibrator numbers to patient variables, a large amount of actual case data were collected. The data produced a scatter graph that suggested a predictable line or data trend that could be used to complete the algorithm. Currently, we are the only lab working on this level of engineering problem-solving to deliver a more custom and functional orthotic.