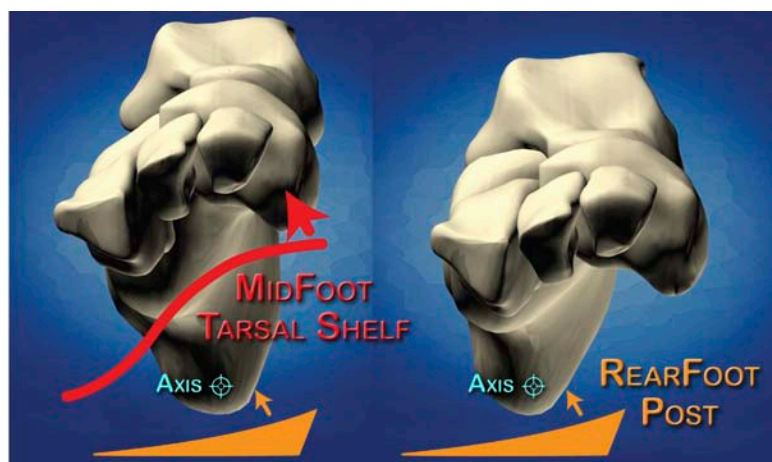
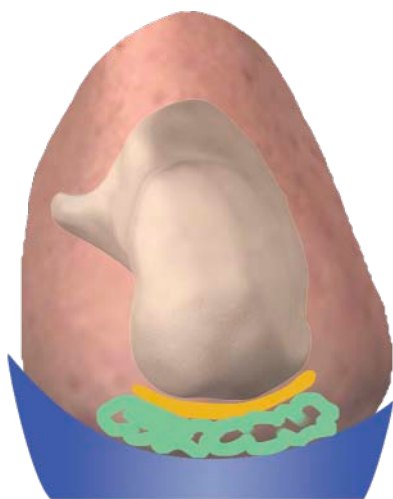


## Restoring Re-Supination No Small Postural Feat



Comparison of leverage advantage of a typical rearfoot post with a full-arch-contact MASS orthotic. The ability to impose a supinatory force at the medial midfoot tarsal shelf gives the MASS design of Sole Supports incredible mechanical advantage for restoring supination.



The problems with external mechanical influences on the inferior calcaneus: the inferior calcaneus itself is relatively round; it sits on a fluid-filled bursal sac and one of the largest fat pads in the body; the heel cup of the orthosis is bowl-shaped. This is functionally similar to a ball in a bowl: the ball will seek its own position in the central concavity of the bowl regardless of the slope of the bowl sides. Compare this mechanical coupling to a ball and socket joint like the hip: the acetabulum provides an articulating surface but does not impose a rotational influence on the femur (other than limiting extremes of range of motion).

The gold standard of orthotic intervention has always been applying some kind of leverage at the heel (mainly) and occasionally at the forefoot. This is what is taught in the schools as part of Neutral STJ Position methodology and also avoids the tacitly held taboo against direct arch control. The problem is that the posture of the foot, in the common case of over-pronation, cannot possibly be restored to normal re-supination with these usual smoke and mirror tricks.

If you consider the diagram to the left it becomes intuitively obvious that a rearfoot post cannot possibly supply enough mechanical leverage to re-supinate the foot from an over-pronated position. Moreover, it is working through one of the largest fat pads in the body and a bursal sac under the calcaneus. Additionally, the calcaneus is rounded where it makes contact with a rounded heel cup. Like a ball and socket joint, the ball will seek its own position –influenced by everything but the round socket it sits in. Finally, how much help will a rearfoot post be after heel lift, during the critical forefoot loading phase in stance?

If real re-supination is not achieved after midstance, the actual biomechanics of gait must compensate in ways that inevitably lead to pain and deformity. Many experts defend current practice by saying that relieving “tissue stresses” enough to stop pain is all the patient cares about and therefore all that practitioners should care about. That may be true, but as professionals, don’t we have a responsibility to offer a higher level of care? Should we not restore normal function as well as eliminate pain?

In every other sort of orthopedic practice it is well understood that normal joint alignment or posture is critical for establishing normal function; that *dysfunction* creates pathology. Somehow the rules got changed for the foot and many of those treating foot diagnoses have been schooled that posture and function are not important. At Sole Supports we are determined to make care of the foot as function-oriented as any other joint complex in the body.

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*At the end of midstance, which of the above two feet is likely to be re-supinated enough for healthy forefoot loading? The top foot posture is controlled by a Sole Support and has little distance to go to recover adequate supination. The bottom foot is on a typical, low-arched Rootian device with a very large range (red) to recover with no mechanical assistance from the orthotic.*

The key to controlling re-supination of the foot at heel lift is to disallow over-pronation after heel strike. The only way this is possible, given the impact forces and hyperflexibility of foot structure that promote too large a range of motion into pronation, is to mold the foot into an adequately supinated posture at heel strike. A MASS position orthosis such as Sole Supports cradles the foot in such a position at the onset of stance phase, allowing only a small yet functional amount of pronation to proceed into midstance.

Since the total range of pronation is thus constrained, it is a relatively easy mechanical feat to bring the foot back to the full, necessary amount of supination for healthy forefoot loading. The Sole Supports shell is designed to provide a spring-like force to the entire plantar surface after full pronation at midstance in order to give the foot the postural assistance it needs.

Recent studies of supination resistance (the amount of force necessary to push the foot back into supination from variable amounts of over-pronation) have demonstrated that there are exponentially larger forces required to re-supinate a foot the deeper it goes into pronation <sup>1,2</sup>.

1. Payne et al, Static Stance Response to Different Types of Foot Orthoses, J Am Podiatr Med Assoc 93(6): 492-498, 2003

2. Payne et al, The Reliability of the Manual Supination Resistance Test, J Am Podiatr Med Assoc 93(3): 185-189, 2003