

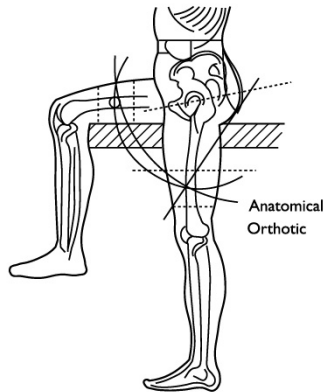
BIOMECHANICS OF SWASH®

A Major Biomechanical Engineering Accomplishment

The SWASH® appears to be a relatively simple device, but looks can be deceiving. From the distal tip of one upright to the distal tip of the other, there are a combination of twenty-one (21) joints and angles in the SWASH®. Changing one angle affects the function of the other twenty.

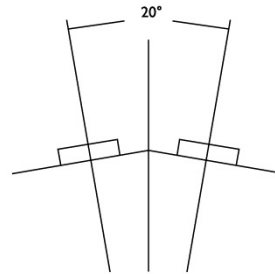
Anatomic vs. Orthotic Pathways of Motion

At first glance, it appears that the orthosis should cause significant "pistoning" of the thigh cuffs on the thighs, as the wearer moves from standing to sitting. The orthotic hip joints do not approximate the location of the anatomical hip joints. The orthotic joints are actually positioned closer to the sacroiliac joints than they are to the hip joints.



But in fact, the pathways of motion of the SWASH® thigh cuffs do mimic the pathways of motion of the femurs. This is designed into the orthosis through a combination of the angle of the pelvic band in the sagittal plane, and the angle of the hip joint assemblies in the transverse plane. Also contributing are the angles of the uprights through the hip joints, and the planes on which the angles on the uprights themselves are shaped.

The result of this tri-plane engineering is that "pistoning" of the cuff on the thigh is minimized.



Center of Gravity

Upon seeing the SWASH® orthosis, one would expect that the center of gravity would be posterior to the trunk. The joints are posterior, leading to the expectation that the center of gravity would also be posterior.

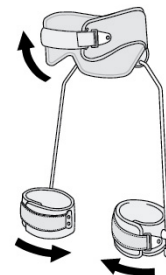
In fact, however, the tri-plane engineering again utilizes all the angles described previously to bring the center of gravity just anterior to L2, through the center of the trunk. Of most significance is the 20° angle in the transverse plane designed into the posterior section of the pelvic band. This angle moves the center of gravity from posterior to mid-trunk alignment.

Proximal Transfer of Adductor Tone

High adductor tone affects posture of the entire body. It drives the feet into pronation, internally rotates the lower limbs, and has a flexion influence on both the knees and the hips. This lower extremity reaction to adductor tone influences the trunk into a slouched posture.

It is theorized that as SWASH® overcomes adductor tone, two things happen. First, the biomechanical effect of the tone is reversed.

It exerts an external rotary influence on the lower limbs (without twister cables), the knees and hips are influenced more towards extension, and the trunk stands more erect. Second, as the SWASH® reaches its limit for adduction, it transfers adductor force proximally, assisting anterior rotation of the pelvis to help achieve a more erect postural position.



NOTE: Preliminary results of a 10- patient study reports there is no increase in adductor tone associated with the use of a SWASH®.