

# FOOTBED FACTS

**F**or many skiers, footbeds are thought to be a necessary part of a ski boot purchase. Without a custom footbed to support the foot it is impossible to properly edge a ski, especially if the skier is pronated (even though pronation is a helpful part of natural foot function that has a place in skiing).

Boot fit issues arise in many situations that may have nothing to do with comfort but are important to good, balanced skiing. To properly design a footbed and adjust boot fit it is helpful to understand foot motion and its function.

During normal stride, the foot functions in this order: a mobile base of support, a balance aid and propulsion. Mobility in all directions is, of course, necessary as the ground is constantly changing under our feet, whether we're walking on a mountain trail, putting our feet down on a rock or simply pushing off our toes to move forward.

Foot mobility happens in six directions parallel to the three planes of the human body (frontal, sagittal and transverse). In the frontal plane, the foot can roll onto its outer or inner edges. There are nearly twice the movements available when rolling to the outside. In the sagittal plane (side view), the foot can extend and flex and in the transverse plane (looking down on the top of the head), the foot can rotate within limits, left and right.

These motions, happening simultaneously, make up the movements of supination and in skiing, the much-hated pronation. Pronation is the foot rolling onto its inside edge, rotating outward (duck foot) and flexing at the ankle all at the same time. A supinated position is a combination of the opposite directions. During walking, our feet are constantly moving between pronated and supinated positions, but in skiing we have been taught to typically be most concerned with pronation.



## HOW IS FOOT FUNCTION IMPORTANT TO SKIING?

Even while standing motionless, the muscles of our feet and lower leg are constantly working and our feet are subtly changing position in order to maintain our body within an aligned and balanced position.

Coaches talk about switching feet at the top of the turn and moving the body downhill ahead of the turn. This is a constant flow from one turn to the next that results in the upper body and hips being slightly rotated with respect to the feet at the beginning of each turn. This rotation is carried through the ankles to the feet and should result in constant motion of each foot from pronation to supination inside the boot, as in walking. This foot motion results in smooth and subtle control of ski edge angles.

Boots must therefore have room around the ankles and the sides of the instep to permit the foot to roll from pronation to supination. As we switch edges at the end of a left turn to begin a right, the left foot pronates to edge the left ski and the right foot supinates. These foot positions, which are held until the next turn, result in the ankles moving closer to the shell and rearward. There must be room for the ankles to

move fully or the foot is blocked and a smooth transition to a new set of edges cannot smoothly happen.

Pronation of the foot is also necessary to maintain the downhill ski solidly on the edge and to adjust edge angle throughout the turn. How is it possible to determine if a boot is shaped appropriately to permit proper foot motion? Shell fit!

With your heel firmly in the shell heel pocket and the foot straight ahead, there should be no contact between your anklebones and the shell. You should also be able to roll your foot from side to side without shell contact until very close to the end of natural range of motion. Stretching or grinding the shells can eliminate contact in this case. For some individuals, a foot orthotic may also help, especially if contact happens on the inside of the foot during pronation. The key is to remember that pain is not the only reason to modify shells - good skiing is a reason as well. **SRC**

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