

FM Slalom Tech Series

Article #06_05

Skiing with an Edge

With focus on the adjustable fin and the precision in construction of skis, it is safe to say bevel tuning is not near as common as it used to be. Skis are expensive and without any technical reference to learn from, taking sandpaper to a ski's bevels sounds more than daunting.

But when fin and boot changes aren't enough or go out of a reasonable range, what else do you do?

Ski manufacturers have moved to "fast" ski designs that ride higher in the water and are more sensitive to water conditions. We have seen that these ski designs researched in Florida don't do so well in cold water. There may also be skis of the same model that don't quite ski the same. These are some examples where a course of bevel tuning may be in order.

Slalom Ski Bevel Design

The two main lines of interest on the ski are the edges on each side of the 45 degree bevel. The top edge meets the sidewall of the ski and the bottom edge meets with the bottom of the ski.

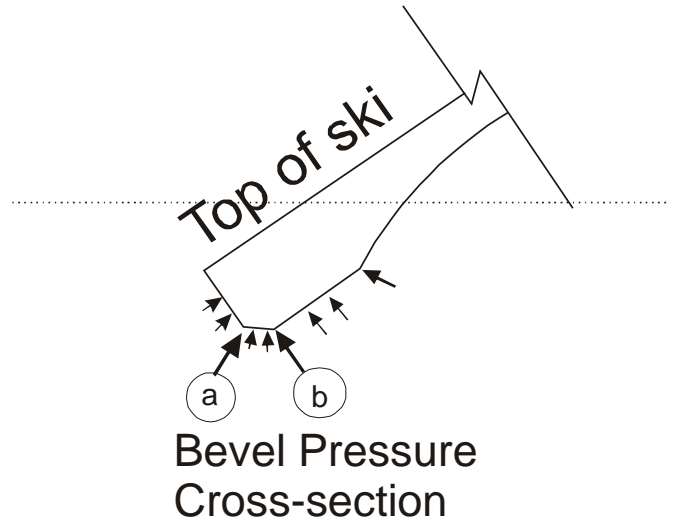
As a general rule, sharp or pointed edges collate pressure and cause lift. The two surfaces at each side of the sharp point edge are resistant to rolling and have increased stability.

Rounded edges disperse water pressure and cause a ski to sit deeper in the water and roll more easily.

Ski designs use both sharp and rounded edges at strategic places on the ski so that ski can operate and transition smoothly throughout the slalom course.

The Top Bevel

The following figure is a cross section used to illustrate how water pressure is increased or decreased with the shape of the bevel to change the ski's behavior.



The top bevel (a) in the figure above, along with the sidewall configuration and thickness is typically used to set the tip/tail attitude of the ski on edge. When the ski rolls on edge, the top bevel starts to act on the ski in a vertical manner. A sharp bevel causes lift, so if the ski has a sharper edge toward the front, the tip will be driven higher.

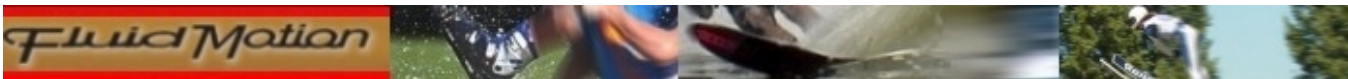
Conversely a rounder top bevel sets the ski deeper in the water. Rounded bevels are sometimes used at the tail of the ski to keep the tail deep and firmly planted.

The Bottom Bevel

When the ski rolls on edge, the bottom bevel acts in a more the horizontal direction, thus determining whether a ski carries straighter path outbound or starts to drive back toward the center of the course. This action is similar to adjusting the under-steer or over-steer in a car.

A sharper bottom bevel edge (b) in figure above and underneath the front bindings to the tip of the ski, pushes the front of the ski toward the skier by reducing slide. The pressure created from the sharper bevel provides a more aggressive approach to the turn and enhances the ski's ability to stay on track through the wakes. A rounder bevel edge in the same area does the opposite.

A rounder bottom bevel in the tail section increases tail slide, while a sharper bevel decreases tail slide.



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How to Adjust Bevels

Andy Mapple's video gives us a great lesson on how to go about adjusting a ski's bevels if the ski is a tunnel or modified tunnel concave ski. By using a flat file wrapped in #240 to 320 wet sandpaper, the top or bottom bevel may be sharpened. Hand sanding the bevels with the same sandpaper dulls the edges to produce a rounder bevel.

For a full concave ski, tuning the bottom bevel may be difficult or impossible to do. For a full concave design, a sharper bottom bevel will ride higher on the flat plane and track harder as well.

To make the entire bevel larger is quite a bit of work. The ski will sit deeper in the water overall as smaller bevels ride higher. To test some radical changes, we substantially widened the bevels under the bindings for a Goode 9100. Running the ski through the belt sander flattened the bevels and produced sharp edges. We then rounded the edges off by 20 minutes of wet sanding to restore the bevels to a sharpness that was close to the original mold. As predicted the ski sat deeper in the water and skied very nicely.

Conclusion

A lot of top skiers are riding skis with adjusted bevels to handle weight or variances in ski production. A skier in salt water or very clean water for example, might want to consider some bevel tuning to get the ski to sit properly in all phases of the course.

To build a setup that is optimum for you and your conditions requires analysis of the entire system of the fin, ski and bindings.