Facts on Binding Position and Balance

Generally the audience of SRC (Ski Racing Canada) is aware that binding position affects the way skis work or feel. However, you probably have not been taught that binding position is an important factor in a skier's ability to maintain balance and may not realize that when we or our athletes test skis, major differences between models may be simply accounted for by binding position differences. Do your athletes use rules about binding position that are scientifically based or do they use rules that are quantitative only such as, "I always mount my skis 1cm forward".

Binding position is not determined by ski designers nor is placement determined by flex or waist position. Rather, after a ski is designed and prototypes are made, ski testers determine the position for recreational skis which includes race skis available to non-national team members.

There are differences between manufacturers' binding position placement and in general, skis from Germany and Austria are mounted behind that of skis from France and the U.S. if we make the effort to standardize position to the running surface length.

The chart below compares the mid-boot sole (MBS) mark position for skis from different manufacturers. In the chart, the location of the MBS mark is standardized to ski running surface (RS) length using the formula (distance from beginning running surface/running surface length) X 100. Where running surface is described as the length between ski contact points at the tip and tail and MBS length is the distance from the tip contact point to the MBS mark on the ski. There are differences of up to three percent. Specifically, if the Atomic 9.26 is compared to the Head GS WC the difference is 1.8% which equates to more than 3 cm difference with higher percentages being further back. It explains much of the characteristic differences between the skis.

Company	Model	Length	RS	CRS	MBS Length	MBS% RS
Atomic	9.26	180	1590	795	892	56.1%
	9.26	190	1694	847	950	56.1%
	9.26	200	1782	891	1002	56.2%
Atomic	10.26	193	1715	858	965	56.3%
	10.26	198	1770	885	990	55.9%
	10.26	203	1804	902	998	55.3%
	9.18 men's	170	1489	745	831	55.8%
	9.18 men's	180	1596	798	894	56.0%
	9.18 women's	170	1486	743	823	55.4%
	9.18 women's	180	1593	797	875	54.9%
Head	GS WC	183	1610	81	87.4	54.3%
	GS Jr.	165	1440	72	78	54.2%
Stöckli	GS Jr.	161	1392	70	77.2	55.5%

The chart demonstrates why rules such as always moving bindings 1 cm forward of the manufacturer's specified position are not valid. One cm forward on an Atomic for instance will be a totally different position on the ski than 1cm forward on a Head. The only correct method of changing position is to reference it to running surface length.

Studies for Atomic several years ago in which I helped design research methods showed that binding position affected an athlete's ability to consistently maintain tip pressure in a turn. Figure 1 below was made with data generated by pressure transducers placed under the toe and heel bindings of test skis.

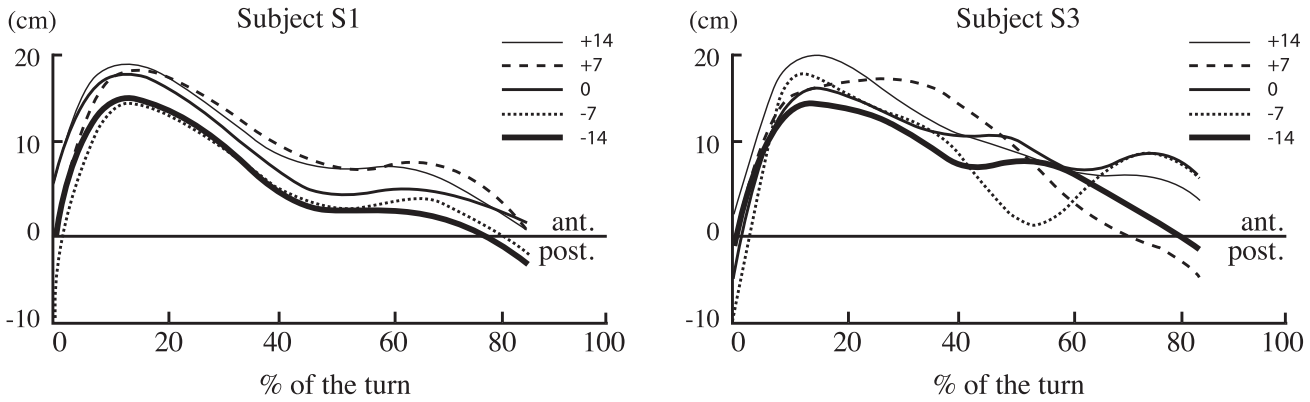

Fig. 1*: Application point of the force in anterior-posterior direction over time concerning 5 different binding positions (subject S1 and S3). *The Effect of Binding Position on Performance and Comfort in Skiing. Schwameder, Stefanyshyn, Tscharner, Nigg. Science and Skiing 2.

Subject 1 was a Canadian National Team skier. It is evident that throughout a turn he was able to maintain a smooth transition from forward to more rearward center of pressure as the turn progressed, despite binding position changes of +1.4cm and -1.4cm made in .7 cm increments. It can also be clearly seen from the graph for Subject 1 that as bindings were moved rearward the centre of pressure also moved rearward.

Subject 3 was an Alberta provincial team member. His graph shows how his ability to apply consistent pressure throughout the turn completely disintegrated in response to binding position changes. His ability to maintain balance was impacted by the change in binding position.

Later research supported by Nordica compared the factory binding position on one of their carving skis to the binding position found by a device called the Campbell Balancer. The Campbell balanced position was significantly preferred by the seven skiers in the test, despite that on average, it was 3.7cm ahead of the factory position.

Fortunately for our purposes, the Campbell balanced position and the method of mounting bindings that locates the ball of the skiers foot over the centre of the ski running surface are very close and can often be substituted with good results.

What is the take home message? Binding position is an important, even vital, part of equipment setup for racers and recreational skiers that can lead to great gains in ease of skiing. For racers it can resolve problems such as often being late in the turn, problems with sitting back or even more importantly, just finishing.

Experiment with it systematically by first finding the center of the ski running surface (CRS) and trying different positions. Reference the distance from the boot toe to the CRS. Once a position is found that rewards your athletes it can be duplicated on all skis regardless of brand and model.

Experiments with binding position can reap great rewards instantly for your athlete. More in later issues.

Lou.