



NORDIC ULTRATUNE UPDATE

News & Notes from NORDIC ULTRATUNE

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News and Notes

It's been a very busy winter at Ultratune with lots of excitement....

World Cup in Alberta

I was at Canmore for the four World Cup races, providing ski service for Slovenia. Some info in this newsletter; it was a great experience.

Masters World Cup in McCall

If you hope to have skis stone ground prior to Masters World Cup in McCall, plan ahead. There's still a little time, but don't wait much longer.

Supertour Successes

Congratulations to Karin Camenisch for winning the Supertour Sprint Title. Ultratune has been preparing skis for Karin, and a number of other high-placing Supertour skiers this season.

Other odds and ends...

"Super skiing" is a perfect summary for the season so far. Here in the Methow Valley there has been lots of snow, and colder than normal temps – classic skiing has been soooo perfect for the past 10 weeks!.

Look for us on the trails!

-Mark Waechter

In This Issue

- World Cup in Canmore
- Special Topics in Chemistry & Physics
- New Ski Info
- Notes on Ultratune Services



A busy day at Ultratune.

Schedule Stuff

Regular hours are Thurs, Fri, Sat, Sun, Mon, 11-5. Stop in and say hello! Most days I'm in the shop earlier, but those hours are a sure thing. Usually Tuesday and Wednesday of every week are reserved for ski testing and a little time off.

Shop schedule notes:

Note that Ultratune will be closed for a few days during Canadian National Championships (Callaghan Valley) where I'll be supporting the MV Nordic Juniors for a few days with wax help.

World Cup Notes

By Mark Waechter

During the World Cup races in Canmore in January, I sent some notes to Topher Sabot of Fasterskier.com and they were posted on the web site, so I won't spend any time re-hashing that info. You can find it there.

The short description of the trip would call it a 600 mile drive through a big snowstorm, followed by a week of 12 hour days working in a cold wax room, ending with a 600 mile drive through a big snowstorm. But that description would be selling the experience short. It was a full week of very hard, but very rewarding work and a great opportunity to work again at the highest level. Working hard as a team, with great people, is always rewarding. The World Cup is certainly where the wax meets the tracks.

What's New?

Here are some short comments on a few of the things that seemed noteworthy during the week.

Testing Protocols

Ski testing continues to rely on timed testing in prepared tracks. However, using the speed trap was primarily used for "zero testing" this year.

Zero Testing is a formal speed trap test to measure small differences in a group of test skis. Team Slovenia has a set of 10 pairs of factory matched skis (same construction, matched flex, same grind). Each day the skis are identically prepared, and tested against each other to check for minor variations in speed. The zero test consists of a half-dozen timed runs for each pair, with averaging and stats done to quantify the minor differences, if and when they exist.

With "zeroed skis" the wax testing begins. Testing glide waxes is done by feel – comparing skis (from a set of matched pairs) that have different glide preps on each foot. Dozens of techs are skiing around the test areas - slow, fast, with poles, without poles – from all the ski nations. Frequent stops to swap skis from foot to foot. Typically we were testing 6-10 base gliders (LF & HF waxes), and also testing about 10 powders each day. And some liquids and gels, too. Careful notes are kept, and the the best combinations (wax, powder, liquid) were used for the races. Simple in concept but a lot

of work to implement systematically so that errors don't get through the program.

On sprint race days, the testing was ongoing so that the recipe could be updated for later heats.

Grip wax for classic skis was pretty straight forward. Conditions were cold and it was hard wax all the way. The servicemen and a coach picked likely choices, and testing was done on identically prepared, matched, classic skis.



Not much extra space, but not much chaos either.

Grip waxing is tricky because the right ski can be prepared with the right wax, but if it's not exactly the right amount applied in the right way, the results can be all wrong. The servicemen worked closely with the athletes to prepare and test and re-check the race skis.

It was interesting to see that all the classic skis had a single set of wax pocket marks. One mark in the front and one in the back. Period. It's a very simple setup, as long as the servicemen and the skiers are familiar with the skis.

Waxes and Tools

New cleaning fluids are being used, specifically for cleaning fluoro products from ski bases. We used a fluoro cleaner from Italian wax company

Maplus, but a similar product will also be available in 08/09 from Swix.

The wax supply for Slovenia was well stocked, with all the glide products you've ever seen plus a bunch you haven't. Some had labels in Russian that I couldn't even read, other test waxes were special World Cup mixtures, but most were products available in North America.

Without giving away any secrets, I can say we used a different base glider for each race day, and I'm pretty sure we used the same fluoro powder each day. Always the wax choices were based on same-day test results.

Once again, all the brushing was done by hand. Roto-tools were used only for applying fluoros. Lots of elbow grease required. Imagine a week spent brushing out dozens of pairs of skis waxed with Start Green (or Swix 4, or Toko Blue)... ..you get the picture.

High quality digital wax irons were used. A good digital iron makes the work with cold waxes and fluoro products much simpler. Star makes a good digital iron (available from Ultratune, by the way), and Swix digital irons are common, too.

Respirators are used, of course. Full-face masks offer good eye protection as well as respiratory safety. Ventilation in the wax room wasn't perfect though, and the very cold temperatures didn't make it easy to work with an open door.

The Slovene team had a Briko Slidemaster with them. This is a new setup that looks a lot like a shoe polishing machine, and it's used with special glide waxes. It's very quick, no iron is used, and it makes very fast skis. However, effective Jan 1, 2008, Briko has discontinued all its ski waxing products, so the Slidemaster and the Briko waxes are apparently now going to be unavailable. This is the 2nd season that Slovenia has been using the Slidemaster (a prototype last year), and they've been happy with it. It will be interesting to see if another company will acquire Briko's technology, or if this will simply fade away as a curiosity.

Clean skis. The typical Master Skier could learn a lesson in keeping skis clean. Every single pair of skis were kept clean on the tops and sides. If they can keep 90-100 pairs of skis clean, what's your excuse? It was nice to work on skis that weren't sticky and dirty.

The Real Wax Room Secret

As usual, the real wax room secret is that there are no real secrets. Very careful work with no shortcuts. Testing a single variable at a time. Always strive to have "very good skis", but not making risky choices. Be very careful with the testing and the data, and then trust the data. Good skis, with good base grinds, and good wax; it's that simple.



Gianluca Marcolini and Stefan Lichon, servicemen for Team Slovenia, in the wax cabin.

Amazing but True

On Wednesday, Ivan brought some food to the wax room, including a roast chicken (from the grocery store) which nobody ate. The chicken sat in a bag on the floor for two days. On Friday, Stefan ate half the chicken – to my utter horror and amazement. I simply couldn't imagine eating chicken leftovers that were sitting out for a couple days (this is in the category of *'lessons previously learned the hard way'*). Stefan showed no signs of distress whatsoever. I was amazed.

A 'Separated at Birth' award could go to coach Ivan Hudac who could pass for a twin of Johan Bruyneel (cycling coach, formerly of US Postal / Discovery). Except for the accent, I suppose.

Also, all the euro servicemen seem to use chewing tobacco ("snus"). They were surprised that I don't touch the stuff – they favor some euro brand that comes in tiny little pouches which are at least somewhat tidy. None for me, thanks.

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Capture the Flag

By Mark Waechter

How many of you would recognize a flag from Slovenia if you saw it on the race course? That thought crossed my mind when I saw Vesna Fabjan wrapped in her home country's flag, cheering for team-mates in the World Cup Classic Sprint heats in Canmore.



Vesna Fabjan wrapped in the flag of Slovenia

The flag of Slovenia is a white, blue, and red horizontally banded flag with a standard showing mountains, stars, and water.

I asked Vesna Fabjan (a.k.a. "Munchkin") about the flag. Vesna is a 22 year old athlete, in her 4th season of World Cup skiing, who has improved steadily each year. This year she's a "red-group" sprinter; clearly a skier with a bright future.

The three-headed mountain shown on the flag is Mt Triglav, the highest point in Slovenia, and also the highest point in the Julian Alps with a summit at 2864 meters. Mt Triglav is located in the north central part of the country, in northern Carniola.

The water depicted in the foreground is the Adriatic Sea, and perhaps some regional rivers.

Slovenia is a country of about 3 million people, located "to the right and up" from Italy. Slovenia has seashore on the Adriatic, and Alpine summits. Slovenia became an independent nation around 1991 with the break-up of Yugoslavia.

World Cup Odds & Ends

A Half-Liter Cappuccino?

By their 3rd day in Canmore, the skiers had discovered Starbucks. As one Slovenian skier said, "This place 'Starbucks' is for me!... There is no place in Slovenia where I can get a 20 ounce cappuccino!"

After spending a very long day in a just-a-little-bit-too-cold wax hut, it was a huge bright spot in the day to have a skier walk in with a tray of extra large hot drinks from Starbucks! One for Gianluca, Stefan, Ivan, and me. I'll forever remember this short break as one of the week's wax room high points.

Land of Immigrants

Canada is definitely a land of immigrants. Recent immigrants, as compared to the U.S. From the Slovenian contingent (athletes, servicemen, and coaches), there were four people with close relatives in North America. Both Katja and Vesna had relatives make the trip to come see the racing in Canmore!



SPECIAL TOPICS IN CHEMISTRY & PHYSICS

DISPLACEMENT, DEFORMATION, SURFACE ROUGHNESS, & MECHANICAL INTERLOCK

Ski Drag in Cold, Dry and Loose Snow Conditions

By Mark Waechter

Part 2 of a 3 part series on factors
that influence ski speed

The 2007/2008 winter will be remembered for a long time as a terrific season of colder than normal temperatures, combined with above average snowfall. It's been beautiful hardwax classic skiing for weeks on end.

In this season of perfect classic tracks, the factors that have caused ski drag have been related to cold temperatures, sharp snow crystals, un-compressed and un-transformed snowpack. This season's dominant weather (at least here in Washington's Methow Valley) is a perfect frame of reference for this discussion of ski drag ins cold, loose, and dry conditions.

Ski drag in these cold, loose, and dry conditions are influenced by ski selection as well as ski base preparation.

But before I go further, let's clarify some terms that I'll use in the discussion.

Coverage and Contact:

- When a ski is on the snow, and weighted with a skier on it, the "area of coverage" is the entire ski.
- When a ski is on the snow and weighted with a skier, the "area of contact" is the part of the ski that is in *intimate load bearing contact with the snow*.

This distinction between 'coverage' and 'contact' is important when comparing camber and pressure distribution differences among skis.

The *area of contact* for a ski is much smaller than the *area of coverage*. Because of irregularities in the surfaces, the ski is actually riding on a small fraction of the coverage area. The area of contact is affected by irregularities of snow surface, including microscopic irregularities, by Structure in ski base, and camber of ski – typically tips/tails.

Naturally, the amount of weight on a ski affects the *area of contact*. Because points of contact

are deformable, an increase in normal force (downward pressure, weight) will increase the area of actual intimate contact and change the resistance to movement. This is a case where the 'standard dry friction equation' fails to be applicable.



Squeaky cold snow in the Methow Valley

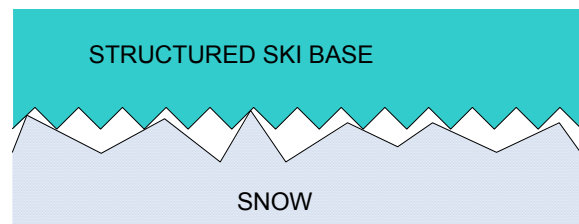
Displacement and Deformation:

Displacement and deformation are terms to describe moving the snow, compressing the snow, and shearing the snow crystals and snowpack on a large scale.

In soft snow conditions ski selection is critical to minimize energy loss due to displacement and large scale deformation. When the ski's area of contact is a large portion of the area of coverage, it reduces the pressure and minimizes deformation. The ski will float better if the skier's weight is distributed over a larger area.

Surface Roughness & Interlock

Surface roughness creates ski drag when sharp pointy snow crystals interact with grooves or features on the ski base. The sharp dendrite features on the snow crystal 'interlocks' with the features on the ski.



Mechanical interlock due to surface roughness.

In this situation, the ski/snow interface has to shear the snow and break the snow crystals or

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snowpack. This can be visualized as 'velcro friction'; that idea is helpful for many skiers.

Often, with surface roughness and mechanical interlock, there is an audible 'hissing' sound coming from the ski/snow interface.

Discussing the Situations....

To illustrate these forms of ski drag, discussing certain conditions and situations is helpful.

Case 1: *Cold temps, and snow that has not been through freeze/thaw cycles, but has been groomed and compacted. Firm track.*

In a situation like this, with a firm track, displacement should not be a problem. The snow doesn't collapse under the ski. In this scenario, with dry cold snow that still is primarily fine crystals, the main concern is surface roughness and interlock friction. A very fine, shallow, base structure will minimize the opportunity for snow crystals to catch or lock-in on the ski base. If the track is very firm, a short front contact area might work well.

Case 2: *New fresh and falling snow that hasn't been compressed or machine groomed.*

This second situation is the bane of all the 'clydesdale' skiers. Soft snow that doesn't support the distribution of pressure on the ski will sink into the snowpack and often make a creaking crunching noise. Each stride will expend a sizeable energy cost compressing the snow, with very poor glide especially while climbing. This scenario points to ski selection as the most important factor. Choosing a ski with a progressive camber that distributes load over a large contact area will optimize the skier's ability to stay on top of the snow without sinking in. In cold conditions, the base structure should be fine and shallow, but the ski choice will trump all other factors with loose, soft, unpacked snow.

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In a Nutshell

In cold and dry snow conditions, if we were to be summarizing the ski drag concerns could be as follows:

Displacement and Deformation occur when the ski crushes the snowpack or shears and breaks snow crystals. Surface Roughness and Mechanical Interlock cause ski drag when sharp crystals interact with rough ski base features.

Strategies for minimizing drag in cold and dry, and soft/loose snow conditions.

In cold and dry conditions, or in conditions with loose, unpacked snow, these ski friction mechanisms are big factors. A strategy for minimizing the drag can be broken down into three parts:

Choose a ski that floats when the snow is soft, loose, and cold. A progressive camber with pressure distribution that distributes the load over a large area will float best.

Fine and shallow structures will be least grabby in cold sharp-featured snow. A deep structure, with sharp features, will be very slow and grabby in snow with fine crystal features. Shallow grinds, and grinds with interference patterns (with areas of reduced structure) will have smaller and fewer surface features to catch the sharp dendritic snow. These fine structures will typically feel less grabby, especially on climbs.



Consider the track conditions. When selecting the ski and structure, it's important to consider the conditions. On a hard track, a ski that has a small pressure distribution area will limit the

(Continued on page 7)

(Continued from page 6)

intimate contact. This will further minimize the area available for ski drag due to interlock and surface roughness. However, in very soft conditions, a stiff ski with a small contact area may displace snow (plow) and feel slow. Be aware that fine, sharp-featured snow crystals will have significant drag in aggressive structures.

Summary

A good strategy for maximizing glide starts with a good understanding of the all the mechanisms that slow down the ski. In dry, cold, and loose soft snowpack conditions, an understanding of displacement and deformation as well as surface roughness and interlock will help the skier analyze the situation on the trail. Choosing the right ski, with the right surface structure, with an appropriate wax choice will help minimize the total ski drag.

Postscript

This discussion has been limited to the description of Displacement and Deformation, Surface Roughness and Mechanical Interlock. Other sources of ski drag should be considered in other conditions. These other mechanisms will be discussed in further articles (or past articles).

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TAZZARI STONE GRINDING

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WINTHROP, WA

XC-SKI SERVICE & SUPPLIES



A very fine structure makes a big difference in cold snow!



Karin Camenisch on the move. (Ian Harvey Photo)

Methow Valley CPA Biz for Sale

For Sale: CPA practice in the Methow Valley. Do you want to be able to ski on the MVSTA trails on your lunch break during tax season? Small practice - 100% tax work. Growth potential, I have not been accepting new clients for years. I have been only preparing tax returns during the busy season and working in our orchard the rest of the year. Now it is time to be a full time orchardist. For more information call John @ 509-997-0888 or jr@methownet.com

Podium-Ready Skis at Ultratune



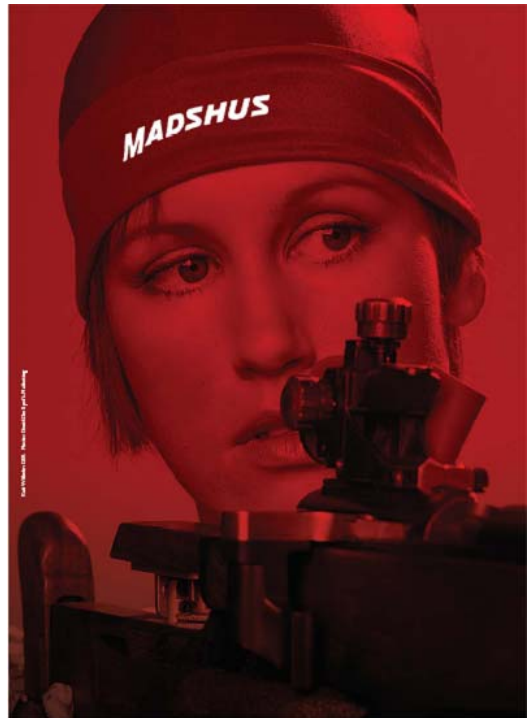
Ultratune continues to offer flex fit, hand picked skis during the 07/08 season. The price, including stone grind of your choice and hotbox service is \$479. If you'd like some, let me know! xcgrind@ultratune.net

The hand picked ski program works like this: You send me a note letting me know what you want; I'll need some size and weight info, along with information on preferences. Boot size helps, too. I'll pick skis for you, then I'll contact you for grind info and payment. They'll be stone ground, hotboxed, bindings mounted, etc, and shipped to you.

Ultratune still has a good selection of skis! There are some holes in the line-up, but we can fit most skiers. In addition, Ultratune is already reserving ski picks for the Autumn 2008.

FOR MORE INFORMATION

There's a review of the New Rossignol Xium Carbon and the Madshus Nanosonic Highspeed in the March 2007 edition of the Ultratune newsletter.



Ultratune Supports Washington Biathletes



*Photo Credit: Ian Harvey
Congratulations to Karin Camenisch!
Winner of the 2008 Supertour Sprint Title*

Hotbox Services at Nordic Ultratune

I routinely get emails asking for clarification of our Hotbox services. Here's what we offer:

Hotbox Basic - In our basic Hotbox process, skis are waxed with a warm paraffin and placed in the Hotbox for 90 minutes for thorough wax penetration.

Hotbox Deluxe - With the Hotbox Deluxe process, the skis receive an antistatic treatment using a special process, followed by a warm paraffin, then Hotboxed for 3 hours, providing super-saturation. The Hotbox Deluxe is highly recommended for all stone-ground skis, especially if you plan to race very soon after receiving your skis from the grinder.



Questions? Topics?

If you have any questions or topics that you'd like to see in the newsletter, let me know!
Send email to: xcgrind@ultratune.net

When to Stone Grind Skis

Skis are subject to damage every time you ski on them or wax them, or just leave them sitting around. Abrasive skiing conditions, heat from wax irons, and exposure to air all degrade your ski bases. The performance of your skis is greatly affected by the condition of the P-Tex and the surface condition of your skis.

If your skis have base damage, they can be improved with a fresh grind. Any of these symptoms can be remedied with a new base finish from Nordic Ultratune:

- *Surface scratches*
- *Over-heated, oxidized, dried out*
- *Skis won't hold wax*
- *No longer flat – convex or concave*
- *No structure remaining*
- *Skis just aren't fast as they used to be...*

In addition, you can choose the base structure that you need – whether it's an all-around structure for your one-and-only pair of skis, or a special purpose grind for specific snow conditions.



Please clean your skis - don't send them looking like this!

Why Grind New Skis?

The bases of new skis are better than they've ever been in the past. However, your new skis have probably been sitting in a warehouse for the better part of a year. Often new skis have dried-out, oxidized base material. **It's also common for new skis to have a relatively aggressive structure on the base which can be slow for all but wet or icy conditions.** Sometimes new skis have scratches and often brand-new skis aren't perfectly flat.



Notes from our Customers

----- Original Message -----

From: Grace Boutot
Subject: Received Skis

Mark,
I just received the Madshus skis and boots yesterday. Thank you so much for your great service! The skis look exceptional and the boots are great. I can't wait to try them on snow. Thank you again for everything. I will be sure to tell my teammates, coaches, and other skiers about your great service.

----- Original Message -----

From: Karin Camenisch
Subject: classic skis run fast

Hello Mark,
Thanks for grinding all the classic skis. I raced on one of the new skis (MVL) this weekend in West and thought they were running really fast. I was able to gap some skiers on the downhill!

Thanks again for all your hard work!
Karin Camenisch

----- Original Message -----

From: Kinkade-Schall, Kristi L.
Subject: RE: skis ready

Whoo hoo! The skis are AWESOME! They arrived on my doorstep Thursday as predicted. Thanks so much for all your help. I'm hopeful they will help me become a stronger more athletic skier! How could they not with the Espresso Grind?!

Thanks again Mark.
Kristi

----- Original Message -----

From: <Marko Gracer>
Sent: Wednesday, January 23, 2008 1:55 PM

Mark,
Congratulation for winning, it is first winning in Canada, hope not last...also first time that I was not with the team but it is great that you are a part of team... Champagne tonight for all...

all best
Marko

Notes from our Customers

----- Original Message -----

From: "Martin Rosvall"
Subject: Re: ski pickup?

Dear Mark,
I just came up from the basement after some prep work with the skis and I must say that it is a true pleasure to work with them after your grinding!

This weekend the ski season started for real in Sweden with the first big race in Bruksvallarna. The Swedish Television made a short interview with my Swedish grinder, Lorentz Söderhielm. It is of course in Swedish, but it might be fun for you to look into his garage. Anyway, he is a great guy who works 18 hours per day in his garage.

But he does not return your skis with a personal letter! I was so impressed when I found your letter. It is really helpful and will make it easier for me to evaluate and give you feedback on the grinds. Again, thank you very much for your careful work!

----- Original Message -----

From: Jon Engen
Subject: grinds

Thanks a million for the grinds a couple of weeks ago. The 615b has without doubt been the base of choice here in Sun Valley this year.

Jon Engen

----- Original Message -----

From: Randy Beckner
Subject: mvx

Hi Mark,
I just wanted to drop you a quick email about the grinds you did for me. I have always had great luck with the xco2 but my new favorite has to be the mvx. I was down in west last weekend for the Rendezvous. -21 on race morning but warming fairly quickly. I tested two pairs of skis and even at -8 the mvx was the fastest grind. I had easily the fastest skis of all the guys I skied with throughout the 50 K. What's even more impressive is that when I got home I didn't have time to rewax before the next mornings ski. In Helena it was 40 with transforming snow and the mvx grind still worked great!

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2007-08 WORK ORDER FORM & PRICE LIST

(Please attach one copy of this form to each pair of skis)

INSTRUCTIONS:

- Please: we must have a fully completed order form to begin work on your skis!
- A personal check or charge card info (Visa/Mastercard) must accompany your skis.
- Remove all wax from skis - there will be a \$5.00 surcharge for removing wax from skis.
- Tie skis together with rubber bands or tape - ski ties will not be returned.
- Fold this form and tape it to your skis. One work order form per pair.

SHIP SKIS TO:

**NORDIC
ULTRATUNE**
134 Riverside Ave
Winthrop, WA 98862

Grinds (all grinds include travel wax):

		Prices in US\$
LJ03	- general purpose "all around" grind; very good on classic skis	\$ 64.00
MVX	- universal layered cross-structure for skate skis in "east slope" conditions	\$ 64.00
MVL	- general purpose linear grind for classic skis in colder "east slope" conditions	\$ 64.00
615B	- fine, layered, interference pattern for skate skis in colder conditions	\$ 76.00
XC01	- for extreme cold conditions; linear grind with a secondary polishing stage	\$ 76.00
XC02	- for cold & dry snow; linear grind with a secondary polishing stage	\$ 76.00
SLC02	- an excellent klister grind for classic skis; a 2-stage compound grind	\$ 76.00
R2.3, R3.3	- for coarse, transformed snow, high humidity - 3-stage compound grind	\$ 88.00

Waxing (add to the above price):

Hot Box Basic	- paraffin wax with 90 minute hotbox soak	\$ 15.00
Hot Box Deluxe	- anti-static treatment followed by paraffin wax & 3 hour hotbox soak	\$ 25.00

Additional Services (add to the above price):

Binding Installation	(specify boot size _____)	\$ 12.00
Ultratune Flex Analysis		\$ 15.00
Rush order and overnight shipping (please call in advance)		\$ 35.00

Subtotal: \$ _____

Washington residents add 7.7% sales tax: \$ _____

Packaging, Shipping & Insurance: \$20.00 first pair, \$10.00 subsequent pairs \$ _____

Total: \$ _____

SHIPPING ADDRESS

SKI INFO

NAME		
ADDRESS		
APT / SUITE		
CITY		
STATE	ZIP	
TELEPHONE	()	
EMAIL		

BRAND		
LAST 4 DIGITS OF SERIAL NUMBER		
SKATE	<input type="checkbox"/>	CLASSIC <input type="checkbox"/>

SKIER INFO FOR FLEX ANALYSIS

SKIER HEIGHT	<input type="text"/>	WEIGHT	<input type="text"/>
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NOTES

DATE / /

CHARGE CARD PAYMENT INFORMATION

NAME ON CARD		
VISA / M.C.	<input type="text"/>	EXP <input type="text"/> / <input type="text"/>
SIGNATURE	_____	

