NORDIC ULTRATUNE UPDATE

News & Notes from NORDIC ULTRATUNE

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News and Notes

November 1st! There's new snow in the mountains above my home. The North Cascades are showing a snow line at about 4500 feet, and creeping downward day by day. We'll be skiing on freshly groomed tracks in just a few weeks.

The early snow on the mountains has a striking texture of white with streaks of granite. I'm in awe each time I see the spires wrapped in snow for the first time each year. The weather forecasts are pointing toward an outstanding snow season in most parts of North America and the anticipation is palpable.

In the shop, stone grinding is going full speed. Lots of skiers and teams are preparing for the ski season. The response to the new structures from the Mantec has been phenomenal.

Additionally, new skis have been flying out the door. About 90% of the pre-ordered skis have been shipped (a few pesky hard to find skis are still in the works). And there are a lot of great skis here in the shop if you decide you'd like a pair.

Follow the news.
Ultratune has a blog. Check it out at:
http://blog.ultratune.net

And our web site, of course!
http://www.ultratune.net

Thank you for reading the Ultratune newsletter.

We're well into the 6th season in Winthrop, WA, and our success is due to our focus on high quality work, and also due to our loyal customers who spread the word of their fast skis to friends.

Thanks!

-Mark Waechter

Schedule

During fall and winter, 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 (when the snow arrives) and a little time off.

In This Issue

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Classic Ski Glide Considerations

by Mark Waechter

When classic skiing, as compared to skate skiing, there are significant differences in the factors that influence ski speed. I'll address some of the variables that differ in the two techniques and how ski preparation can optimize performance.

It is important to acknowledge that classic skiing is affected to a great extent by the grip wax and ski fit. A ski with no grip won't go up hills, and sticky grip wax will create overwhelming glide problems. A poorly fitted ski will often have poor grip and poor glide, too.

With respect to glide, classic skiing differs from skate skiing in a few important ways.

- *Stop-Start Action* - Classic skis, during striding and kick-double-pole, come to a complete stop in the track with every stride. The classic ski has a repeated stop-start action.

- *Running in the Track* - Classic skis typically run in a track that is prepared differently than the corduroy skating surface. The track slots are more easily skied in – every skier uses the exact same ski path – and are usually more transformed than the skating lane.

- *Torsional Aspects* - Classic skis are not subject to very much torsional shear; the motion primarily is fore/aft, in line with the longitudinal axis of the ski.

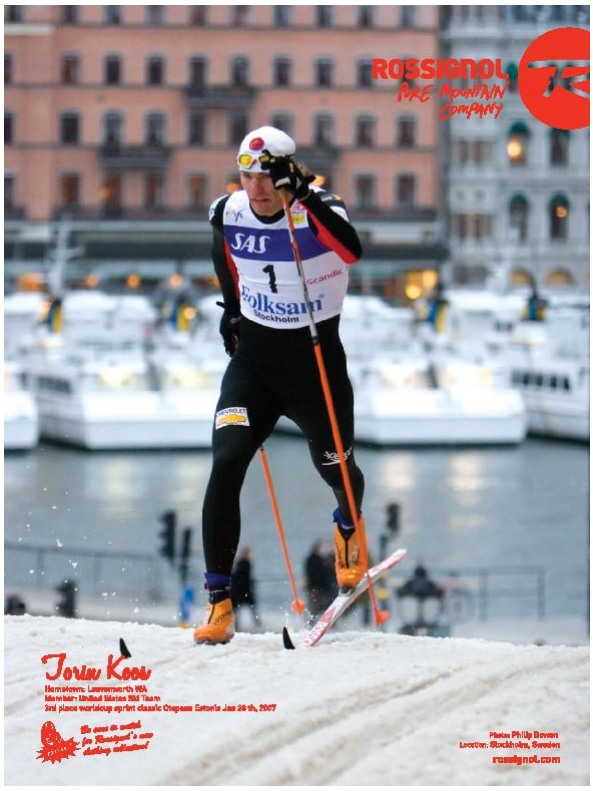
These variables don't all move in the same direction, and trade-offs are necessary to get optimum ski performance.

Let's examine these primary differences, one at a time.

Stop-Start Action

With each stride, each time you set the wax pocket, your "grip ski" comes to a complete stop in the track. The dynamics of the ski coming to a stop, and the release of the ski from the track, are unique to classic skiing.

The glide characteristics of the ski as it decelerates, stops, releases, and returns to the track will have a significant effect on race times. However, this variable is difficult to test objectively and at is typically tested by "feel", if tested at all.



Note that for skiers with good technique, the ski doesn't accelerate in the track from the stopped position (that only happens for "shufflers"). With good technique, the grip foot lifts up out of the track, and swings forward, landing in the track at full speed (actually faster than the velocity of the CG of the skier).

Slow speed stickiness is addressed by being sure to have a structure that releases easily – usually by making sure that there isn't too much "mechanical interlock" friction in the structure choice In effect, avoid an overly deep and "toothy" base structure.

Slow speed glide differences have the most impact on striding climbs. Since this is where most of the racing time is spent, it should be a primary concern.

Running in the Track

Classic skis usually run in prepared tracks. These tracks lack the significant surface features that are in the skate lane ("corduroy"), and since each classic skier uses the same line, the tracks get skied-in, transformed, and glazed much more quickly.

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The result is that in all conditions, except new falling snow, the classic track provides a much more "transformed" surface for the classic ski than the skating lane. With the wrong ski/prep, high speed descents feel like there's a top end limit on the ski speed. The top-end speed is often the one measurement that is tested with classic skis, since a speed trap can objectively measure this aspect reliably.

CXC's Brian Gregg striding at Soldier Hollow

In the track, whether double poling on the flats, or on descents, structure and glide wax considerations will be different for the classic ski than the skate ski. Usually the structure is more aggressive for in-track skiing.

Torsional Aspects

There is very little twist and side-slip force exerted on classic skis. In the case of skate skis, the interruptions and patterns in the base structure influence performance by creating a surface that releases easily under side-forces. The torsional forces are typically a non-issue for classic skis, and the bilateral symmetry in structure patterns aren't really a factor for classic skis (not a negative, but not a positive either).

Base Micro-Groove Considerations

Linear structures are still widely used for classic skis. Though linear structures are often "grabby" on skate skis, this is less noticeable on classic skis. However, the long uninterrupted grooves in linear structures can be susceptible to capillary propagation of moisture, which can be a negative. And the low speed stickiness of deep linear structures can sometimes be felt in the stop-start action of striding. Overall, the linear structures are more suitable for classic skis, though they continue to be de-emphasized compared with just a few years ago. At Nordic Ultratune, the XC02 continues to be very versatile for very cold temperatures. The MVL is a good all-around mid range linear structure for hardwax conditions, and the venerable LJ03 is still common for transformed tracks.

Patterned structures typically release more easily at low speed, and have discontinuities to deter capillary propagation. Keep in mind that for the same line spacing, the patterned structures are less aggressive, since the interruptions are zones of less structure. Ultratune's M1D has been very successful for klister skis and saw a lot of use at Callaghan Valley during the Olympics. Additionally, the d5 is very good at temps near 0C, including days with new snow near zero. The i5 is widely used for the "blue extra" days for hardtrack hardwax skiing. These patterned structures are not just for skate skis; they're increasingly used on classic skis, too.

Summary

Your choice of base structure is often not the same for your classic skis and skate skis on a given day. The differences in conditions for the classic track compared to the skate lane, and the differences in the skis themselves, plus the specifics of how you ski on the classic boards – all make a difference in the optimization of the ski for gliding. Choose carefully. ■

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WINTHROP, WA

High Tech Headlamps

by Mark Waechter

This season we've got two great headlamps for night skiing. The **Mila PLS100**, and this year I've added the **Petzl Ultra Belt Accu-4**. While most headlamps are adequate for walking (maybe), or camp chores (maybe), or reading in a tent, they don't really have a bright or wide enough beam to accommodate night skiing.

For me, the quest for a super headlight has been a result of needing to ski early in the morning or after work. In the dark, easy skiing with no trees (i.e. golf course skiing) isn't too bad. But that night-time run, through the trees, down *Sick Joke Hill* on skate skis might be more than you bargained for without something super bright.

Both models use remote batteries (on a cable). Remote batteries are important for night skiing because temperatures below 50F will degrade battery performance. The remote battery can be stashed in a warm pocket for the battery's sake, and also keeps the weight off of your head! The headlamps weigh very little on your head and don't feel clunky.

These two head lamps make night skiing a dream.

Petzl Ultra Belt Accu-4

The Petzl is the top dog. It uses power LED's for the light, and a lithium ion battery pack with a smart charger. It has regulated power output, so the lighting stays the sam. It doesn't start bright and slowly dim, it starts super bright and stays constantly bright. It automatically switches to reserve power when the battery is almost discharged. The Petzl has 3 light levels, and this version (the bigger battery "Accu 4") will run for 10 hours in the medium output level. Ski all night if you want to.

The Petzl Ultra Belt Accu-4

The Petzl has all the latest technology – microprocessor controlled, LED's, lithium ion batteries. Plus the ergonomics for the controls are the best. It's not cheap – the price for the headlamp, battery pack, charger, etc, is $499. But it is the very best headlamp for night skiing.

Mila PLS100

The Mila lamp is a very bright halogen head lamp with a very wide beam and a NiCad battery pack. A wide beam Mila halogen headlamp gives you a new way to see in the dark.

The Mila PLS 100 headlamp features both a 10 watt and a 20 watt bulb and gives you the option of two very bright settings. A key feature of the PLS 100 is the large 100mm (3.5 inch) reflector which provides a big wide beam of light. The adjustable headset is lightweight and has been designed to be both comfortable and to keep the light in place while running. The 6 volt, 9 amp-hour nickel metal hydride rechargeable battery attaches to the headlamp with a power cord and can be carried in a waist pack or hydration pack.

The Mila PLS 100 Headlamp modeled by Kelsey

This is a great light system for cross country or back country skiing, running, or any sport where bright lighting is needed. It comes with an overnight battery charger. Burn time: 5 hours at 10 watts; 2 hours 20 minutes at 20 watts. Weight is 200g (7 oz.) for the headgear and lamp. Battery weight is 630g (22 oz.). The price is $329.

If you need a super bright light for skiing, then the Petzl Ultra or Mila are the way to go. Send email to: xcgrind@ultratune.net if you have questions or would like one sent to you. ■

"Grind over the weekend" for 2010/11

Ultratune's "Grind over the weekend" schedule is intended to minimize turn-around time for ski service.

Batches of skis start the grind process each Thursday, and are shipped out on the following Monday. That will be our standard schedule again for the 2010/2011 ski season.

Here's why it works so well:

If you're an out-of-town skier, you can ski on Sunday, pack up your skis and ship them to Ultratune on Monday with delivery in time for the Thursday batch. They'll be back on the FedEx truck at the beginning of the week (4 days later), and you'll receive them on Thursday. If you work this out, you'll see that you miss only one weekend of skiing on your favorite boards.

To avoid missing any ski days at all, you can send your skis before the snow flies, but that would be too easy, wouldn't it? ■

Easy distance skiing at Silver Star in Canada

Lars Berger gets long glide

November Stone Grinding Schedule

You've been training this summer and fall to get the most from your skiing, so make sure your skis aren't a limiter.

Prepare all of your skis to run their best with a fresh grind and hotbox service. At Nordic Ultratune, a grind batch starts every Thursday and those skis are ready for shipping on the following Monday -- just 4 days later.

Return shipping is FedEx Express Saver, which is 3rd day delivery. So, skis that are shipped out on Monday will arrive back to you on Thursday.

Here's the upcoming service schedule at Nordic Ultratune. Use these dates to make sure you get your skis ready before your most important races.

- Skis in by Nov 4th will ship out on Nov 8th and arrive by the 11th.
- Skis in by Nov 11th will ship out on Nov 15th and arrive by the 18th.
- Skis in by Nov 18th will ship out on Nov 22nd and arrive by the 26th (the 25th is Thanksgiving day)
- Skis in by the 26th will ship out on Nov 29th and arrive by Dec 2nd.

You can see that there are still a couple of service batches scheduled before the big Thanksgiving week training camps (and races...). There is still time to get a fast grind on your skis before the season kicks off! But don't delay. Fast boards are a joy to ski on, and they're a real advantage.■

Part 2: Respiratory Muscle Training

By Margaret Waechter, M.S.

Ed Note: This is the 2nd part of a 4 article series. These articles originally appeared in the 2006/07 editions of the Nordic Ultratune Newsletter, and are being reprinted after several requests.

About the author:
Margaret Waechter has an M.S. in Exercise Science, and is an ACSM Registered Clinical Exercise Physiologist®. She runs the cardio-pulmonary rehab center at Okanogan-Douglas Community Hospital. No stranger to elite XC-Skiing, Margaret was a Canadian National Cross Country Ski Team member in the 1980's.

RMT Devices – A Short Review

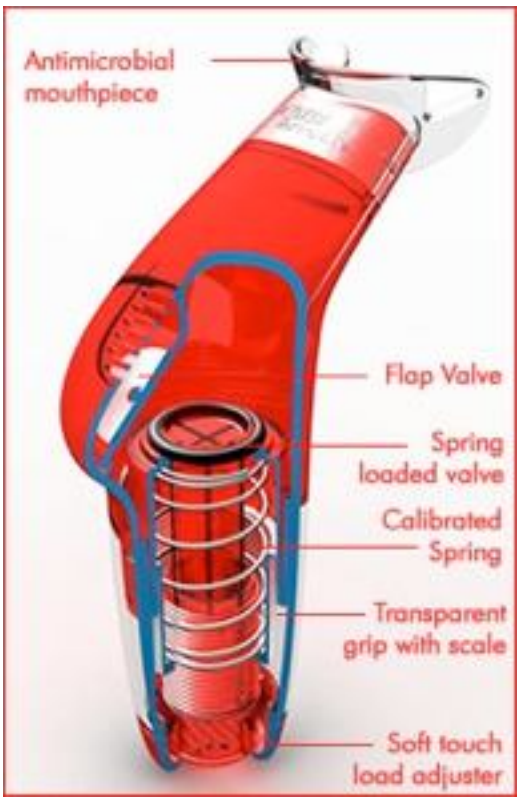
Research findings regarding performance improvements in respiratory muscle endurance after respiratory muscle training have been variable. Part of the problem lies in the type of load applied (resistive, elastic, or hyperpnoea), whether the load is applied progressively or constantly, participant motivation, learning effects, and variable breathing patterns (Eastwood, Hillman, & Finucane, 2001). This article will review two common types of Respiratory Muscle Training devices. An example of each type, and a description of how they work is provided.

Inspiratory Resistive Loading Device (IRL)

The first kind of device imposes a respiratory resistance or load and is called **Inspiratory Resistive Loading.** Typically individuals take 30 maximal inspirations at 50% of PI_{max}(maximum inspiratory pressure), 1-2 times per day (McConnell, A. K., ACSM national conference, 2006). An example of such a device is the Powerbreathe® (IMT Technologies Ltd, Birmingham, UK).

How the Powerbreathe® Works

Caine and McConnell (2000) describe seven desirable characteristics of an inspiratorymuscle training device. These include 1) Genuine threshold loading – flow initiated when threshold pressure is achieved, and flow stops when threshold pressure is not maintained; 2) Flow independent loading – i.e. resistance to inspiration remains constant irrespective of changes in flow rates; 3) A higher range of load selection so healthy people can use the device 4) Load selection continuous; 5) Loading is reproducible; 6) Comfortable and practical to use; 7) Easy to clean and maintain.



The Powerbreathe®

The Powerbreathe® provides true threshold, and near flow independent loading across the range of intensities that are considered physiologically pertinent. There is a spring loaded poppet valve in the device that is lifted from its seat to allow air flow into the lungs when enough negative pressure within the main body is created via inspiration to equal the spring generated positive force exerted on the valve. At high lung volumes this negative pressure becomes lower than the positive pressure on the valve, and the valve shuts. Expiration through an unimpeded flap valve allows exhalation to occur unimpeded. This is a pressure threshold training device (Caine & McConnell, 2000). It has been suggested that inspiratory muscle strength gains can occur using intensities at 80-90% of PI_{max}, strength, OR endurance gains at 60-80% of PI_{max}, and endurance gains at 60% of PI_{max} (Enright, Unnithan, Heward, Withnall, & Davies, 2006). *(continued on page 6)*

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Voluntary Isocapnic Hyperpnoea Device (VIH)

The second kind of device allows high flows and low resistance and is called **Voluntary Isocapnic Hyperpnoea (VIH)** training (Isocapnic Hyperpnoea is defined as abnormally deep or rapid breathing at constant arterial CO2 level). This requires hyperpnoea to be sustained continuously for 15-30 minutes, 3-5 days per week. It typically uses 60-90% of maximum voluntary ventilation (MVV). An example of this is the Spirotiger® breathing device, which is comprised of a mouthpiece attached to different sized inflatable re-breathing bags through a shuttle valve (Idag, Volketswill, Zurich, Switzerland). The Italian Nordic Ski Team was apparently using this device in the lead-up to the Turin Olympics, as well as members of the (*now disbanded)* Phonak Cycling Team.

How the Spirotiger® works

During heavy exercise there is increased cellular production of carbon dioxide (CO_2), and a corresponding increase in blood carbon dioxide levels. Ventilation increases during heavy exercise to supplement alveolar (those tiny sacs in the lungs) excretion of carbon dioxide. Hyperventilation allows blood CO_2 levels to remain constant. In hyperpnoea the link between blood CO_2 levels and alveolar ventilation becomes "uncoupled". This can lead to respiratory alkalosis. To prevent hyocapnea (low blood CO_2 levels) this training device uses a partial re-breathing system to increase inspired CO_2 levels. Different sized re-breathing bags with a valve system are used to allow partial re-breathing of the user's expired gases. It is important to get the proportion of "re-breathed gas" correct to prevent **hyper**capnea-induced respiratory acidosis and hypoxia, so the correct bag size is important (Passfield et al., 2005). However, in a small study using seven healthy subjects the increase in inspiratory CO_2 levels never became high enough to pose a significant health risk. Slight hypoxia was noted when the incorrect re-breathing bag was used. The hyperpnoea increased heart rate and blood pressure significantly, but did not acutely effect lung function measures and blood lactate (Passfield et al.).

Although much more expensive than an inspiratory resistive loading device, it may "do more" to improve endurance performance. There is ongoing study regarding the efficacy and safety of using this device for intermittent hypoxic training. This is certainly very intriguing work! For more information, Juerg Feldman at FACT CANADA (http://www.fact-canada.com/), is a wealth of great information on the Spirotiger®.

*The **Spirotiger®***

The Spirotiger has been used in a number of different ways that may be beneficial for improving cross country ski performance.

1. To improve inter- and intra-muscular coordination (small bag and high respiratory rate with stable O_2.)

2. Expansion training and mobilization (train diaphragm using bigger re-breathing bags and slower respiratory rates). This is seeking improvements in economy moving air.

3. Hypoxia and hypercapnia with bigger dead space for H+ buffering and Hct /Hb stimulation. Allows Intermittent Hypoxic training **and** respiratory training (Feldman, 2006, http://www.fact-canada.com/).

4. Clear Intermittent Altitude Training with motion. In this case one wants to stimulate hypoxia (decreased SaO_2) in connection with hypercapnia with additional metabolic activity for Hct / Hb as well as H + lactate transport (Feldman, 2006, http://www.fact-canada.com/).

5. Can be used to warm-up respiratory system before competition

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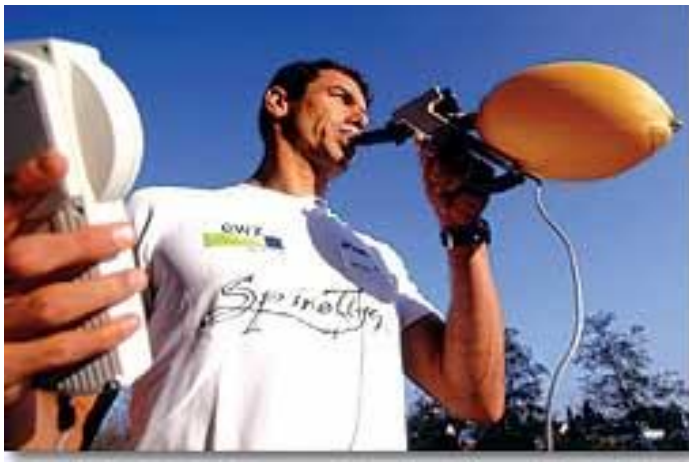

An athlete using a Spirotiger®

The elite athlete could / should adopt RMT training as part of a complete training program.

The busy master's athlete, who may be unable to tolerate as much intensity training, due to age and the demands of jobs and family, may find RMT a great way of stimulating cellular processes to improve performance without incurring muscle fatigue. How many of us have time to spend 14 hours a day in an altitude tent (never mind the financial resources to do so), or have access to typical modes of IHT (intermittent hypoxic training), or can spend time at "altitude training camps" in preparing for high altitude events? The Spirotiger may offer the benefits of IHT with a minimal financial and time investment. However, your co-workers may think you are crazy as you use this device in the staff room during your lunch break!

Caine, M. P. & McConnell, A. K. (2000). Development and evaluation of a pressure threshold inspiratory muscle trainer for use in the context of sports performance. *Sports Engineering, 3*, 149-159.

Eastwood, P. R., Hillman, D. R., & Finucane, K. E. (2001). Inspiratory muscle performance in endurance athletes and sedentary subjects. *Respirology, 6*, 95-104.

(Enright, S. J., Unnithan, V. B., Heward, C., Withnall, L., & Davies, D. H. (2006). Effect of high-intensity muscle training on lung volumes, diaphragm thickness, and exercise capacity in subjects who are healthy. *Physical Therapy, 86* (3), 345-354.

Feldman, J. (2006). http://www.fact-canada.com/. October 25.

McConnell, A. K., ACSM national conference, 2006.

Passfield, L., Dobbins, T., Myers, S., Reilly, M., & Williams, E. M. (2005). Acute cardio-respiratory changes induced by hyperpnoea using a respiratory muscle trainer. *Ergonomics, 48* (11-14), 1423-1432. ■

A Methow Valley ski trail.

The Updated Grind Menu

With the addition of the new Mantec grinding machine last season, and also as a result of collaboration with serviceman Stefano Vuerich of Val diFiemme, Italy, the grind menu was updated with new offerings during the 2009/2010 season.

I've been working at World Cup events since 2005. Through these channels I first became familiar with the quality of the base structures produced by the Mantec equipment. It was Gianaluca Marcolini who suggested that I get in touch with Stefano Vuerich, the leading World Cup ski serviceman who grinds a big percentage of all the skis on the World Cup circuit.

The Mantec Ski Numericontrol 140 arrived in October 2009, and along with the machine are some of the successful World Cup grinds from Europe.

Updated World Cup Structures:

- M1D - warm, wet, transformed conditions. Skate or classic klister grind.
- D5 - universal layered cross structure; typically 0C to -5C
- i5 - angle-biased structure for medium conditions, typically -2C to -10C
- S2 - fine, symmetrical pattern for cold conditions; typically -5C to -20C
- S1 – very fine, symmetrical pattern for very cold, fine, dry conditions; typically -10 to -22C

Linear Structures from Ultratune will remain unchanged:

- LJ03 - linear grind for temperatures near 0C.
- MVL - general purpose linear grind for classic skis, finer than LJ03
- XC02 - for cold & dry snow; linear grind with a secondary polishing stage

The grinds on the menu are proven structures that are fast and very versatile. The new World Cup structures are good on classic skis as well as skate skis. These structures are all grinds that I've used and tested on the World Cup and at the Olympics, and the performance data and race results attest to their quality.

Download a workorder form, and send some skis! Spring and summer is a great time to get the skis prepared for the coming season. ■

The Mantec Grinder at Nordic Ultratune

Team Service

If your team or club wants to save some money, you can get a **team discount** at Ultratune.

Who Qualifies?

Your group can be considered a "team" if you can gather 15 pairs of skis or more. If you and your training buddies can gather 15 pairs, you're a team!

The skis should all be sent (or delivered) as a single group, and return shipping will be to a single address. Typically, with team service, work is done at a flat package rate, with all grinds at the same price for simplicity. No "separate checks" – a single "group payment" is recommended.

Call 509.996.4145 or email xcgrind@ultratune.net for further details. ■

Some new Madshus skate skis ready for tuning.

The Nordic Ultratune Hand Picked Ski Program

The hand-picked ski program continues for the 2010/2011 season. You get the skis you want, picked from the best possible selection, and they arrive before the snow flies.

Atomic, Madshus, and Rossignol all have significant upgrades to their skis (and new graphics, too).

For the upcoming season, the following models are available:

Skate skis:

- **Atomic Featherlight Skate - $549**
- **Madshus Nanosonic Skate - $599**
- **Rossignol Xium WCS Skate - $599**

Classic Skis:

- **Atomic WorldCup Classic - $549**
- **Madshus Nanosonic Classic - $599**
- **Rossignol Xium C2 Classic - $599**

Specialty Classic Skis

- **Atomic WorldCup Multi/Rubber - $549**
- **Madshus Nanosonic Zero - $599**
- **Rossignol Xium C2 Rubber - $599**

I work closely with the ski companies, knowledgeable world cup skiers, coaches, and servicemen to get the best possible information on ski fitting for each brand and model that Ultratune sells.

Precise tools for measuring camber and flex.

All skis are selected using the Ultratune Digital Flex Press in our shop. Some will be pre-selected at the ski warehouse, but they'll always be tested and flex verified in our shop.

Whether you choose a ski from Atomic, Madshus, or Rossignol, the performance will depend on fit and finish. A well fitted ski with a fast base finish will result in great performance.

You get a ski with correct flex, picked for the intended use, with a great Ultratune base grind for the intended conditions. They're saturated with wax in our hotbox and delivered to you.

If you would like a pair of skis, send a request. ■

Send an email to xcgrind@ultratune.net with information:

Your Name

Weight – how much do you weigh with your ski clothes on?

Height– how tall are you?

Ski type – skate ski or classic ski?

Which ski? If you know the model and size that you want, tell me. If you have questions about the skis, ask. I usually reply to emails in less than a day, even in the summer.

A short description of what you're looking for. This can be as simple as "an all-around ski", or as specific as you can describe. Will the skis be your one-and-only pair, are the skis intended to fill in a specific purpose among many pairs of race skis. The more information you provide, the better able I am to choose the right skis for you.

Stone Grinding. If you know the base grind you'd like, then include that. Don't worry - I can help with the choices.

A phone number. At some point, we'll need to talk, so send a number.

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MADSHUS ATOMIC ROSSIGNOL PURE MOUNTAIN COMPANY

Stone Grind Your Skis!

Skis are subject to damage every time you ski on them, 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:

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

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. ■

The stone & drive wheel on the Mantec Grinder

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 wax and placed in the Hotbox for 90 minutes for thorough wax penetration. **At $15 it's a bargain.**

Hotbox Deluxe - With the Hotbox Deluxe process, the skis receive an antistatic treatment using a special process, followed by 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. ■

Let's Be Specific!

Skis intended for specific conditions need to be structured for the best possible performance. Nordic Ultratune can help you choose the best base structures for your needs. Get rid of excuses by getting the skis prepared for top speed, right away.

It is certainly true that the p-tex bases on new skis are better than they were in the past. But it's very likely that your new skis have 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.

Naturally, you want fast skis. A grind and hotbox will have them race ready. ■

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

NORDIC ULTRATUNE

2010/2011 SEASON - 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.
- Include this form with your skis. One work order form per pair.

SHIP SKIS TO:

NORDIC ULTRATUNE
134 Riverside Ave
Winthrop, WA 98862

UPDATED WORLD CUP STRUCTURES!		Prices in US$
D5	- universal layered cross-structure for skate or classic skis; typically 0 to -5C	$ 64.00
i5	- angle bias cross-structure for medium conditions, typically -2 to -10C	$ 64.00
S2	- fine, symmetrical interference pattern for cold conditions; typically -5 to -20C	$ 64.00
S1	- fine, symmetrical interference pattern for very cold, dry, new and fine snow conditions;	$ 64.00
M1D	- warm, wet, transformed conditions. Skate, or warm klister grind for classic skis	$ 64.00
LINEAR STRUCTURES		
LJ03	- linear grind for temperatures near 0C.	$ 64.00
MVL	- general purpose linear grind for classic skis in colder conditions	$ 64.00
XC02	- for very cold & dry snow; linear grind with a secondary polishing stage	$ 72.00
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):		
Minor edge damage repair		$ 8.00
Binding Installation	(specify boot size_____)	$ 12.00
Ultratune Flex Analysis		$ 20.00
Rush order and overnight shipping (please call in advance for pricing and scheduling)		

Subtotal: $_____

Washington residents add 7.7% sales tax: $_____

Packaging, Shipping & Insurance: $25.00 first pair, $15.00 subsequent pairs $_____

Total: **$_____**

SHIPPING ADDRESS

NAME

ADDRESS

APT / SUITE

CITY

STATE ZIP

TELEPHONE ( )

EMAIL

CHARGE CARD PAYMENT INFORMATION

NAME ON CARD

VISA / M.C. EXP /

SIGNATURE V-Code

SKI INFO

BRAND

LAST 4 DIGITS OF SERIAL NUMBER

SKATE CLASSIC

SKIER INFO FOR FLEX ANALYSIS

SKIER HEIGHT WEIGHT

NOTES

DATE / /