

Nordic Ultra-Tune Update

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Fall Edition, September 2004

Volume 7, Number 1

Welcome!

Welcome to the 2004-2005 ski season! By the time you get this, Nordic UltraTune will be up and running with a new set of diamonds, a new stone, and some new grinds: one fully developed, and another under development. I'll keep you up to speed on the developing grind: I'll need to do some cold weather testing with the help of Patrick McGownd in Anchorage, but I have high hopes.

NUTS Stuff

Grinds

The new, fully-developed grind is Z40, developed by Zach Caldwell. This is an extremely fine cold-weather grind that did very well at national championships last year. It seems to be very like our already-popular xc02: a temp range from -4°C down to -20 or so, but while the xc02 is best in aggressive, dry snow, the Z40 tends to like higher humidity. In other words, the xc02 is likely to be best in areas such as the Rockies - Colorado, New Mexico, Utah, parts of Montana; while Z40 will be better in higher-humidity areas, such as the East Coast, the Northwest (if it ever gets cold) and Anchorage.

The grind under development is a two-layer structure which will seek to widen the range of application of Z40 (and maybe xc02).

As Z40 and xc02 are still "under exploration" - we are still finding out when each one is best, when to use them, even how to apply them (more of this below) - they will carry an Extra Guarantee: if they do *not* work for you, or if the one you pick proves not to work as well as the other, I will happily re-grind *at no charge*. But then, that's the standard Nordic Ultratune guarantee: "If there is a problem, we'll fix it. - Period."

The problem with both grinds, from the technician's point of view, is that both structures are so fine as to be pushing the capabilities of the diamond and the stone to the edge. In fact, in both cases, but especially the Z40, the diamond has to be specially sharpened, or the grinds are impossible to do at all. Clearly, shaping a diamond is difficult, so we apply these grinds after cutting a CD grind (the central part of an "R" grind, where the diamond dresses the stone in two directions, at differing speeds), and after filing the steel around the diamond as well. It's hard to do, hence the slightly higher charge on both grinds.

Zach is currently working on a new diamond system just for this grind. To follow up, or to have the Z40 Master do this grind himself, please see Zach's website at <http://www.engineeredtuning.net/>

Schedule

Last fall the amount of work coming into the shop overwhelmed me and ski return was slower than I liked; the first half of the year was busier than I have ever seen, with well over 50% of annual turnover in the first three months. On the other hand, after-Christmas business fell off equally dramatically. In an effort to keep business at a more even level, I am running ads in several major national ski publications. These are likely to add to the work level in the fall as well, but as they don't come into effect until mid- to late October or even November, the time to have your skis done to avoid the rush, is **NOW**.

I'll have to ask for some understanding, and some help: last year I simply gave up training and skiing, and felt awful by spring. This year I am going to train daily, and try to get to a camp or two, some races, Nationals, and perhaps the Birkie, with Zach. I will do all I can to get skis done as fast as is in keeping with quality work, but please be understanding if I slip out to run or roller ski, and am closed on weekends. I'm just not quite ready to sacrifice skiing to the ski business! Please get skis in as far ahead of need as you can.

In order to speed things up, please:

- 1) **No Styrofoam "peanut!"** I can't cope with them, and will simply return, unopened, ski boxes packed with them.
- 2) **Please fill out the Work Order Form completely and clearly**, and include a check (if checks are wrong, I will refund, or e-mail you; if I feel you have ordered the wrong grind, I will call or e-mail); I generally have to stop and make several phone calls about checks, etc. with every batch, and it does slow things down!
- 3) **Remove all wax from the skis.** Get klister out of the groove. If wax gets into the stone, the stone has to be re-set, which takes time and costs a lot; if I have to remove wax, it's another time drain.
- 4) **Pack lightly:** generally, all you need it to tape tips together with a bit of paper, foam,

or cardboard between them, and wrap some bubble wrap or a few newspapers around the middle to protect the bindings. It can, literally, take *hours* to unpack skis when a lot of them are swathed like King Tut. It's not necessary: even loose skis in a bag arrive quite safely, and we have never lost even one (though there may have been a few which should have been lost...)

Wax

I am able to travel wax and hotbox now with Star, Swix, Toko and Solda. If you have a preference in this area, please add a note to the Order Form. No extra charge. But *please note:* I can only do the multi-layer **World Cup Plus** with Star and Toko: no aspersions at all on other brands, but it is simply too expensive to stock the full line of soaking paraffin, graphite/moly hard-matrix wax, and fluoroparaffin in all brands, and in several hardnesses (the final layer of the World Cup Plus service is grind-appropriate: R grinds get softer waxes, LJ grinds something in the middle, xc02 and Z40 something fairly hard).

I have been working with Toko to develop a special-order hard-matrix Moly LF wax, which should function as both an anti-static *and* a base-hardening layer. This will be available sometime this fall, but is for in-shop use only, and not for sale.

The Phone & Communications

This is a one-man shop. If the machinery is running, especially if there is a ski going through the grinder, I simply can't answer the phone, so *please:* leave a message! I'll get back to you as soon as I can – and may even be able to make it by the time you've left part of your message. So don't hang up if you hear the answering machine!

If you can e-mail, that's even better: I come into the shop early and set aside time to answer all e-mail, as well as checking it through the day. As a phone call often means turning off the machinery, then re-

starting it, a phone call can result in significant “down time.” Multiply that by several calls, and the result can be slowed production. So please, if your question is answerable by e-mail, contact me at natxcgrind@yahoo.com. (Please note that the Verizon address - nathaniel.brown6@verizon.net - is for newsletter subscriptions only. It's on outlook, and I got 1,022 spam “messages” in July alone – so e-mail to that address may be lost in the onslaught.)

The Book

Some of you will already have a copy of my *Complete Guide to Cross-Country Ski Preparation* (Mountaineers Books – available at Barnes & Noble, REI, or through your local book shop – or ask your local ski shop to stock it!). I must have missed something, because I was completely surprised this spring when a *Russian* edition popped out of the mail! I can't read a word of it, so I'm not sure how closely it follows the original, but apparently the first edition sold out, and there's now a second printing. What a kick!

A Plea!

Would the customer who borrowed my Madshus classic skis and forgot that he had them please find a way to get them back to me? They're my only good classic skis!

Stone Grinding - is it for you?

For quite a few years, top racers have known that stone grinding is the best way to get the most out of their skis. At the last Olympics, the Swedes and the Germans combined resources to fly a Tazzari stone-grinder in from Sweden, and rented a house and shop close to the Olympic venue, in order to be on the spot with the most up-to-date stone grinding technology available. The amount that this cost - flying two tons of

equipment from Europe, and renting a house in a town hosting the Olympics! - is some indication of the importance of stone-grinding at the top level of our sport.

But is there an advantage for the average citizen racer, or for the recreational skier?

Unequivocally - yes!

I have almost always had fast skis, but my initial reaction to skiing on newly-ground skis was amazement that such a difference was possible. Other skiers who have tried my skis, or had theirs newly ground, can usually be summed up in one word: “Wow!”

Why do my skis need grinding?

To understand why your skis need grinding, it is useful to understand what a base is. To simplify greatly, a ski base is made up of a plastic very similar to the material that is used to hold soda cans together in six-packs. This plastic is shredded, or *sintered*, and then compressed, under heat, into a block resembling a cheese wheel. The wheel is peeled into 2-4 mm thick strips, and these strips, colored and with various proprietary additives (graphite, fluoros, etc.) are trimmed to the desired width to form the base of your skis. To simplify even more, what you are skiing on resembles a sponge, or perhaps a scrubbing pad: irregular bits of plastic joined together, with open spaces between them.

Many top racers automatically have their skis stone ground as soon as they leave the factory. Most factories do a very good job finishing their skis, but the

grinds they put in the bases are usually generic, and because these grinds have to last, they often more aggressive than real race grinds. In addition, the factory simply does not have the time to fine-tune either the machinery or the process, and as a result, bases are often partially spoiled by heat created by grinding the thousands of pairs of skis that need to be produced as fast as possible

It takes up to twenty minutes just to grind one pair of skis - you'll see why, below. In addition, custom grinders buff and wax each pair, and in my shop, hotboxing is also an option, adding another forty-five minutes to the time spent on each ski. Factories simply cannot afford to spend this much time on each pair.

As the ski is stored and handled, the base picks up dirt and ages. Both these processes tend to seal the base, and prevent it from absorbing, or holding, wax.

But by far the most common source of base damage that I see is from over-heating the base while ironing, and I'd estimate that around 90% of the skis I see have been over-heated. It's important to remember that bases begin to melt as low as 85°C, and go into complete meltdown at 135°C. Most cheap irons will go much hotter than this, no matter what the temperature setting, and the application of colder paraffins and of pure fluorocarbons often means that an iron, especially one with a poor temperature control (we have documented temperature fluctuations of up to +/- 20° on a cheaper iron) will often heat up well into the danger zone. The result is a melted, or sealed base that will not accept, or hold, wax because the

open spaces between the "bits" are blocked.

Careful Ironing is a must! I always rub on a layer of paraffin before ironing, to ensure that there is *always* some wax between the iron and the base. Then I drip some more wax on, just to be sure: you can't use too much wax! In my shop, I keep a couple of brackets on the wall above my work bench (a pair of steel shelf elbows will do very well). With my iron set as low as possible, I iron the ski in one, continuous pass down the length of the ski (or glide zone), being careful never to stop or concentrate too much heat in one place. Each pass takes around 30-40 seconds. I do this five times, then place the ski, base up, on the bracket, and wax the other ski. When Ski Number Two has had its five passes, I put *it* on the rack, and iron Ski Number One again. I alternate back and forth until I have ironed each ski three or four times. The wax does not need to be molten the whole time! Wax is absorbed as a product of temperature/time, so the idea is to keep the ski and wax warm for as long as possible, avoiding high heat. (A hotbox is wonderful for this)

So what is stone-grinding?

When stone grinding a ski, the operator feeds the ski through a complex, purpose-built machine. In the machine, the ski is pressed against a rotating grindstone by a rubber-coated "feed wheel." This process removes old base material from the base of the ski, "opening" the base so that it will absorb wax more efficiently, as well as flattening the running surface and removing all but major scratches. The final product is a base with tiny "rills" in it - tiny grooves reminiscent of the

grooves on a phonograph record (anybody remember those?). These rills are designed to break the suction that is created between the ski and the snow by water droplets, which are either created by the friction of the ski moving over the snow, or by water already present, as in spring skiing.

That's the simple explanation - and about all you get from a stone grinder that is set up to service skis cheaply and quickly at a non-specialist "outdoor" shop. Usually, you get what you pay for, and skis are often made even worse by inexperienced operators or poor machines. **Rule Number One:** *make sure you send you skis to a cross-country specialist who can custom grind your skis.*

The Custom Process

A good custom grind will involve at least three stages and numerous precautions to ensure optimum results. The skis that I work on go through at least these stages:

1. **The flattening stage:** worn and sealed outer layers are removed. This "opens" the base to accept wax. Most scratches are removed.
2. **The polishing stage:** the base of the ski is polished, in order to leave a completely blank surface; in this way the base is a *tabula rasa* and the final structure (the "rills") goes into the base cleanly, not as a hodge-podge of grinding marks.
3. **The structuring phase:** the skis are passed through the machine one final time (or in the case of compound grinds - grinds which are layered, or different on different parts of the ski, the ski may pass through two or

three time), and the structure is cut into the base.

Structure

The various patterns of structure that we can put into a base are controlled by stone speed, feed speed, and the speed and pattern with which the stone is "dressed" for the structuring phase, giving us an almost infinite variety to work with.

We test as much as we can, because different types of structures work best in different kinds of snow and new ideas are always coming to the fore (the newest structures are tending to be both finer and shallower than what we have seen before - or what we were able to produce before) and each development gives racers an edge on the competition.

At the same time, for citizen racing or recreational skiing, it's usually enough to go with a broad-ranged structure for predominantly wet, or predominantly dry snows, and any good custom grinder will be able to help you select the grind that will work best in the snow you normally ski in. It's useful to remember **Rule Number Two:** *almost the right structure is almost always as good as the right structure!* In other words, *keep it simple!*

Don't stress about the fine gradations: they may take seconds off World Cup racer's time, but after custom grinding your skis will be so much better than they were that you will hardly recognize them, and in many cases, they will perform better than they did when they were new! (**Hint:** *never throw an old pair of skis away - have them ground instead!*)

Why is custom grinding expensive?

A good custom grind will cost from around \$60 to around \$90, with more added on for extra waxing, etc. Why is this so?

There are quite a few things that custom grinder do, to ensure the best possible results for your skis - all expensive to do:

- The grinding stone is sharpened, or re-dressed at frequent intervals, ensuring a far cleaner “cut” than a factory or sports store grind. Any dressing of the stone is expensive in terms of lost stone and lost dressing diamond: stones cost around \$1,000, and diamonds are not only a skier’s best friend, but expensive (as of writing, we are working on a new kind of diamond for very fine structures, so a shop will now need several *kinds* of diamonds).
- The stone and the base of the ski are continuously washed with *filtered* water, to keep dirt out. Filters need to be cleaned and/or changed often.
- The base is chilled with *refrigerated* water, to avoid over-heating, and to ensure a better “cut” by working with a colder, more rigid, base. Refrigeration equipment is expensive to buy and to run.
- Research into new structure patterns, new methods, and feedback from top athletes are on-going, and take time and money.
- All this is very labor-intensive, and requires considerable skill and experience.

Conclusion

An investment in stone grinding will not only enhance both the pleasure of skiing (and results!) - but should be viewed in a perspective that includes the amount you have invested in poles, boots, bindings, skis, travel, training and trail passes. Stone grinding is a small additional investment in view of all this!

Finally, **Rule Number Three**: send your skis to a custom grinder! Avoid local “outdoor” shops, who do not have the machinery or the skills and experience.

Give stone grinding a try - you’ll be delighted, whether you skis are old or new, whether you race or just enjoy a day out on skis. I guarantee it.

Training

A local junior skier named Ian has been trying to lure me back into doing some coaching. I’ve tried to help out with some advice from time to time, but one of my convictions is that to be a really good skier, one goal needs must be to learn enough to become self-coached. To do this well, you need to get advice from as many good sources as you can. To this end, I put Ian in touch with Ryan Quinn and Jordan Goldwarg, and the correspondence developed as following.

(I had meant to send this out in the spring, but an illness in the family prevented me from getting the last spring letter out. Some of this may be a little off-kilter for this time of year, but there is so much good, solid advice in these letters, that I offer them now.)

Ryan wrote:

Planning:

Planning monthly hours – I think total monthly hours should increase slightly (by 5-7 hours) each month from May

through August. September is a good time to take an easier month because there is usually the added stress of starting back to school and a need to recover from a good summer of training. If you've done solid training over the summer, the months of October-December are the most important to getting you race-ready for the season, so you want to be rested going into these months. I like to use the model of building up hours as the summer progresses, taking a lighter month in September, and building up again in the late fall/early winter.

Planning weekly hours – I think that the weekly hours planned each month should combine a mix of hard weeks and recovery weeks. For example if your plan for June was 40 hours, one week might be 8 hours, then 9hrs, then 11hrs, then 12hrs. The important thing is that the body actually builds strength and endurance through the recovery periods, so you can't try for your maximum each week. Also, if the hours per week become too consistent (e.g. 10 hours every week), the body can fall into a rut and leave you flat—too tired to go longer or faster.

To plan your weekly hours, use your monthly hours and break them up in to 4 weeks with increasing volume. To plan your monthly hours, pick a goal for the year's total hours and break it up into building cycles over the summer and fall, and maintenance months in the early winter and spring. The majority of your training hours happen in May-Dec (with a lower volume month in September). Again, it's better to not do the same number of hours from one month to the next. Increase them as you go to challenge your body and build capacity, but then rest so that your body can actually have a chance to get stronger.

It can be difficult to decide how many hours in the year you should do, and you will get better at it as you have more years of keeping track of all of this to draw from. But as a general parameter, you don't want to increase hours from one year to the next by too big of a jump. If you've been keeping track of your yearly hours, increase them by 15-17% from last year. If not, shoot

for about 400. But even when you decide what it is, don't put too much emphasis on this number. It can and will change. It's just a number—a guideline to help you plan your months, weeks, and days on paper.

Listen to your body and keep a log for your own purposes. Don't live by it and don't be afraid to change the plan if you need to. I think of my training log as more of an experiment, to help me learn about my body and about how it responds to training. You want to know what it feels like to have a great interval session and be feeling really good, and then you want to be able to look and see what you did before that. It's equally important when you have a bad race or get sick, to look back and see if any training you did in the weeks before that was too hard.

Judging from your plan it looks like you already know this, but I think it is very important to have one rest day each week. It's good for your body, good for your social life, and good for your sanity.

Intervals:

To get the most out of intervals, you want the hardest and most important interval sessions to occur at times when you are most rested, or at least when you are not tired. On a recovery week the focus is to recover, so it's probably better not to do hard intervals this week. But the week after is a good time to focus on quality intervals. Put in the best quality and the most explosive intervals when you are not worrying about how many hours you have to get that week. In other words, don't try to do the hardest interval session in the middle of your biggest volume week.

May/June – I never did more than one interval session per week in May and June, and they were usually longer, easier intervals, such as 4x8min at a good cruising pace, but not anywhere near a max effort. In May and June I liked to do intervals by biking or hiking or something else other than bounding and roller skiing. This is because running, bounding, and roller skiing are very important later and I don't want to

burn myself out of them. The important thing in this period is to get the blood and oxygen flowing and let the body become efficient at going fast. This period is also a good time to think about technique when you are doing intervals or easy distance training. Ski walking intervals are great at this time of year if you are in the mood for something more ski specific. Just think about good body position and other general technique stuff. Then this technical stuff will already be more automatic when you start going hard. If you start thinking about technique early in the season, you will also get more out of serious technique sessions that you should do later in the summer and fall.

July/Aug – This is the time of year when I started using roller skiing and running more often. Intervals can get harder now, and shorter, and you can do more of them. But you still don't need to do much more than once a week. Maybe every 5 days or pick two weeks a month were you do intervals twice. There are so many different ways to do intervals and you take advantage of this. Mix it up by doing some at max effort, e.g. 6x4 min hard, and then for the next session do something like 3x10min and a medium pace, and then the next one can be 8-10 x 45 sec. Also mix it up between double-pole, running, hill bounding, etc. Variety is good. Try not to do too many intervals in the 1-2 minute range this time of year. I think speed is good (like 30-45 sec sprints) because this is a different type of muscle and sprinting is becoming a bigger part of skiing. But when you to a bunch of 2 min intervals, it tends to encourage your body to peak and become too race-ready, which is not good this time of year. No matter what kind of intervals you do this time of year, always have a **full** recovery in between each interval. This is important so you can go harder on each interval and give your body time to recover and build. As a side note, I always liked to substitute some of the interval sessions in July/Aug with races or time trials, such as running a 10k or getting in a bike race. I never worried too much about results in the

race. It was more to do a sustained effort and compete.

A note on hard intervals: The key to hard intervals is being able to go as hard as you can throughout the full interval session. To be able to do this, you must be rested beforehand. I think of it as extremes—go as hard as I can on the hard days, rest as much as I can on the rest days. Skiing is a dynamic sport and the training should be dynamic

Strength – a note:

To get the most out of strength sessions, it is important to allow enough recovery between them. I did one strength workout approximately every three days. If you must do strength more frequently than that, try to use different muscle groups from session to session to give the ones you just worked more recovery.

May/June – Strength is important during this period, but it can be general. Don't feel like you have to be roller skiing all the time. That is more important later and you don't want to get sick of it. Good strength for this period is push ups/sit ups, back exercises, other circuit training. Other activities like swimming, kayaking, and biking also isolate some good ski muscles and can count as general strength.

July/Aug – In this period, keep up the core strength (abs/back), but add more specific strength. You don't need to do strength any more often, but the strength sessions can get more intense and more specific to skiing muscles. Recovery is still important in between. I would usually do double-pole repeats on hills, long easy double pole roller ski workouts, and skating without poles during this period.

Hope that is some helpful general information. If you have any questions about anything, send me an email and I'd be happy to try and answer.

- Ryan

Ian wrote:

- Ian

Thanks for your comments on my ski-plan. It was put together as a complete stab in the dark, and I'm just beginning to understand the breadth of the naiveté that I show in it. This year my training was almost exclusively 1hr tempo runs, which I did 5 times per week. I now realize just how primitive my methods have been. I may have met you before... I know for sure that you've blown me away in at least 1 race. I'm going to restructure The Plan and craft it according to your input.

For the Second Edition many things will change, but I will primarily (correct me if I'm wrong):

Figure weekly hours and vary them into some sort of scheme, perhaps a monthly crescendo or such.

Use far fewer but longer intervals in the beginning of the season, emphasizing full recovery.

Insert some sort of core-strength regimen Include more designated rest time (perhaps full rest days and some easier weeks).

Your advice went far and beyond amendments to the plan, but I think these are the core changes that you suggested I make. I do have a few specific questions, if you don't mind entertaining them.

How much running do you actually do? Do you spend a lot of your time in the city pounding pavement on city streets?

Have you ever figured out any good roller skiing in Seattle?

Do you split your r'skiing evenly between disciplines and how much do you try and isolate on thing (like no poles or poles only)?

Ryan responds:

Yeah, those sound like the main points to look at when creating/revising The Plan. In the last few years, "Core strength" has actually developed into its own school of thought. I was referring to it more in the general sense—sit-ups of all kind, medicine ball throws, even some isolated double pole exercises—basically, anything that works the torso muscles. I don't think it has to be as fancy as some people have made it.

To answer your questions:

How much running do you actually do? I've been in Seattle only a year so I'm a little new to this kind of training terrain. This winter I did more running than usual because I couldn't go up to the snow as often, so I was skiing less, running more. Obviously, when there is snow, skiing is always the best. But for certain workouts, say a short recovery session, running serves the same purpose. You don't need to drive all the way up to the passes to do a 30 min ski. In the summers and fall I did a ton of running. I think running is the best thing for consistent aerobic training (until there is snow.) Roller skiing is better for strength and technique, but it's not as consistent and flexible, especially, as you know, in the city. I don't know if any of that answers the question, but running has always been the main part of my summer and fall training.

Have you ever figured out any good roller skiing in Seattle? No, but I haven't really looked for it. This was my first year not doing "serious" racing and training, and I never got out rollerskiing. Probably because I didn't know where to go. Nat might have a better answer.

Do you split your r'skiing evenly between disciplines and how much do you try and isolate on thing (like no poles or poles only)? I usually ended up doing more classic

roller skiing than skate, but not much difference total. Classic roller skiing sessions were either all double pole or mostly double pole. When you're just doing a distance roller ski (or when doing classic intervals), striding is great. But I was always afraid of doing too much striding because the kick is always perfect and you can develop bad habits from that that don't work out on snow. That's not to say you should avoid striding. Just if you don't do it most of the time, when you do it's easier to focus on technique. Skating is good for both easy distance and for leg strength. Skating for a while w/o poles is excellent leg strength. Otherwise, skating is best for getting in easy distance hours.

Let me know if you've got any more questions. I am actually moving from Seattle in two weeks, so I probably am not much good as a training partner at this point (I will be at Nat's place in BC for July—I think he mentioned you were coming up to train).

- Ryan Quinn

Jordan added:

Nat gave me your training plan to look over, and I just have a few comments I want to share with you. From just looking at it (and without actually talking to you to get the details of it), some of what I'm about to say may seem obvious.

First, some general advice. Have you set a target for total training hours for the year? If you know how many hours you trained last year, you probably don't want to increase it by more than about 10% (e.g. if you did 400 hours last year, you probably don't want to do more than 450 this year). Once you have your yearly target, then you can start breaking this down into your four-week cycles, figuring out how many hours you want for each cycle (most likely building up to a peak in late November or early December). Next, you can break it down further, week-by-week: on a four-week cycle, I like to follow this template: Week 1

-- Low volume, lots of intensity; 2 -- Medium volume, medium intensity; 3 -- High volume, little intensity; 4 -- Recovery.

After having said this, though, let me emphasize the importance of being flexible. Try to plan ahead and know when you're going to have a lot of other stuff going on that will affect your training. For example, it wouldn't be realistic to plan a volume week when you have finals -- if you try to do that, both your training and your finals will suffer, and you'll just get frustrated. It's okay, then, to modify your plan to take external factors into account; if you end up doing two medium weeks instead of a volume week and a recovery week, that's fine.

During weeks with lots of volume, break some of the days down into two sessions. You don't need to do more than two ODs in a week, and your body can more easily handle two workouts of 2h30 and 1h30 than one workout of 4h00. Just make sure you rest up plenty between sessions. (During the summer, the days are long enough to even do three sessions -- for example, an early morning strength workout, intervals in the early afternoon, and a recovery jog in the evening.)

In terms of intervals and intensity training, remember that there are two kinds of intensity, both of which are equally important and both of which need to be developed. Threshold intensity (Level 3) will increase your lactate threshold, which will allow you to go faster and farther before lactic acid starts building up in your muscles and slowing you down. VO2 Max intensity (Level 4) will increase your VO2 Max (the volume of oxygen your lungs can exchange), which will increase your overall speed.

For threshold workouts, it's *really* important that you stay below your lactate threshold. (Without actually doing physiological testing, you can figure out your threshold simply by how you feel. If you're going hard enough that you know your muscles

will be tired and sore from the exertion, then you're above threshold -- the soreness comes from the lactic acid. Your threshold will be different for different activities and even on different days depending on your health, but you probably can feel that point when your level of exertion is becoming unsustainable and you'll be sore.) For these workouts, you can do long timed intervals (3 or 4 intervals of 8 or 10 minutes), or natural intervals, or a pace workout lasting 30 or 40 minutes. Over the course of the summer, you should be able to go faster and at a higher heart rate, while still staying below your threshold.

For VO2 Max intervals, these should be shorter and harder -- you're trying to increase your lung capacity and you should feel the burn, both in your lungs and in your muscles. They can take all kinds of forms, varying in length from 30 seconds to 5 minutes, either structured or natural. Mix it up to keep it interesting.

In general, you should do more threshold earlier in the summer and more VO2 Max later in the summer, although you should do some of each all the way through.

One last comment: no two skiers are alike and no two training plans are alike. There is no "right" way to train. The most important thing is to find something that works for you and then be confident enough to carry it through without worrying what other people are doing. Often the best way to do this is to listen to your body. If you haven't already, you'll soon discover the difference between feeling bad in a workout because it's a hard workout, and feeling bad in a workout because you're sick or you're tired or some aspect of your plan just isn't working. When this happens, step back, reevaluate what you're doing, and don't be afraid to make adjustments. And keep a training log -- besides being able to refer back to it, the simple act of writing down a few words about the workout makes you think about what you just did and how it felt.

Okay, I hope this helps! Let me know if you have any questions about any of it.

-Jordan Goldwarg

Products

It's not exactly a ski tool website or catalog, but I've recently bought a number of tools from the **Garrett Wade** Company and have been very impressed with all that they carry: high quality tools of all sorts - the sort of store that's almost as dangerous for me as a good bookstore or CD shop. Have a look at their website and order a catalog at <http://www.garrettwade.com/>

Last spring I saw a really very good ski bench/profile bench which was both portable and very good at supporting the full length of the ski, essential to all good prepping work. The bench was made by Charles Caswell. As I get inquiries from time to time on where to find a good profile bench, I offer the following as a good source:

Custom Nordic ski waxing bench/jig, fully adjustable to accommodate any length ski, binding hold down devise with adjustable tensioning knob. The jig can be bolted to a work bench with tightening knobs or clamped down making it completely portable. The ski forms are made of 1 1/2" thick Baltic birch ply for strength and stability, the rail is 1 3/4" thick and approximately 72" long of beech or oak beautifully detailed and finished, completely user friendly, cost 175.00 plus tax and shipping.

Charles can be reached via: crdesign@earthlink.net or (20) 522 7306

NUTS Poster

This year NUTS has a great mini-poster. We'd like to ask customers to post them around for us. If you can do so, just send me your address and I'll send you a poster to put up at your local shop or ski center, and send along one for you, too. Thanks for the help!

To order a poster – tell me how many you can realistically use (I have to print these up myself, on premium paper), just drop a line to: natxcgrind@yahoo.com.

Letters

Last spring, I published a letter and my response to it. The letter contained the following:

Part of my normal waxing procedure is to use a bronze brush, light "razor blade" scrape, and light Fibertex before each waxing. I learned this from Toko who suggest that rewaxing without this procedure will reheat micro fibers into the base and essentially seal it to a certain degree. My question is: what do you think of this process both in terms of its efficacy as well as how it might affect the longevity of your grinds.

I subsequently received the following from Ian Harvey, of Toko:

Just an FYI, I did not make this recommendation, nor do I endorse it. I believe the best way to keep a base hair free is to get a hair free grind and then don't do anything to cause hair. It is also important to keep the base waxed as a dry base gets "hairy" easier than a waxed and lubricated base. It is my belief that "razor blade" scraping skis that have any texture to them at all (structure) is usually counter productive as the blade will "cap" the structure first rendering it less effective and secondly creating micro hair on the sides of the structure. Generally I don't use Fibertex either for this reason. I'd use it if I screwed up and created hair and let my bases dry out etc.

Here are my recommendations again more clearly for ski maintenance:

1. Don't do anything to cause hair like using an aggressive metal brush, razors, or

Fibertex unless you're making some "cold" skis, then OK on the Razor and Fibertex.

2. Don't let bases dry out

3. If bases are getting white or haven't been waxed in a bit, then heat in a very soft wax (yellow), scrape and brush with copper brush, then heat in a hard wax (blue), scrape and brush with copper brush, and repeat two more times. When this process is done, heat in Moly, scrape and brush and the wax of the day. The skis will be fine. If not enough heat is used (on the iron), then bases will also turn white.

4. Ski with the good skis only in good conditions, otherwise use training skis.

Bottom line is prevention rather than reaction (rather than messing your skis up and then trying to fix them, just don't do anything to mess them up)

A note on the xc02 grind, from Justin Wadsworth:

XCO2 has been a great all around grind, and worked really well for the conditions of the Boulder Mountain. Tour this year. With that grind and Solda S 20 and S 30 mixed, I'm sure I had the fastest skis in the race.

This weekend is my first Birkie, which should be interesting. I'm looking forward to putting the hurt on, which when you only have to do it once a year is a lot easier.

Cheers – Justin

A note from Jacques Desrosiers

I would have a question for Nat Brown after reading his paper on "Base Damage" in The Master Skier (appeared a while ago).

I don't mean that I expect a personal reply to this, but maybe Nat could come back on the topic in some Q & A type of articles in The Master Skier, or on his own website.

Anyway, here's my question.

Nat mentions that he never, never waxes

above 115°C. Now I just don't understand how you manage to melt hard waxes like Swix LF4, Toko LF Blue or Start Green at that temperature. My experience is either the wax doesn't melt at all at that temperature, or if it does the wax droplets pop off the base before you can iron them properly.

I know that if you raise the temperature, say at 145°C, you may very well melt the base -- which actually happened to me once on a brand new Fischer RCS. But then if I'm going to ski at -20°C tomorrow, what am I supposed to do?

I would truly appreciate seeing clear through this, since I'm waxing my Madshus classic ski et my Fischer skating ski along Nat's guidelines.

Very good questions - you have seen through me!

About 80-90% of the skis I see are burned, some through heating too much, others simply through accumulation of heat (repeated ironing - bases are affected as low as 85 C), some through blow-torching kick waxes. As a result, I try in my articles to exaggerate temperature control, and over-emphasize the need for care.

Indeed, I wax up to 130 C, but I am also very careful always to have a good, thick coat of wax between the iron and the base, and I am equally careful to keep the iron moving, usually quite fast.

On the other hand, years ago I had a one-temperature iron I got in Sweden. I liked it because the heat was very steady, and it was easy to pack. Its temperature was supposed to be about 115. Some waxes were very slow to melt, but I found I could even do greens, if I was patient and careful (I suspect the iron was really closer to 120 or even 125, but being small, it lost heat very fast).

What we are trying to do is to keep the wax and base warm, as wax is absorbed as a product of heat/time. Sometimes it may be

more "merciful" to iron fast, at a higher heat, to spread the wax, but then I think it's best to finish ironing at a low temp. I'll attach the handout that I send out with all skis, which explains this in more detail. This is also why I feel strongly that the hotbox is the best way to go (I can supply you with directions for making one, if you would like me to.)

There are several FAQ's regarding ironing on my website at www.ultratune.net.

Closures

I'll put exact dates up later, when my year's schedule is complete, but I plan to close the shop this winter as follows:

October: A long weekend at some point, to close down the ranch. Business as usual, but closing early for the weekend, probably October 8.

November 8 & 9 (Important guest from England; ship as normal: I'll be here to take in skis and answer e-mail, but the machinery will be turned off.)

November: Thanksgiving through the traditional Thanksgiving weekend.

December: Christmas Holiday: *To Be Announced*; may start early for a camp.

January: During National Championships – but my dates are uncertain. *To be announced.*

Please: forward a copy of this newsletter to your ski friends – it's a big help to Nordic UltraTune – and your friends!