Notes From Level IV Ski Preparation Course

By Jake Weaver

In November 2003, I took a NCCP course in order to learn more about ski preparation and waxing. The course was given by Alain Masson. Alain is a former Canadian National Team athlete and technician. He waxed for the National Team at the 2002 Olympic Games. He has been the coach of the Yukon Ski Team for several years. Since this is an intimidating area for most of us, I thought I should share the knowledge with the club.

This was a Level IV course so some of the content was aimed at people who would be involved with the national team. A lot of it does not apply to the level of skiing and racing our club is involved in so I have left those parts out. I have reorganized my notes on the information that applies to us.

Keep in mind that ski preparation is more important in higher level competitions where finish times are very close. At the club level and especially in dealing with children, it is misguided to concentrate on ski preparation at the expense of time and attention give to the children. We should try, with a minimum of fuss, to give them skis that work so they can practise proper technique.

GLIDE WAX

- used on glide zone of ski base : ie. the whole length of skating skis
  the tip and tail of classic skis
- allows the ski to slide over the snow faster by reducing surface tension
- different glide waxes are available for different temperature ranges
- waxes are heated with an iron to melt into the base
- **should be done in a well ventilated space to minimize inhalation of fumes**
- high performance high Fluoro content waxes are not indicated for club racers like us
  - very expensive
  - used by top level ski racers
  - fumes are a much greater health risk

Grain of Salt

The relative importance of glide waxing to outcome:

75% Ski characteristics eg. Length, camber strength, flex pattern

15% Base structure – microscopic groove patterns in the base
- deeper pattern is better for warmer and wetter snow

10% Glide wax – This may only make a difference in top level competitions where finish times are very close

In classic races the kick wax is much more important than the glide wax.
The athlete's technique and fitness have by far the greatest effect.

Applying Glide Wax

- secure ski with base up, preferably in a proper waxing bench

- select correct temperature range wax (When selecting glide wax for classic skiing, use warmer wax than for skating because snow in the classic track is more transformed)

- set iron to temperature that will melt wax but not so hot as to make it smoke

- hold wax against iron so that it drips onto base. Run two beads, one on each side of the groove OR soften the wax on the iron and crayon it onto the base

- apply enough wax so that the iron is not in direct contact with the base, causing it to overheat

- for classic skis, do not put glide wax in the grip zone

- do not worry about waxing in the groove. It is not porous and does not absorb wax

- iron the wax into the base – Use long passes in one direction, keeping the iron moving. Move iron at a speed that will leave melted wax behind the iron, but it should solidify in a few seconds. Do 2 or 3 passes, then allow to cool for 5 minutes. Repeat this twice more (total of 3 times). Let cool longer (preferably overnight) then scrape.

- Scrape with plastic scraper. Scrape groove and edges first. There are specific groove scrapers. Hold scraper at 45 º for edges. Scrape with long strokes, moving from tip to tail. Be careful not to gouge or unlevel the base. Continue until no more wax is being removed.

- Brush with nylon brush. To remove wax from the microscopic indentations in the base (called structure). Press hard, moving from tip to tail. Continue until no more white flecks of wax are coming off the ski.

- DO NOT OVERHEAT THE BASE. It breaks the bond between the base material and the ski, causing delamination bubbles. Delamination cannot be repaired. The ski is most susceptible to delamination at the tip and tail where it is thin. Some brands are more susceptible to delamination (Madshus is worse than Fischer)
- To avoid overheating, keep enough wax between the iron and the base.
  Keep iron moving
  If wax is not solidifying right away after ironing, let the ski cool down before ironing again

NOTE: Always work in one direction (from tip to tail when scraping, brushing, etc.)

Cleaning the Base

Apply glide wax with iron.
Scrape wax with plastic scraper while wax is still soft.
Do whenever bases are dirty, 2 or 3 times a season or more often in dirty snow conditions.

Preparing Bases of New Skis (also if bases have been stone ground)

NOTE: When rubbing or scraping skis, always go in one direction – **tip to tail.**

1) Rub with Fibretex (medium or coarse) to raise micro-hairs in the base

2) Scrape with Metal Scraper
– to remove the micro-hairs
- be sure to hold scraper level to avoid gouging or unleveling the base. **BE CAREFUL.**
- use light pressure

Repeat Steps 1 and 2.

3) Bevel the edges
- use metal scraper at 45º to base
- make small bevel
- this makes skis slightly easier to turn
- protects edges from chipping

4) Clean the base – wax and scrape while hot
– do once or twice

5) Saturate bases with wax
- this process of hot waxing several times allows the wax to penetrate deeper into the base
- this makes the ski base more resistant to oxidization and it makes the ski faster
- use warmer temperature wax because it penetrates the base better

Steps:
a) Apply hot wax and let cool
b) Scrape with plastic scraper
c) Brush with nylon brush
d) Repeat steps a through c, 10 to 15 times for a new ski
(I feel good if I can do it 7 times. If you wax once a week for the first couple of months, that should work also.)

Note: Some articles have recommended using a warm glide wax for the first 3 or 4 layers, then alternate a cold wax with the warm wax for subsequent layers.

KICK WAXING FOR CLASSIC SKIS

- Kick wax provides "grip" when classic skiing.
- Kick waxes are specific for snow temperatures and characteristics.
- Kick wax is applied to the wax pocket or kick zone of the base.

KICK ZONE (Wax Pocket)

- This is the middle part of the base which, because of the camber of the ski, is not touching the snow when the skier's weight is distributed evenly on both skis.
- When the skier's weight is on one ski, the camber is compressed and the base in the kick zone contacts the snow.
- Kick wax on the kick zone allows the points of the snow crystals to be compressed into the surface of the wax, providing "grip".

Finding the Wax Pocket (Paper Test)

- Stand on skis on flat, hard surface with weight evenly distributed on both skis.
- Slide a piece of paper under ski bases directly below feet.
- Slide the paper forward and back and note where it grabs.
- Mark these front and back points on the sidewall of the ski with a piece of tape.
- Kick wax the skis 2 inches beyond these marks front and back and ski for about 5 km.
- Check where the wax has worn off.
- The remaining wax defines the actual wax pocket (kick wax zone). Mark the front and back points on the sidewalls using permanent marker or paint.
- For children and for skiers with worse fitness and technique extend the wax pocket and use a softer ski.

NOTE: The pocket for klister is 1-2 inches shorter on either end because the klister goes on in a thicker layer than hard wax.

For the klister pocket you can do the paper test with the paper folded to 4 thicknesses.

SELECTING A KICK WAX

- Kick wax allows the points of the snow crystals to be compressed into the surface of the wax, providing "grip".
- Ideally, the snow should release and not remain embedded in the wax.
- If the snow does not release, this results is snow building up on the wax (called "icing up")
- Snow build up on the wax eliminates any glide.
- The snow build up can become glazed resulting in a thin layer of ice over the wax causing the ski to lose grip.
- Selecting a wax is a balance between good grip and good glide. Too much grip will slow down your glide because the snow is not releasing from the wax.
- In general, a wax with a warmer temperature rating will provide more grip.
- Waxing for children or skiers with worse technique or fitness should emphasize grip over glide.

Snow Conditions Related to Kick Waxing

- Fresh, cold, dry snow has sharp points on the crystals.
- Transformed snow – crystals become rounded, less sharp.
- Snow is transformed by:
  - Elements – warmer temperatures
    - increased water content (wetter snow)
    - wind
    - sun
  - Mechanical – grooming
    - skiing the track

The Snow Continuum

	Untransformed Snow	→	Transformed Snow
Crystal Shape	sharp corners	→ rounded edges →	round
Typical Conditions	dry	→	wet
	cold	→	warm
	fresh snow	→	old snow or ice
	unskied	→	well-skied
Ideal Wax	cold hard wax	→ warmer hard wax →	klister

Factors to Consider When Selecting Kick Wax

- Age of snow – fresh vs old.
- Water content – wet (packing) vs. dry
- Air temperature
- Snow temperature – usually follows air temperature after a few hours.
- Track preparation – more or less compacted
- Amount track has been skied
- Fitness and technique of skier
- Stiffness of skis

Note: After considering all these factors select the wax of the day. Keep in mind the waxes that are the next steps warmer and colder which you can change to if the wax you first selected is not working ideally.

Kick Wax Application

1) Clean kick zone with wax remover and let dry well (do not use remover on the glide zone. It slows the ski considerably.)

2) Abrade the wax pocket – helps wax to adhere to base.
–use sand paper
–cold conditions – 120 to 150 grit
- lightly in direction of ski
– warm, wet conditions – 100 to 80 grit
- heavier pressure
- 45º to base in both directions creating an "X" pattern
– do not sand whole wax pocket. Sand 1" to 2" short of the ends of the wax pocket (klister kick zone)

3) Base Binder
- helps wax adhere to the base.
– eg. Toko green base wax or Rex base binder
– put on thin layer by "crayoning" lightly onto base.
– warm with heat gun or iron, then use a light pass with a cork
or cork it in if you don't have a heat source
– you want a thin layer that is invisible, but tacky to the touch.

4) Apply Wax of the Day – Hard Wax
- "crayon" onto base in thin layers with no clumps or lumps.
– apply 4 to 6 layers, corking between each layer.

5) Corking – done to create heat which helps create a smooth, uniform layer of wax
– best to use a synthetic cork
– rub back and forth very quickly over wax using light pressure (better than using slow motion and pushing hard).

6) Let wax cool before skiing

7) Test wax – ski for a few hundred metres
– assess for grip and glide.
– if not enough grip, add some of a warmer wax.
– if not enough glide, add some of a colder wax.

Applying Klister

1) Clean base

2) Abrade klister kick zone with 100 to 80 grit sandpaper.
Note: Klister kick zone is shorter than for hard wax

3) Base klister – colder klister, eg. blue or green
– adheres to the base longer
– apply very small amount
– keep out of groove – results in a thicker layer which ices up more easily
– heat just a bit with heat gun and smooth with thumb

4) Klister of the Day
– apply thin layer (a bit thicker if very transformed snow)
– heat just a bit and smooth with thumb
– keep out of groove
- apply one layer only

5) Let cool before skiing

6) Test klister – ski a few hundred metres
- if not enough grip, mix in some warmer klister
– if not enough glide, mix in some colder klister
Mixing klisters – when adding a different klister to alter the original one, you can mix them together on the ski base with a small wire brush or the corner of a scraper; then smooth with thumb.

Hard Waxing near 0ºC
– do outdoors
– cool wax in snow
– apply wax with light pressure
– cork with very light pressure

Klister for Warm Conditions
– eg. red klister – very soft
– put a band of cold, stiffer klister at the back of the kick zone
– this helps to prevent the softer klister from sliding back onto the glide zone.

Alain Masson's Klister Kit

Rex Blue – for base binder
- mixed with universal for ice

Start Universal – mixed with Rex Blue for ice
– add to Swix Red or Purple to make them colder
Swix Red – good for wet snow
Swix Purple – good for wet snow

Ice or Cold Transformed Snow
-Rex Blue binder
–Start Universal (very sticky) mixed with Rex Blue (very durable)

Icing Up – snow does not release from wax or klister and builds up causing sticking or glazes over causing slipping.
–worse with thick layer of wax or klister. Therefore, apply thin layer.

Cover Wax
- a thin layer of colder wax applied over a warm hard wax or klister.
– used when icing up (must de-ice first) or if snow very dirty
– needed in changeable conditions near 0ºC. Eg. sun-shade, change in temperature, change in altitude.

Start Kick Wax Tape
This is a new product discussed in the course. It is applied to the ski like double sided tape and is supposed to be quite durable. The national team used it quite a bit in training and although they did not use it in a race, it was their second choice for a couple of world cup races.
Advantages – very durable (150 km per application)
– wider temperature ranges (+5 to –20 º Celsius)
Disadvantages – cost $20 per roll doing 2 pairs of skis

Sande's Waxing System
Through year of experience in challenging waxing conditions at Hollyburn, Sande Robertson has developed a waxing system which works very well for our local conditions. We tend to have very coarse, transformed snow, conditions that usually require klister. Sande, however, often uses a very thick application of hard wax which includes large clumps of wax. She corks it lightly leaving the wax quite thick and rough. She finds this acts like mini fish scales and it is quite durable. She leaves the wax on the ski and just adds more on top of it the next time out. This techinique was not mentioned in the course; they have not discovered it yet, or they are keeping it quiet because it is their secret weapon.