



Competition-Coaching Introduction Advanced (T2T)

Step 1:

Clothing, equipment and ski preparation



**Reference Material
for On Snow Workshop**



PARTNERS IN COACH EDUCATION

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Patrimoine canadien

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1.1 Equipment selection and team clothing

Cross Country skiers require a large variety of equipment to be able to train effectively over the course of a training season. From trail running at +30°C to ski racing at -17°C and everything in between, skiers train in wildly different conditions and using a diversity of training modes. Having the right equipment and clothing is paramount to being able to train properly for skiing regardless of the conditions. Train-to-Train skiers often do not have the knowledge and training background to appreciate what equipment they need to be properly prepared for year round practices in skiing. The following section of the reference material will provide coaches guidelines for advising skiers on what they need to be ready for practice and racing at the Train-to-Train level.

1.1.1 Summer Training Equipment

One of the great advantages of training for skiing in the summer months is the variety of training opportunities available to athletes. These opportunities come with the need for an assortment of different training gear for the different types of workouts available. Obviously each club will have its own preferred methods of training athletes, but there are certain dryland training modes that athletes at the Train-to-Train stage of development should be familiar with. The following is a list of training equipment needed for your standard Train-to-Train athlete during the dryland season.



Figure 1: Trail Running Shoes (Photo Credit: Brooks Running)

Trail Running Shoes: Most ski running activities occur outdoors and off road, so road running shoes are usually not durable enough to be a worthwhile investment. Trail running shoes are recommended for Train to Train athletes. These shoes are more rugged and provide more stability when running on uneven surfaces. One season of training in these shoes is usually enough to wear them out and they will have to be replaced the following year.



Figure 2: A ski water belt (Photo Credit: swixsports.ca)

Water belt: For running actives a drink belt that holds water bottles is usually preferable to ski specific drink belts used in the winter. Winter water belts tend to bounce around when running making them uncomfortable. All drink belts should have a pocket for carrying food during workouts.

Rollerskis: Rollerskis are covered in depth in section 3 of the dryland reference material, but as a reminder athletes at the Train-to-Train level should have skate rollerskis, carbide tips on poles, spare tips, gloves, a helmet (see below) and bright shirts when rollerskiing. Skiers with experience can also start to use classic rollerskis at this stage of development.

Helmets: Used for both rollerskiing and cycling helmets are a must-have piece of equipment. Although all new helmets are created equally from a safety perspective, helmets that have been used regularly or dropped can weaken over time. It is recommended that helmets be replaced every two seasons and directly after sustaining any major impact.

Skiwalking poles: Any ski pole with carbide tips and a comfortable strap will suffice for skiing walking. Skiwalking poles should be approximately 5 to 10cm shorter than classic poles.

Road Bike: Often used as a cross training tool all the way through the senior ranks, road cycling can be introduced to older Training to Train athletes as a frequent training method. Road bikes are by no means necessary for training at this age level, but will become an important component of training as athletes grow and mature. Road bikes must be safe and in good working order to be used as a training tool. Refer athletes to local bike shops to ensure that their bikes are in good working order. It is also recommended that athletes invest in clipless pedal and shoes for road cycling.

1.1.2 Winter Equipment



Figure 3: A selection of older ski waxes (Photo Credit: Justtrails.com)

Ski Preparation Equipment: Skiers at the Train-to-Train level need to have a large selection of grip and glide waxes and the tools and knowledge to apply these waxes. Coaches have a responsibility to teach and educate athlete on the use and application of different waxes so that they can arrive at practice prepared and ready to train. Coaches should send out a list of required waxes at the beginning of the season so that wax recommendations are easy to make for the whole team. At minimum this list should include a list of grip and glide waxes and a list of basic tools athletes need to be familiar with. These tools should include scrapers, wax irons, heat guns, brushes, shop towels, wax remover, klister paddles, sandpaper and putty knives.

Skis: In an ideal world, skiers at this level should have 6 pairs of skis as follows: 1 pair each of classic and skate rock skis, 1 pair of each of classic and skate warm up/training skis, 1 pair each of skate and classic race skis.

- **Rock Skis:** These are any skis that the athletes do not mind having scraped, and scratched when skiing on marginal conditions. Rock skis can be older skis from previous seasons, but ideally should be reasonably well suited to the height and weight of the skier.
- **Warm up/Training Skis:** These skis are used for warming up for races and training to protect race skis from nicks and damage. Rock skis are often quite slow and not necessarily the best option for training in good snow conditions. In good snow having a pair of training/warm up skis is a good idea. These are usually race skis that have been downgraded and are not raced on anymore. They also serve to save skiers from using their race skis too often. If athletes have decent quality rock skis, it is not necessary to have training/warm up skis.
- **Race skis:** As the name suggests these are the skis that the athlete uses for racing. They should be an appropriate sized and flex ski for the skier's height and weight. Classic skis should have a well-defined klister pocket and skate skis should have tip and tail splay. For more information on ski selection please see the competition development manual.



Figure 4: Pole Straps (Photo Credit: swixsports.ca)

Poles: Poles for Train-to-Train athletes should be strong, lightweight and include a proper full hand strap. Often Training to Train athletes will leave their pole straps too loose which do not allow them to release their pole when following through with their poling motion. Also these athletes tend to grow rather quickly and poles that work at the beginning of race season can be too short at season's end; check pole height regularly.

Boots: Ensure skate boots have a solid cuff to support the ankle. Poor ankle support can lead to balance issues with new skiers, especially on rollerskis. Boot fit is also crucial as boots that are too big will be floppy and not provide the needed support to be able to control skis. At this stage of development athletes should be using distinct classic and stake boots (combi boots are no longer a competitive option).



Figure 5: Ski Visor (Photo Credit: Bliz Eyewear)

Sun Glasses/Visors: Snow is a bright and reflective substance and too much time outside in the sun can be damaging to the eyes and make it difficult to see. A good pair of sport sunglasses will protect your eyes from harmful UV rays and enhance vision. Sunglasses or visors should be selected with interchangeable lenses. Required lens are a dark sun blocking lens, a yellow or pink lens to offer contrast in low light conditions, and a clear lens to offer protection from snow in races with precipitation. If athletes need vision correction, wearing contacts or purchasing prescription sport sunglasses is definitely a good idea.



Figure 6: Skin Protection (Photo Credit: Dermatone)

Dermatone/Vaseline: On cold days athletes can protect their faces from frostbite by applying a layer of Dermatone or Vaseline. These products protect against cold, windburn, and sun by forming barrier on your skin to help retain your body's moisture. Application of these products is especially important for races as athletes cannot cover their whole face with buffs due to oxygen demands. If athletes are especially prone to frost bite they can also apply physio tape directly to their faces to cover exposed skin.

1.1.3 Clothing

Clothing is as important as equipment for proper ski training. Not having the right clothing can lead to athletes having to cut workout short or not being able to train due to inclement weather. As the saying goes, there is no such thing as bad weather, only bad clothing. Upon reviewing this section there should be no such thing as bad clothing either.

a) Summer Layers



Figure 7: Running Shorts (Photo Credit Sugoi)

Shorts and Shirts: Lightweight breathable synthetic athletic clothing is recommended. Every major athletic apparel manufacturer produces clothing suitable for summer training that wicks moisture and dries quickly. Cotton products are simply not good choices as they do not dry and can be too hot in humid conditions. Long sleeved shirts should be used on cooler days. Bright training shirts are also recommended for rollerskiing to help with visibility.

Rain Jacket: It rains in the summer. Having a breathable rain shell can be a life-saver on rainy day, keeping athletes warm and reasonably dry. If there is rain in the forecast athletes should bring a rain jacket to practice.

Running Hat: Sun and heat can quickly sap energy in the summer; the use of a hat to keep the sun off the face or neck is recommended.

Sunscreen: A must when training in sunny conditions in both the summer and winter. Long days in the sun can have negative health consequences for athletes and also drain energy in the short term. Athletes should apply sunscreen before all practices.

b) Winter Layers

As you are no doubt aware skiing generates a lot of body heat and moisture. Though winter weather may be cold, ski clothing needs to protect athletes from the elements while also allowing sweat to quickly ventilate away. If it doesn't, athletes will get chilled (or even hypothermic) once they stop. The simple solution to this problem is layering. This system allows athletes to stay warm and dry in variety of conditions and manages moisture well. When dressing for warmth in the winter, it is important to remember that several light layers provide more warmth than a single large thick layer. Each layer traps air that the athlete's body heat warms. The more warm layers of air the warmer an athlete will be outside. This also allows you to shed layers as you warm up from activity.



Figure 8: Base Layers (Photo Credit: Helly Hanson)

Base Layers: The first layer should be a synthetic clothing (often made of polyester) that's fast drying, breathable and that wicks moisture away from the body their body. For leg base layers, skiers skip right to a racing tight without a long underwear base layer. Racing tights tend to be more wind resistant than base layers and will keep the skier warm if they are moving or the ambient temperature is not that cold. Racing tights can also be considered a middle layer for skiers.

Middle Layers: Middle layers are your insulation layer and should be of a similar breathable synthetic material as the underwear base layer (but a bit thicker). Either way, breathability is key as this is the layer that transports any moisture buildup to the outside where it can evaporate as well as offering you some good core warmth. High necked garments are excellent, but should come with at least a half zip to offer the option of loosening the collar to assist in temperature regulation.

Soft-shell outer layer: Cross-country skiers need a shell layer with exceptional breathability. Usually this layer is the team's racing Jacket . The outer shell should be a light, breathable and highly windproof type of garment, frequently lined with mesh or thin synthetic lining. Many of these jackets will also offer venting options to assist in regulating body temperature. Just remember that stopping a cold wind from stealing body warmth is the primary function of this layer.

Cross Country Skiing Pants (aka warm up pants): Cross country ski pants have a slim fit and are designed to allow movement that is specific to skiing. Pants are usually the second layer on the legs and the outer layer, so they need to be breathable, but highly wind resistant. The best of these are either a combined 'softshell' fabric or a single layer with a mesh or other thin lining. Either way, the fabric should have a fairly smooth finish to prevent snow from sticking where it can melt in and make athletes cold and damp. Some of these pants offer full-length leg zips which are useful for access (putting them on or taking them off without even needing to remover skis, particularly useful to racers).

Hats: A good toque or hat is a must for keeping your head warm. Look for a good close fit that covers the ears. Dense fabrics or windproof linings are also worth looking for as they reduce heat loss from wind. For racing, light weight lycra hats or headbands are preferred, as these garments will prevent overheating and moisture build up.



Figure 9: Ski mitts and gloves (Photo Credit Yoko and Auclair Gloves)

Gloves: Look for a sleek insulated pair of gloves. Hand wear must be breathable to prevent moisture build-up and, thus, cold hands. Mitts are warmer than gloves and usually used for temperatures below -10 C and for those prone to cold hands even in moderate temperatures. A selection of different thickness gloves is recommended for athletes for different weather conditions. Hands are usually one of the first parts of the body that become cold, so overcompensating with warmer gloves is a good idea.

Bufs: Probably the greatest advance in ski clothing technology in recent memory, Bufs are thin synthetic neck warmers that protect the neck, ears and face from the cool and can also double as a head band. Bufs are excellent for reducing skin exposure to the elements on cold days and it is recommended that skiers have at least one buff.

Socks: For the feet, a base layer (liner socks) and an insulating layer (wool or synthetic socks) are often used, with ski boots acting as the shell layer. While thick socks can certainly be used to create more warmth, skiers should be aware of how much space is available in their ski boots. Modern socks are designed to give support, offer sole/heel padding, wick moisture away, and breath freely. To keep things simple, there are few sock combinations that will outperform a wool and synthetic blend sock for warmth, comfort and longevity. Most often just a single pair of medium thickness wool/synthetic socks will supply sufficient warmth.

Wind briefs: Briefs with light thermal protection to keep your privates warm in windy conditions. These are extremely important for male racers and should be worn at all races.

Change of Clothes: No matter what conditions an athlete trains in, if they work up a sweat they should change into dry clothing directly after practice. Sitting around in workout gear is unhygienic and can make athletes cold.

What to Race In: When dressing for a race athlete should wear their racing suit, wind briefs gloves hats, and sunglasses/visor. As it gets colder athletes should add base layers of long underwear and a buff to the equation. Swapping gloves for mitts could also be a good idea. When warming up for a race, athletes should wear their outer shell layers over their race suit. Athletes need to develop their own understanding of what clothing they feel comfortable racing in. Individual differences in sweating and circulation between athletes can lead to extremely diverse selections of clothing for racing. As part of their post race evaluation athletes should reflect on the temperature of the race and whether they need to make any clothes changes for next time.

1.1.4 Team Clothing



Figure 10: Canmore Nordic showing off their team colours (Photo Credit: Canmore Nordic)

Team clothing is an important part of ski teams in Canada and your club should make an effort to ensure members purchase and wear your team's clothing at all events. Team clothing can include training gear for all conditions, but at minimum should include a race suit and team jacket. Why are team clothes so important to a racing team? There are a number of reasons:

A sense of belonging: If the team wears the same clothes to the practice and races then they share a feeling of commonness and belonging.

A feeling of equality: Team clothing brings every one to the same level, no matter how fast a skier or their background, wearing a team uniform precipitates a feeling of equality amongst those wearing the uniform.

Mutual growth: Athletes wearing team clothes are more caring for their teammates; they care not only for their growth and success but the growth and success of their peers and team. Uniforms foster support traits which are very necessary for a person as an individual and an organization as a whole to thrive and prosper.

Marketing and Sponsorship: Team uniforms are a great way to advertise for your club. Large groups of skiers training together are an eye-catching sight and can drum up interest in your team. Further branding on team clothing can be a potential sponsorship opportunity for your club. Companies wanting to be associated with healthy active athletes may be willing to pay to have their logo on the team clothing. Realistically these sponsorship opportunities may not be extensive, but clubs should try and limit the number of logos featured on their clothes to 1 or 2 to provide better exposure to sponsors and some exclusivity to the branding. This will allow clubs to charge more for the branding.

1.2 Wax Testing Protocols:

Wax testing is one of the more important jobs for coaches on race weekends. The following section covers testing procedures to ensure that you choose the right wax on race day

a) Test Equipment

For a large team the club should have 3 pairs of matched guide skis and two pairs of matched grip skis with well developed grip zones for testing both hardwax and klister. If your club does not have matched test skis, your personal skis can be used to test wax using the test by feel method described below. If you are using your own skis remember that testing between different pairs of skis is not an accurate way to test wax, as ski camber and grinds of unmatched skis will lead to significant differences in testing. In addition to glide and grip skis clubs should also endeavor to set aside a pair of skis specifically for testing structure. Putting deep rilled structure in skis is difficult to remove without the aid of stone grinding and therefore it is not recommended to test structure on personal skis.

b) Zeroing Skis

All test skis should be waxed with the same base paraffin wax before the glide test wax is applied to the skis. This process is known as zeroing and ensures that your test skis are as close to equal speed as possible before you apply test race wax.

c) Applying Test Glide

Test glide paraffin's can be applied the day before based on the race day weather forecast This can save some time when arriving on site, but more tests should be made considering the snow variables of the course. Apply the test waxes on the test skis ensuring that all skis are brushed in a similar manner after they are waxed.



Figure 10: One way of keeping track of test waxes (Photo Credit: Fast Trax Nordic Team)

d) Testing Glide

Glide testing can be done using two procedures: glide outs or by feel. To complete a glide out test you will need to wax sets of two skis with the same base wax on each pair. For example test ski 1 and ski 2 would both have LF blue applied as a base wax, whereas test ski 3 and ski 4 would both have LF green applied to the bases. These pairs of skis can now be tested against each other based on how far they glide out on a flat after descending a hill (hence the term glide out).

When looking to perform a glide out test, choose a hill that is not too steep and does not require any turning. The hill should run out on to a flat section of trail that will cause the ski to eventually come to a stop. Before starting the glide out test ensure that the track or section of trail that you are skiing on has been skied in, meaning that new snow has been skied on numerous times. This will ensure that the speed of the snow remains consistent rather than speeding up over the course of the test due to physical changes in the snow. In doing this ensure that the test skis have all been skied on an equal amount, the more you ski on the test skis the slower the skis will become.

Solo Glide Out Test: Choose a starting point for your test and clearly mark the snow or place a marker in the snow (e.g. a ski tie) to indicate the start point of the test. If you are completing the glide out test by yourself, align your bindings with the start mark using your poles to prevent you from moving down the hill. To start the test release your poles from the snow and immediately drop into a stable tuck position (elbows resting on knees). Descend the hill maintaining this position until you have come to a complete stop. Mark the point in the snow that your bindings reached with a ski tie and repeat the test with your next matched pair of test skis. The pair of skis that end up with the furthest finish mark is your fastest wax. It is important to start and descend in an identical manner for all of your tests. Subtle changes in your tuck position or how you start to descend the hill can change how far the skis will glide leading to inaccurate results.

Pair Glide Out Test: This type of glide out test requires two testers descending the glide out hill at the same time. Marking the start and the finish positions of the glide out can be carried out in the same manner as the solo test, however this test is focused more on the relative finish position of the two skiers performing the test. To do a paired glide out test, two testers of approximate equal weight and skiing ability should each be on a pair of skis with different glide wax. The testers start descending the hill together holding on to each other's pole or hand. This will normalize the testers' speed relative to each other. Once the testers are moving at the same speed (this may take a second or two), they should release contact with each other and immediately get into a tuck position. Try as best as possible to hold a similar tuck position as your testing partner. The testers continue down the hill side by side until they come to a stop. The testing partner who has glided further has the faster wax. This test should be repeated by switching the skis between partners to ensure that the track conditions or tuck positions are not influencing the results. This test can be influenced by the ski abilities of the testers, as some skiers are more proficient at riding a flat ski and distributing weight evenly while gliding.



Figure 11: Norwegian wax techs performing a glide out test (Photo Credit: Noah Hoffman)

Test By Feel: To complete this test each individual test ski should be waxed with a different glide wax. Ski testers then ski on a pair of skis determining a faster ski or ‘winner’ by feel. This test should be completed on a variety of terrain, especially gradual uphill requiring one skate and downhill. This type of testing requires experienced skiers with excellent ability to ride a flat ski. It is recommended that testers switch which foot the test skis are on halfway through the test to account for differences in balance between legs and variations in the slope of the ski trail.

Testing using this method should start with pairs being skied on to determine winners (for example if you had three pairs of skis, after three tests you should end up with 3 remaining ‘winner’ skis to test). The remaining skis are pitted head to head to determine the fastest ski/wax of the day (in our example of three winner skis, this would require two additional tests). This procedure allows for skis to be skied on approximately an equal number of times, ensuring that individual skis will not slow down relative to other as a result of being skied on more often. Compared with the glide out test tests by feel can test more waxes in less time, but as mentioned do require an experienced wax tester/skier. Furthermore glide tests can sometimes differentiate minute differences between waxes that testers cannot feel.

e) Grip Testing

Grip testing is done in a similar manner to the test by feel method above. If your club does not have a selection of matched grip test skis, each pair of grip skis must be tested independently from each other. Differences in camber and ski construction will significantly influence the grip and glide characteristics of a grip wax. Grip wax for a given pair of skis should also be applied

in a uniform manner as differences in grip wax thickness will influence wax performance. Ideally one person will apply all the grip wax on the test skis, or the individuals applying grip wax will have procedures in place to ensure that all grip wax is applied identically.

When testing classic skis, grip should be tested on the different slopes that will be found on the race course. If the track is soft, tests should occur both in and out of the track. Glide is also extremely important and classic test skis should be tested on downhills and flats to ensure there is no drag. Finally, unlike glide testing, classic testing should also determine the next wax to be applied if conditions change. For example if conditions are warming, testers and coaches should determine what wax they can apply if they want to add more grip to their racers' skis (in testing this is often the stickier, but slightly slower grip wax). If you only have one or two pair of classic skis that you are using for testing, you do not need to fully clean each test ski between each test. Using a putty knife and scraping off the grip wax as best as possible between tests will do the trick. Furthermore using wax remover without allowing proper time for it to evaporate from the base of the ski will alter the grip properties of the next wax applied to the ski.

Testing Binders: If testing in new snow conditions it is not necessary to apply a binder to the test grip skis, but you should conduct a separate test to determine an appropriate binder for the day's race. This can be accomplished by applying the same grip wax over different base binders and seeing how the binder influences the grip and glide characteristics of the skis.

f) Keeping Track of Testing

When applying wax to test skis the skis must be labeled clearly and the wax applied to each ski recorded in a notebook or white board in the wax room. All tests should be conducted 'blind' (without the ski tester knowing exactly what wax is on each ski). This will eliminate bias and ensure that the correct wax is chosen. When testing glide the results of each test can be recorded in the notebook or a system of eliminating skis can be used so that test skis that are no longer part of the testing are not confused with skis still being tested. For example eliminated test skis can be flipped over on the snow or placed into a ski bag. However, grip testing should involve detailed notes on the grip and glide characteristics of each ski. A rating system should be used to describe each aspect so you can quickly review the characteristics of each grip wax. Commonly a 5-point rating system is used to describe grip and glide (figure 13).

Number rating	Glide Characteristic	Grip Characteristic
1	Very slow, grabby and icing	No grip, like skiing on skate skis
2	Slow with drag	Some grip, but very slippery
3	Ok glide, but still some resistance	Grip is there, but not amazing, some slipping
4	Great glide, no noticeable drag	Good grip, can climb all hills without slipping
5	Rocket fast skis	Rollerski kick, can walk up walls

Figure 13: glide and grip rating

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The aim for race skis should be to have at least 4's for both grip and glide when testing. By rating the skis you can come up with combinations of different waxes or move to the brands that tend to be working better to narrow your search.

g) Narrowing Testing

Once you have completed your initial tests use the information you have gathered to narrow subsequent tests. For example if your glide tests come up with waxes that are in the 0 to -4 range, zero or refresh your test skis or try all waxes that you have in that range from different brands.

1.3 Glide and grip wax application

The Basics of Grip and Glide Wax Application

At this point in your coaching education you have probably waxed a fair number of skis and have a fairly strong understanding of how grip and glide wax is applied to skis. This section is a brief refresher of the best practices of glide and grip application in case there are any areas that you are unsure of. CCC has also created a waxing video that covers all advanced aspects of waxing protocol, for more detailed step by step instruction please refer to this [resource](#).

Prepare the Grip Area on Classic Skis

- Use a putty knife or klister paddle to remove any old grip wax from the grip zone. If there is a base binder or klister on the grip area use a heat gun to warm the wax to ease removal.
- Apply wax remover to a shop towel and rub it over the grip area to remove the rest of the grip wax or klister. If the wax is really stubborn, soak a piece of Fibretex in some base cleaner & rub vigorously (A flat nylon scotch pad from a supermarket also works well).
- Remember to remove any grip wax or klister from the groove in the base.
- Avoid getting the base cleaner over the glide area of the ski (some wax techs prefer to apply glide wax without removing it before cleaning the grip zone to prevent wax remover from getting on the glide zone).
- Once the wax has been removed dry the grip zone with a fresh piece of shop towel. The grip zone can now be sanded with fine sand paper (e.g. 120 grit). Sand in a longitudinal direction or wrap the sand paper around a cork and sand both longitudinally and horizontally (wrapping around a cork will keep the sand paper flush with the base of the ski and prevent beveling of the edges).
- The grip area is now ready for a fresh layer of grip wax.

Preparing the Glide Area

- Use a sharp plastic scraper to remove any protective glide wax used to store the skis (You did remember to put on storage wax last season to prevent the bases from drying out right?). Keep the scraper level relative to the base of the ski and proceed carefully to avoid nicking the bases. Start scraping tip to tail. As you become more comfortable with scraping you can attempt to scrape in both directions using back and forth motions with your hands (this is an advanced skill so practice on old skis first).
- Use a groove scraper to remove wax from the groove of the ski. Watch out for flying chunks of wax when scraping a hard glide wax.

- Use a hard nylon or soft brass brush and vigorously brush the ski to remove excess wax from the base of the ski. This process also opens up the pores of the ski to accept new wax. Your final few passes with the brush should be tip to tail.
- Wipe off the any remaining wax shavings with a clean shop towel. If these skis are heading out the door for testing or racing, polish with a horsehair or polish brush.

Applying Glide Wax

- Select a glide wax in the temperature range you require.
- Set the iron the temperature recommended for the wax on the wax packaging. If you are unsure of the temperature range set to the iron to a temperature that corresponds to another wax brand with the same snow temperature range (for example Swix and Toko blue both recommend an iron temperature of 140 °C).
- Apply the wax to the bottom of the iron and drip the wax onto the glide area of the ski on either side of the groove.
- Iron the wax in using light pressure & **keep the iron moving** from tip to tail (**no back and forth!**) to avoid damaging the base. Two or three passes is usually sufficient to melt the wax into the base.
- Avoid getting glide wax onto the sanded grip area.
- Wait until the ski is cool to the touch to remove the glide wax.

Applying Base Binder Hard Wax to Grip Area

- Use a dedicated grip iron or a heat gun and warm the base binder hard wax.
- Crayon a thin layer onto the sanded grip area. Then cork it well in so that the entire grip area is covered with a thin even layer. This can also be accomplished by passing the grip iron over the base or running the heat gun over the grip zone. The heat gives a better bond between the wax & the base.
- It is not necessary to apply a thick layer of base binder
- Avoid getting the wax into the groove and remove excess wax with a klistor paddle.

Applying Hard Grip Waxes

- Ensure the grip zone is dry, clean, free of snow and ice and sanded. Cork the base vigorously to warm it up if cold.
- Crayon a thin layer of the grip wax of the day on to the base of the ski. Cold, dry grip waxes will crayon on thinner and more uniformly.

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- Cork the wax into the base of the ski using smooth even strokes and so that the wax covers the entire grip zone.
- Apply the next layers in the same manner, as required.

Applying Klister Waxes

- Ensure the grip zone is dry, clean, free of snow and ice and sanded. Cork the base vigorously to warm it up if cold. The ski should also be placed on a horizontal surface (ski form) to prevent klister from dripping off the ski.
- Warm the klister tube with a heat gun.
- Place small dabs of klister along the kick zone on both sides of the ski groove. Each dab should be about 3cm apart with each dab about the 4mm to 7mm diameter by 1mm thick.
- With a heat gun warm the klister on the ski. Using your thumb, palm, or klister applicator smooth the klister in the kick zone so it is evenly applied.
- Using shop towels and a klister paddle remove any excess klister from the sidewalls and groove of the ski.
- Let the ski cool outside for 10 to 15minutes before testing the wax.



Figure14: Applying Klister (Photo Credit: skiwax.ca)

1.4 Safety Considerations When Waxing

Ventilation Protection: The fumes generated from waxing skis, especially fluoro powders are harmful to the lungs if inhaled, especially with repeated prolonged exposure. Unfortunately repeated prolonged exposure to waxing fumes is part of the coaching job description. Mechanical barriers placed between the air and the lungs are a great way to mitigate these concerns. At all time when waxing coaches should wear a ventilator mask that filters organic vapors and dusts. The filter cartages should also be replaced every year. If possible waxing should occur in a well ventilated area, if proper ventilation is not available it is recommended that waxing occur outdoors. It is also important to educate athletes on the dangers of wax rooms and ensure that they should spend as little time as possible in the waxing room when fluoro powders are being applied

Skin protection: Wax removers are often a mixed concoction aromatic hydrocarbons and petroleum distillates neither of which are particularly beneficial to human health. To minimize exposure to these substances wear protective latex gloves (or non-allergenic equivalent) when handling wax remover and fluoro powders.

Fire and Heat: Wax remover is a flammable substance and is often applied to shop towels near significant heat sources such as irons, heat guns or propane heating elements. Shop towels have been known to catch on fire when preparing skis. The only prevention for this is to be vigilant and ensure that wax remover and shop towels are kept separate from heat sources when waxing. A clean and tidy workspace with only the tools and waxes currently required is a good way to prevent any unwanted accidents.

Water and Electricity: Waxing inherently occurs in the presence of snow and ice which often aggregates as pools of water around wax benches. At the same time waxing requires the use of electrical sources to power tool and irons. Extension cords often run through snow and water and therefore must be durable heavy duty cords with a thick rubber coating to prevent electrical shocks or shorts. Frayed cords are simply not safe for a wax room environment and should not be used. Power bars, if used should be kept off the ground and attached to the bench if possible. Always check powerbar sockets for snow and debris before plugging in cords.

1.5 Club Wax Box

There are must haves in every wax box for club coaches. Ensuring that you have all of the equipment listed below will allow you to focus your time on testing and preparing skis properly.

Tools for a Club Wax box		
Wax Bench with two forms: must be portable. Number of total forms available should be equal to the total number of race support staff.	Clamps, extra bolts for securing forms, screws	Extension cords (multiple with 3 outlet head)
Heat Guns or propane torch (good to have propane option available for power loss or remote touch ups)	Scrapers: metal, plastic, groove	Putty Knives and Klisters Paddles (for removing klisters)
Brushes: Polish, Nylon and Brass (multiples of each).	Corks (lots)	Wax Remover
Shop Towel or Fiberlene	Sandpaper (range from 60 to 120 grit)	Irons: both for grip and glide. Digital Iron for glide preferable
Structuring Tools	Ski straps/cords (holding and organizing skis on the wall)	Drill for roto brush and screwing straps to walls
Roto brush handle and roto cork/brushes	Gas Mask (for all support staff)	Apron
Gloves latex	Permanent markers	Waxes!

Waxes: The best wax brand is the brand that you are most familiar with. Build your knowledge of one or two wax lines and use them until you are familiar with their use in all conditions. Stock your wax box with multiple copies of glider, powders, klisters, binders and grip waxes from these brands. When the budget allows add to these lines by purchasing waxes from other brands in ranges or areas where you feel like your go-to waxes do not offer enough variety.

1.6 Setting up a Wax Room



Figure 15: Silver Star NorAm Wax Room (Photo Credit Skigo Canada)

At this point in your coaching career you have spent countless hours working on skis in many different wax rooms around the country. You have established waxing procedures and managed teams of support staff and processed hundreds of skis. This section of the coaching reference material seeks to build on your knowledge by providing tips and tricks to increase efficiencies while waxing and to reveal some potentially new tools to aid this process.

Equipment: Properly setting up wax room is essential for the smooth processing of skis during a race weekend, but this involves more than setting up a table and plugging in an iron. Organization is key and there are a number of tools and pieces of equipment that will help you keep the wax room neat and will save you and your support team significant time when processing skis. The following are a list of tools and equipment that coaches should bring with them to competition when support large teams for extended periods and how they are used:



Figure 126: Ski strap bands for wall mounting skis (Photo Credit: swixsports.ca)

Ski Strap Bands: These straps are stapled, screwed, or taped to the wall in the wax room. Many ski manufacturers produce this piece of equipment, but they can be made on the cheap by taping two lengths of sturdy cord together. Although this is a tool you probably already use frequently, it is very important to stress that the more straps you can install the better. In a perfect world coaches should have enough space and straps set up to accommodate warm up, race and test skis, as well as straps set up outside for touch ups and cooling skis. By increasing the available space for skis in the wax room, skis can flow easily through different stages of production and test and warm up skis can have a secure and organized storage area. Significant time and energy can be wasted by having to continuously reorganizing and clean up skis throughout a race weekend.



Figure 13: Swix Ski Rack (Photo Credit: swixsports.ca)

Ski Boxes/Racks: If wall space is at a premium, ski straps are not very useful items. Ski boxes (fig. 6), are an excellent storage solution. The obvious drawback to ski boxes is that they take up significantly more space when travelling. However if you know you are travelling to a

location that does not have waxing facilities, a ski box allows for set up anywhere you can find an outlet.

Whiteboards: A great organizational tool used for keeping track of ski testing, athlete ski information and wax room schedule. Whiteboards are also more visible than paper taped to the wall and can be easily refreshed.

Screws and Nails: Securely affixing items to the wall is often a priority in the wax room. Ski Straps, whiteboards and ropes can all be attached using nails and screws. Furthermore hooks for hanging jackets, boots, poles, masks etc can quickly be fashioned by drilling another screw into the wall. Always ensure that you are allowed to poke holes in the wall before drilling. Keep a drill and hammer in your tool box if screws and nails will be used.

Ski Carriers: As you progress to more advanced ski and wax testing protocols, there will be a need to transport large quantities of skis quickly in and out of the wax room. Ski carriers are an excellent way to expedite this process. They hold 5-6 pairs of skis without the need for ski ties as well as keeping the skis neat and easily accessible. These are not commercially available, but can be easily constructed using plywood.

Bench Upgrades: Installing bumpers along the edges of the wax table will prevent tools and waxes from falling off the bench. These can easily be fashioned with some cardboard and duct tape. Another useful bench upgrade is to install a board under the wax table for extra storage space. This addition can be made by cutting a piece of plywood to fit between the legs of the table while resting on the leg support bars. Finally, taping or zip-tying a power bar to the bench can prevent irons and drills from becoming unplugged by keeping their outlet in one place.

Rope or Straps: Another set up secret is stringing two ropes or straps parallel to each other above the wax benches. The ropes should be taught and well secured. Skis can be stored above the wax benches on these ropes and can be retrieved and replaced more quickly and be accessed by more people (mitigates the need to negotiate people and equipment to retrieve skis).

Miscellaneous Efficiency Equipment: Besides the equipment above and standard waxing gear, a well-prepared team should also travel with:

- Wax Roller: apply wax cheaply and quickly.
- Disposable Gloves: prevent sticky fingers and protects the hands.
- Garbage Bags: Keep the wax room neat.
- Dustpan and Brush: Keep wax room neat, again.
- Scrub Pads: For removing kick wax, soaked in wax remover.
- Radios: Keeping in contact with waxing/testing team.
- Note Pads: Keeping track of test results, equipment etc.
- Smart Phone: Splits (Use webscorer or race splitter app), videos, course maps, live results, team communication.
- Markers: Both for white board and permanent for marking skis.
- Duct Tape: Can solve many problems in a pinch.
- Glue: For repairs to poles and skis. Good to have hot glue and epoxy for repairing more extreme problems.

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- Cordless Drill: For outdoor waxing. Buy an extra battery and bring a charger.
- Drill Bits: Remember the screws from the previous section.
- Spare parts for everything: At some point in your coaching career you will need extra bindings, binding bumpers, NNN keys, binding screws, boot laces, pole tips, shafts, grips and straps.

Putting it all Together: When you enter your new wax room establish where you will be setting up your benches. Try to aim for a situation that avoids through traffic between benches. Next attach as many ski straps to the wall as you can, leaving some space for screws and nails for hooks and a whiteboard. String parallel straps or rope from the walls over the benches for extra storage. Attach straps outside of the wax room and place ski rack/box outside. Label sections of the wall strap storage as “test, warm up, Open Men, Junior Girls etc. Attach power bars to the benches and tape extension cords to the ground in high traffic areas. Tape a garbage bag to the end of each bench if no garbage cans are available. Plug in radios and rechargeable batteries for drill. Now you are ready take in skis and start with waxing.

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