



Competition-Coaching Introduction Advanced (T2T)

Step 3:

Dryland Techniques



**Reference Material
for Dryland Workshop**



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Figure 1: Large group of new rollerskiers (Photo Credit: Strathcona Nordic Ski Club)

3.1 Rollerskiing

Rollerskiing is the most ski-specific method of dryland training; athletes wishing to progress to the highest level of our sport will put in hundreds of hours on rollerskis over the course of their career. Coaches must be as able to manage the considerations of rollerskiing to properly prepare athletes for the winter season. In this section, an in depth overview of rollerskiing will be covered examining safety, maintenance, and athlete behavior when using rollerskis.

Rollerski Intro

It is mid-summer, 30 degrees and humid, the sun is out and the water looks inviting for a dip. Yet the goal of the morning is train for a sport that occurs in conditions that are the polar opposite of the present scene. Rollerskiing can feel like a world away from on snow skiing, but with good focus and technique summer training on rollerskiing can be highly effective in helping to improve winter ski speed. As a Train-to-Train coach you must be aware of the following considerations when adding rollerskiing to your practices (from CCC's rollerskiing policy document).

1. Roller-skiing is an integral part of cross-country ski training, providing one of the most specific forms of ski training that can be practiced without snow.
2. Roller-skiing is also a sporting activity which is characterized by important legal and safety issues:
 - a. The effective practice of roller-skiing requires extended stretches of relatively smooth pavement. There are few venues where such conditions have been created exclusively or primarily for the use of roller-skiers. Therefore, most roller-skiing takes place on public roads and highways. In some municipalities or provinces, this practice is limited or prohibited by legislation.

- b. Several factors contribute to the existence of a considerable risk of injury during roller-skiing. These include the relative instability of roller-ski wheels, the lack of brakes, a hard road surface, the exposure to motor vehicles travelling at relatively high speeds and the inexperience of either athletes or the public with rollerskis.

3.1.1 Safety on Rollerskis

When introducing athletes to rollerskiing safety is a primary concern. Potential hazards can be mitigated by choosing appropriate terrain, athlete behavior, being aware of environmental factors, scouting training venues, and ensuring athletes know how to control speed on rollerskis. This section will examine all of these considerations in depth.

Terrain: When teaching any rollerski technique coaches must ensure that the activity presented is appropriate for the skill level of the participants. At the T2T level, some athletes will be just starting their progression on rollerskis. If this is the case the area used for rollerskiing should be closed to traffic or have extremely limited traffic. Terrain should be flat with some gentle ups and downs. Pavement should be smooth (new) and mostly free of cracks, bumps, gravel, leaves branches and any other debris. If there are hazards, athletes should be made aware of them at the start of practice so they can avoid these obstacles.

There are some areas in Canada where rollerski specific tracks are available for training and many larger cities have bike paths that allow rollerskiing in traffic free areas. Despite the availability of these traffic free training havens, it is often the case that athletes will find themselves skiing on open roads with exposure to vehicle traffic. In North America there have been numerous instances of athletes being injured by cars while rollerskiing. If your team is in a situation where they will be skiing on open roads coaches should select roads with minimal traffic and if possible with wide shoulders are preferable. Avoiding morning and evening rush hours is also generally a good idea.



Figure 2: Wet roads make for tricky skiing (Photo Credit: Perianne Jones)

Environment: At all times athletes should ski when traffic is light and visibility is good. Often times it is necessary to hold practices a dusk or dawn to try and avoid heat during the summer months, in these situations be cognizant that changing light conditions decreases visibility of rollerskiers on roads. Environmental conditions also affect the safety of any rollerski session. Wet roads make turning and controlling rollerskis extremely difficult. Skate skiing on wet roads is especially difficult as the rollerskis will slip out mid push and are not stable. Classic rollerskis will also slip when attempting kick, but this is more reminiscent of poor grip days on snow, and does not pose as great a falling threat as skate rollerskiing. Athletes and coaches need to also be aware of leaves and paint line on the road when rollerskiing in wet conditions. These hazards can be extremely slippery when wet. As the dryland season bleeds into winter, ice can also be found on roads when rollerskiing. Ice can be tricky to spot so athletes should be made aware of these conditions when they start their ski. When skiing on either icy or wet roads, athletes should take caution when entering shaded areas of the road. These sections of road remain wet and icy for longer and can be hidden dangers when the rest of the roads are clear. Finally rollerskiing in thunderstorm conditions is simply not safe. Rollerski practices should be cancelled if thunder and lightning occurs during practice.

Scouting the Route: When rollerskiing on a new section of road, coaches have the responsibility to know the terrain and relay this information to athletes. Athletes starting out on rollerskis should never go down a hill without information on how steep the grade is, if they need to break to control speed and the length of the run-out at the end of the hill. Coaches should bike, rollerski or drive a new rollerski routes before bringing athletes to train on it. This will allow the coaches to pass on information to the athletes about potential dangers. Once the athletes have skied a route a few times, they should have established an appreciation for the hazards and coaches need only remind them of environmental concerns on a given training day (i.e. wet

roads). Of particular note, coaches should be on the lookout for poorly located stop signs or lights and areas where traffic merges on and off the roads. Athletes should avoid or walk hills where they cannot come to a complete stop at intersections at the bottom.

Controlling Speed on Rollerskis Stopping on Rollerskis: Rollerski do not have brakes, therefore the primary lesson to learn for new rollerskiers is how to manage speed and stop. Mastering these skills can allow skiers to stop quickly and will make rollerskiing safe and controlled. Ways to control speed include:



Figure 3: Snowplow on rollerskis (Photo Credit: Dartmouth Women's XC Team)

- **Snowplow:** The position of the skis is similar to an on snow snowplow, but when on rollerskiis the wheels cannot skid over the ground as easily. As a result the snowplow on rollerskis is not as wide and uses a stepping motion (stepping from ski to ski) to help slow the skier.
- **Using grass shoulders:** Skiing off the road on to smooth grass or placing one foot onto the grass will slow or stop rollerskiers. It is important to watch for holes and uneven ground on the shoulder as this result in falls. When skiing on to grassy shoulders, place one foot ahead of the other with more weight on the back foot. This position helps to guard against falls by allow the skier to remain in a stable body position if the front foot hits a hole or uneven ground.
- **Turns:** Turning can also help to control speed. When descending a hill turning up the fall line will cause skiers to stop. On flats skiers can make a small quick turn that will also serve to kill

speed. When turning, look in the direction you want to go (where you want to end up), not where your skis are pointed.

- **Parachuting:** Standing tall and spreading your arms can turn the body in to giant airbrake on descents. The increased wind resistance will slow athletes down this before they pick up too much speed. This technique will not stop an athlete, but will help them control speed on descents.
- **Walking:** If athletes doubt their ability to safely ski a section of road or trail they should be encouraged to walk that section until they feel more comfortable on their skis.



Figure 4 : Single file, helmets, bright shirts, low traffic roads...perfect. (Photo Credit: Liz Kantack)

3.1.2 Athlete Behavior on Rollerskis

Another important factor to safety on rollerskis is the behavior of athletes on rollerskis. Skiing in a safe and conscientious manner is as important to athlete safety as control and maneuverability on rollerskis. The following athlete behaviours should be taught to all athletes on your team:

- Always ski single file. If the road athletes are skiing on is open to vehicle traffic, athletes cannot ski two a breast. Athletes should also ski with traffic on the right side of the road.
- When skiing in a group the last person in the line calls "car back" when a vehicle is approaching. This is very important because skiers further up the line probably won't hear a car coming due to the noise generated by the group.
- Few drivers can relate to the amount of space that a roller skier takes up while skating skiing. Any time a car approaches rollerskis from the rear all skiers should cease skating and double pole, ski classic, or stop skiing all together and get as close to the edge of the

pavement as possible. Do not resume skate skiing until you are sure there is not another car coming from behind.

- Avoid skiing in large groups, this makes it difficult for cars to pass, especially on narrow and winding roads. Athletes should spread out into several smaller groups.
- Be particularly vigilant when a car is coming from behind and another car or skier is approaching from in front. In this situation road space is at a premium and skiers should move to the extremities of the road. If necessary, step off the road completely.
- When athletes stop skiing, all skiers in the group, including the coach, should get entirely off the pavement.
- Be polite to drivers. A good relationship and good reputation with those with whom roller-skiers must share the road is an important element in ensuring safety and protecting the privilege to use roads and highways for this purpose. Car drivers are much more familiar with bicycles on the road than rollerskiers. The more a skier acts like responsible bike rider with regard to behavior, following rules of the road, and the space he or she occupies, the more likely a car will pass safely, without incident.

3.1.3 Rollerski Equipment

There are many brands, models and types of rollerski available on the market, this can make selecting rollerskis a daunting task. The following section provides guideline on selecting rollerskis for your club.

Major factors to consider when purchasing rollerskis are:

1. Skate or classic or combi.
2. Wheel speed.
3. Stability.
4. Replacement wheels and costs.

Skate, classic or combi: It is recommended that beginner skiers start on skate rollerskis and once they become comfortable on these skis progress to classic rollerskis. Skate rollerskis are much more maneuverable and the boots more stable compared to classic rollerskis and boots. This makes it much easier to learn on skate rollerskis. Several manufacturers make decent combi skis, but in general classic and skate rollerskis are different enough that the compromise in making a combi results in a product not optimally suited for either technique. Length (skate skis can be shorter), wheel thickness (skate skis have much narrower wheels), balance point for binding placement (slightly further back for classic) all make for important differences between skate and classic rollerskis.

Wheel speed: Wheel choice needs to suit where athletes will be rollerskiing. A few people like to rollerski on fine gravel roads or smooth dirt trails, in which case you could use off-road rollerskis (with inflatable wheels). Most athletes, however buy conventional rollerskis with solid

synthetic/rubber wheels. With regards to wheel selection, you need to think hard about terrain. Smooth, usually dry pavement? Synthetic is ok and will last a lot longer. Wet or rough pavement? Rubber will grab better on wet and handle rough pavement better, but wear 2-3x more quickly. Lots of hills, maybe with traffic stops on them? Buy slow wheels. Rubber is usually slower, but the easiest way to regulate is with bearing speed. Most companies have several different bearing speeds. Your local ski shop should be able to help you make the correct choices for all these decisions.

Replacement wheels and costs . . .

Rollerski wheels will wear out, it's a fact. Depending on how much use they get and the road surface that you are using them on, the wheels can wear quite fast. It's not uncommon to replace all four skating wheels every year. Classic wheels wear a lot less, but also need replacing occasionally. Before athletes buy rollerskis, they should ask about the availability and costs of replacement wheels.

Until recently replacing wheels was almost the equivalent of buying new rollerskis, but cheaper alternatives now exist and you should make sure that they are available for the brand of ski you buy.



*Figure 5: It is OK to replace wheels before it gets to that...
(Photo Credit: XCOTTAWA)*

Other Rollerski Equipment Considerations:

- **Tips:** Poles do not grip on the pavement as well as they do on snow. Special carbide pole tips are required to help correct this problem. Coaches should ensure that the pole tip and handles are correctly aligned and sharp, and that the athlete plants their pole so that the tip digs in properly. When the skier returns to skiing on snow, they should be aware that they might have to adjust their pole action to achieve proper grip with pole tips. At the Start of the season, athletes should avoid excessive double poling and build up volume slowly. The hard impact of poling on pavement can lead to elbow and wrist injuries.
- **Boots:** Boots with a strong cuff and stiff soles are needed to stake rollerski effectively. Many young skiers often attempt to rollerski with combi boots that are too soft and flexible which decreases stability and increases the likelihood of a fall. However, for beginner classic rollerskiers, combi boots offer increased support compared to regular classic boots and can help instill confidence in young athletes.

- **Fenders:** Having fenders installed on rollerskis make a huge difference in the comfort of skiing in wet conditions. Fenders help keep boots dry and in relatively good condition when rollerskiing.
- **Safety Gear:** All rollerskiers must attend practices with a helmet, gloves and a safety vest or bright colored shirt. No exceptions. Beginner skiers may also want to use elbow and knee pads.

To stride or not to stride: There has been a long-standing debate as to whether athletes should diagonal stride on rollerskis. One side argues that you are only developing bad habits when you stride: the ratchet allows you to kick no matter how bad your technique is. On the flip side striding on rollerskis can be of great help when working on weight transfer, balance, and timing.

As athletes progress to higher levels of training and competition, classic rollerskiing becomes a standard form of dryland training. It is therefore recommended that young skiers start classic rollerski once they have mastered skate rollerskiing. Coaches need to be vigilant of athletes on classic rollerskis to ensure that the aforementioned bad habits do not develop. Specifically when the terrain is steep, athletes have a tendency to kick too long and slowly. A short, sharp kick is imperative. When the kick is slow the application of force is late and takes place far behind the skier. On snow this will cause the skier to slip. A short, sharp kick happens when the skier's weight is directly over the feet when maximum power can be transferred through the ski. To do this, coaches must ensure that their athletes are weight transferring to the kicking ski.

Significant technical improvements can be made by striding on classic rollerskis, but athletes require consistent feedback from coaches to ensure these gains are achieved.



Figure 6: Learning to rollerski (Photo Credit Loppet Nordic Racing)

3.1.4 Starting new skiers on rollerskis:

To bring together the pointers discussed so far in this section here are some tips to help introduce rollerskiing to new skiers.

- An empty paved parking lot is a good place for the first sessions. If that is not possible, locate a stretch of smooth, paved flat road with as little traffic as possible.
- Initially the emphasis should be on establishing a personal comfort level and the activity should only take place in a group session under the supervision of a qualified coach.
- Begin with exercises that the skier can handle. Simple agility courses can be set up to help the skier develop skills that will provide them with a general sense of control, such as turning and stopping. Practice with and without poles. The next step is to work on balance, rhythm and coordination - skills that provide the foundation for good technique.
- Before a skier moves on to more advanced technique work they should be familiar with all of the roller ski speed-control techniques. They should also be able to demonstrate the following: the ability to double pole without their poles slipping, to step turn, to control their speed by having one ski on a slower surface, to stop by going off the road surface, and to comfortably ski down moderate hills. It is also important for the skier to achieve a level of confidence where they can stand (put their full weight) on top of one ski.



Figure 7: Skiing on worn wheels is a bad idea (Photo: Kent Murdoch)

3.1.5 Roller Ski maintenance

Most people do zero maintenance on their roller skis and in general rollerskis stand up a lot of abuse. However there are a few things that should be checked on rollerskis for safety.

- Binding screws do come loose and one does not want the roller ski and binding to separated while skiing. If you notice rattling and vibration noise as you roll down the highway, it could likely be that one or many of your binding screws have come loose. To repair the binding, fill the hole with glue before tightening the screw. Epoxy also works well, you can even buy specialized epoxy for adhering metal to metal. If the roller skis are wood, white glue works great.

- Wheel axle nuts do come loose. Athletes should check their wheel nuts regularly. Use thread locker such as “loctite” or lock nuts if it is a persistent problem. If you find the ratchet is slipping on classic roller skis, it may be that the wheel nuts have worked loose. Wheel nuts do get damaged from scraping on pavement. If they are old, you may want to consider buying replacements so you can use a wrench to effectively tighten them.
- Sharpen your tips often. It is much easier to sharpen a tip that is not worn down too much. Roller ski training will be more effective and less frustrating with sharp tips. Use a diamond file and try to maintain the angles on the tips. To speed up the sharpening process you can use a bench top tile cutter or a dremel tool (more portable) with a rotating diamond blade. This is best done by briefly and gently pressing the tip on the side of the diamond blade.



Figure 7: There are many ways to sharpen a pole tip (Photo Credit: XCOTTAWA)

- Wheels wear down. Check your wheels for wear often and replace when you start to see cracks and holes appear in the wheel. By continuing to ski on wheels with these defects you are endangering yourself as the wheel can come apart suddenly while during a rollerski session.
- When it is really hot outside, avoid using your roller skis in the heat of the day. Occasionally the rubber on roller ski wheels will delaminate on super hot summer days.
- Coaches’ repair kit. Coaches should advise athletes to bring extra tips, to all practice (they can be stored in a drink belt). Coaches can carry glue sticks and a lighter to replace broken tips. At the team van coaches should carry equipment to tighten and replace rollerski parts in case bolts have loosened before the ski.

3.2 Ski striding

The second predominant form of ski specific dryland training is ski striding with poles. Proper technique for ski striding can be found in the L2T reference material. Although not used as extensively as rollerskiing, ski striding is an excellent training technique that uses all four limbs in a ski specific motion.



Figure 8: Ski striding with peers is fun! (Photo Credit: Stratton Mountain School)

3.2.1 Environment and Terrain Considerations for Ski striding

In order to be a useful training method ski striding needs to occur on hilly off road terrain. In general the ski striding techniques require up hills to be executed properly. When selecting terrain for ski striding workouts coaches should look for a long uphill or a series of shorter climbs that can be repeated numerous times.

The hills should be a mix of steeper and more gradual inclines which will force skiers to vary their cadence and technique (eg ski striding vs ski walking) during the workout. This is not to say that a bounding motion cannot be used on the flats when completing a ski striding workout, but this motion is less ski specific. The trail composition itself is also important when considering ski striding terrain. The trail should provide a clear view of the ground (not obstructed by grass or undergrowth) so that athletes can avoid rocks, holes and other hazards. Long grass also gets in the way of poles when striding, coaches should therefore select areas with wide trails or limited low lying bushes. Trails with extremely uneven footing and loose soil should also be avoided to avoid potential ankle injuries. It is recommended staying off paved trails for ski striding workouts as ski striding poles do not dig into pavement very well and bounding motions on pavement can be hard on knees and ankles. Hiking trails in parks, mountain bike trails, and access roads at downhill ski centers are all excellent places to hold ski striding practices.



Figure 9: long gradual uphill in alpine venues are ideal for ski-striding (Photo Credit SMS Nordic)

3.2.2 Equipment for Ski striding

Ski striding requires little equipment to perform but there are a few considerations that athletes and coaches should keep in mind to get the most out of a ski striding workout.

Poles: Poles for ski striding should be robust and strong and need not be super light weight. These poles take a lot of abuse so sacrificing weight for durability is highly recommended. Ski striding poles should come equipped with carbide tips (the same ones used for rollerskiing) and adjustable straps. The height of ski striding poles should be approximately 5cm-10cm shorter than classic ski poles.

Gloves: As ski striding is often carried out in the heat of the summer, chaffing between the pole straps and hands can often be an issue. Using a lightweight glove (for example a cycling glove) when ski striding can prevent blisters and chaffing.

Shoes: Ski striding usually occurs on rough terrain, therefore it is recommended that athletes use proper trail running shoes when completing ski striding workouts.

3.3 Dryland Techniques and Training Programs

YTP: Yearly training plans should incorporate a section devoted to specific training (dryland techniques and on snow training) vs non-specific training (running, weight lifting etc) that provides guidelines to the amount of rollerskiing and ski striding to include in a training plan. Often expressed as a percentage in YTPs, specific training accounts for 20% of total training time early in the training season (May) and progresses to 70%-80% late in the dryland season (Oct-Nov). It can be an arduous task to divide training hours precisely into specific and non-specific training modes. Instead it is easier to divide practices up so that the total number of practices reflects the amount of specific vs non-specific hours in the YTP. For example if there are 24 total workout in a training cycle in May only 4-5 workouts (~20%) should involve ski specific dryland training. Building out training programs from YTPs is covered in more detail in section 11 "From YTP to Training Plan". For examples of YTPs for T2T athletes please refer to the athlete matrix on CCC's website.

Progression: As with any training method, athletes should be gradually exposed to increasing volumes of rollerski and dryland techniques as they progress through the training season and become more comfortable with these training modes. Rollerskiing, especially poling motions, can be quite hard on elbow and wrist joints early season. The constant pounding on pavement is much more strenuous than poling on snow. Athletes should slowly and surely accumulate volume rollerskiing and ski striding before progressing to intensity in these training modes. Allow at least two or three training sessions before adding any significant interval or volume training into the workouts.

Variation: Dryland training can very easily become stale to young skiers if workouts are repeated at the same place using the same techniques and modes. Coaches should endeavor to constantly vary practice locations and modes so athletes are provided with new stimulus and challenges that new locations offer. For rollerskiing and ski striding this entails scouting out new locations that offer new opportunities for training. If practices are held in similar locations week after week, ensure that the content of the practice changes as much as possible. For example focus on double pole one week, legs only the next, intensity the following week. This will help keep athletes engaged in dryland training by providing mental breaks that other training modes (running, cycling and paddling) offer.

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Main writers

Michael Vieira