

Scottish Curling-Ice Group

CUTTING TECHNIQUE

When a blade is used to remove pebble and other irregularities from the surface of curling ice, three words are commonly used to describe the action: scraping, cutting and shaving.

1. "Scraping" is the most common word, historically perhaps referring to the action of scraping the surface with a blade of sorts, primarily to remove debris, snow, frost and whatever else. The blade could be a simple sheet of metal with no real sharp edge to it, often pushed by hand, and it would be very difficult to remove pebble with such an implement. As blades and machinery improved the word remained in use, although today it is more accurate only to use scraping when referring to the use of a handscraper.
2. "Cutting" accurately describes the action of using a sharp blade to cut the surface of the ice. It is now widely used to describe cutting the ice during the daily routine of ice maintenance, but if the blade were to dull the word scraping would be technically more appropriate. The ice cannot be cut with a dull blade, it can only be scraped.
3. "Shaving" would be the most appropriate word to use when cutting the ice with a sharp blade, because it describes the action very accurately. A blade has to be very sharp to shave the ice, but not quite as sharp to be able to cut it. When nipping the pebble with the Nipper the word shaving is most appropriate, as the blades are of high quality steel and very sharp.

Whether scraping, cutting or shaving, it will be assumed here that only a sharp blade will be used when preparing the ice, and the method will be referred to as cutting.

After installation the ice pad should be as level as it can be, with the surface consistent in structure and temperature. Usually there will be some surface tension in the surface and some irregularity, but not so bad as to affect the level of the blade over larger areas. In other words, the blade should remain level when used properly across the surface, and a good, sharp blade will then leave very little evidence in the form of lines down the length of the sheets.

In an ideal world the blade should be the same length as the width of the sheet, which is nearly five metres (15'), but the blade is only 1.5m long (5'). It is recommended to have an overlap of at least 30cm (1'), which makes it very difficult to cut all of the sheet without cutting at least some of it twice. These areas, if the wrong method is used, could become lower, and the pad will no longer be level. On the other hand, if the cutting is done correctly on a level pad the overlap will not be a problem. Also, there has as yet been no curling, no compaction and no ridges, and the normal cutting patterns will make matters even worse. At this stage, therefore, a clear distinction has to be made between cutting a newly flooded level sheet, and cutting a compacted sheet.

The frame or box on an Ice King blade will normally have ten holes spaced evenly apart, with the outer two 7.5cm (3") from the ends and the remainder about 15cm (6") apart. These holes are usually the means by which a pattern will be defined, as they can be used to aim the blade down a straight line.

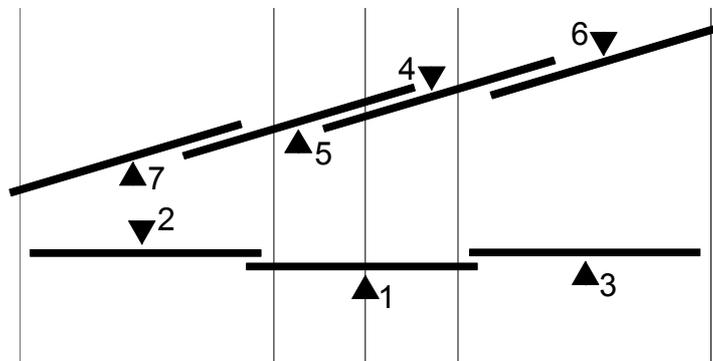
Terminology becomes important too, because cutting ice has a language all its own:

1. Pass – the journey down a sheet of ice from end to end, once.
2. Single pass – cutting with a straight blade once down the middle of the sheet.
3. Three-pass (pattern) – covering most of the sheet in three passes.
4. Four-pass – covering the sheet in four passes.
5. Five-pass – covering the sheet in five passes.
6. Six-pass – covering the sheet in six passes.
7. Straight blade – no angle on the blade.
8. Angled in – blade angled with the nearer end of the blade closer to the centreline, tending to throw snow into the sheet.
9. Angled out – blade angled with the nearer end of the blade further from the centreline, tending to throw snow out from the sheet.
10. Two-hole = 22.5cm (9") from the end – the second hole of the blade frame on the line, usually the hole nearest the centreline.
11. Three-hole = 37.5cm (15") from the end – the third hole of the blade frame on the line, usually the hole nearest the centreline.
12. Four-hole = 52.5cm (21") from the end – the fourth hole of the blade frame on the line, usually the hole nearest the centreline.
13. Slant – used to describe the position of the blade when the rear of the blade is raised off the ice, to provide the correct angle for the cutting edge of the blade in contact with the ice surface.
14. Pattern – a combination of passes to cover the whole sheet of ice or as required.

15. **Level pattern** – a cutting pattern that will never overlap too much and can safely be used to cut a sheet of ice that is already level, flat and even. Will normally be used after flooding.
16. **Game pattern** – a cutting pattern that can be used to cut between games during a serious competition, removing the pebble after only one game.
17. **Working pattern** – a cutting pattern routinely used to maintain a normal level surface, usually on a daily basis, designed to keep down compacted areas along the centreline (which will not be needed if the centreline receives additional passes).
18. **Corrective pattern** – a cutting pattern(s) designed to deal with high lines in other areas, such as uneven pebbling which has caused a ridge to develop near the four-foot line, or of course a high centreline.

Level Pattern

1. Use this pattern on newly flooded ice, when reducing scum and salts by pebbling and cutting.
2. It can start with a three-pass straight-blade pattern, first down the middle, then back one side with minimal overlap and down the other side, again with the same minimal overlap. This three-pass is important to help bring the level down to the hollow lines between pipes, where most of the salts will be. For argument's sake go anti-clockwise.
3. Next use a four-pass with the blade angled out, going clockwise. Usually this will be a three-hole over the centreline, but a two-hole can also be used, and then the outer hole of the blade over the sideline.
4. By drawing the angles on a sheet of paper, it will be obvious that the area is being covered systematically and in opposite ways. After the next hot pebble, do the same but start in the opposite direction. Again the sheet will be systematically covered, with every pattern the opposite of before.
5. In this way the sheet can be pebbled and cut again and again without any problems developing, until the salts have been removed and the surface-tension problem has been equalised, leaving the surface smooth, flat and even.



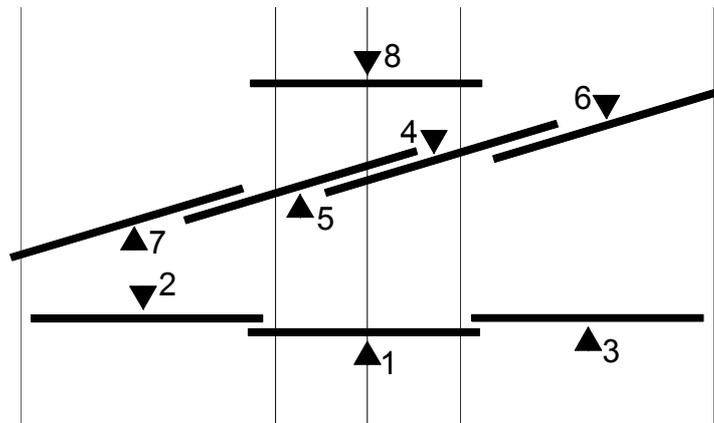
The seven-pass level cutting pattern, starting anti-clockwise

If needed, this routine can be repeated by following the above with a two-hole four-pass pattern anti-clockwise, then a straight-blade three-pass clockwise. This effectively becomes a fourteen-pass working routine for use on perfectly level ice (3–4–4–3). When the blade is newly ground and very sharp it will cut better and a 3–4–3 could be sufficient, while a duller blade might need an extra four-pass to remove all the pebble.

Experienced technicians will know how well a blade should be cutting when sharp, and how to maintain its condition. As a general guide, a newly ground blade will be so sharp that it will simply dig into the ice if the slant is too severe. The ideal slant to begin with will be at about fourteen cranks of the lever, with the rear of the blade less than a centimetre off the ice. As the blade is "run in" over a few days, the bottom of the cutting edge is dulled by friction with the ice and the slant can gradually be increased, half a turn at a time, until it settles down and doesn't dig in, usually around 18 cranks of the lever. Then the slant should be retained without adjustment, honing the blade sufficiently to maintain the correct degree of sharpness. At first hone only with an extra-fine stone (for a diamond stone 1200 grit), giving only a few careful passes of the stone. After a week or two use a fine stone for a few passes and finish off with the extra-fine, working only across the top of the blade.

Game pattern

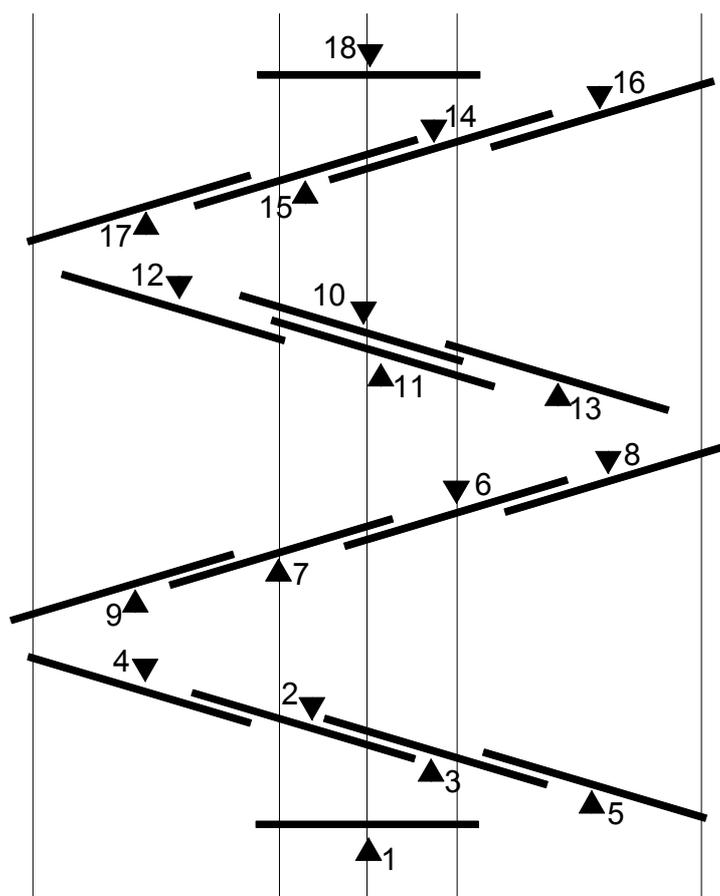
1. This pattern is exactly the same as the level pattern, but it has a single pass added at the end to deal with the compaction down the centreline. Of course the centreline could be cut down too much, in which case the last single pass can be omitted on occasion.
2. This pattern can also be used routinely if there is not too much pebble on the pad. For instance, it will deal well with a double fine (76) or a double extra-fine pebble (77), but any more than that and extra cutting will be needed. It takes about seven minutes per sheet of ice.
3. Because this pattern is so safe and easy to remember (but try to change direction and start clockwise/anti-clockwise), it is recommended for clubs or rinks that use volunteers to prepare the ice.



The eight-pass game/flat pattern, here starting anti-clockwise

Working patterns

1. Every technician will develop his own. If he gets it right his ice will be good and level, but it isn't always possible to identify a problem and, through trying the wrong thing to fix it, the problem could get worse. Only experience within an individual rink can decide the routine to maintain an ice pad to its optimum.
2. The following routine can be used as a starting point. It has many advantages and is easily memorised; it is also easy to remember during cutting which pass comes next. It has proved to keep a pad level for eight weeks or longer, no matter whether it is heavily used or not, and it has the minimum of angle changes. The routine assumes a level pad to start with, a true blade and reasonably even pebble with a good pebble head, and varying pebble heads will be beneficial.
3. The routine has at least three patterns, preferably four and in the same sequence as noted here. On Monday the first pattern is clockwise, every following day is the opposite.
4. The first and last passes are always with a straight blade. All other cuts are with the blade angled out, throwing snow away from the centrelines, and kept the same for every circuit. In this way very little snow will be left on the sheet except down the sidelines.
5. The pattern shown here is based on the flat pattern above. By using the flat 3-4-4-3 as the norm, it can easily be adapted to allow for a higher centreline, either as 1-4-4-3 or even as 1-4-4-1, and if the centre is badly high throw in a four-hole four-pass as well.
6. It helps to use the straightness of the blade as an indicator for the centreline on a regular basis. On the last pass down the middle, first remove all the snow from the blade, then cut the middle and study the snow. If there is a slight (or bad) mound over the middle area of the blade the middle is high and should be cut harder the next day. In a busy rink the middle should receive an extra single pass every day, but quiet rinks might only need one a week.
7. By using the same working patterns as routine, it becomes easier to notice changes in the ice surface and so finding the reasons why and how to deal with the problems.



An eighteen-pass routine cutting pattern, here starting anti-clockwise, including the four-hole four-pass to work the middle down. This is extreme, normally only half this amount of cutting will be sufficient.

Important rules to remember

1. Every sheet can be different, and every curling rink can be different.
2. Finish with a single-pass straight blade over the centreline where possible.
3. The choice of patterns will come from experience, and will depend on many factors. The depth of cut, softness of the ice, sharpness of the blade, the type of water in the pebble – these will all come into play. (See Working Pattern.)
4. Whatever is done in one pattern must be done differently in the next pattern.
5. Use an angled blade rather than a straight blade most of the time.
6. Cut at the right ice-surface temperature, around -4°C or even warmer.
7. The cutting slant of the blade will remain much the same for routine cutting. The blade must not chatter or leave snow behind when it is sharp. Start with a shallow slant and gradually adjust with extra turns to find the best position. Maintain that slant within a turn or two by regular honing, and if the blade doesn't cut well increase the honing instead. Should the slant become too severe (which can happen when the ice is too cold or the problem is unknown), the blade will simply blunt itself with the edge becoming rounded, and the blade should be reground. This kind of damage cannot be cured with a honing stone.
8. Do not cut too hard. The correct amount of snow for one pass over uncut pebble will be a Swiss roll of about 5-7cm in diameter, and when the base is more solid and nearly down to the pad the roll will be about 2-3cm.
9. Use the snow on the blade as a guide to note high and low lines. On good ice the snow will be evenly distributed along the blade. Do not think a bad blade will give a good snow line, and don't panic.
10. Cutting a good pad is easy. Cutting a bad pad is impossible, it needs a flood first.

11. Do everything everywhere by cutting all the sheets exactly the same on each day, unless there is a known problem. Consistency will reveal small problems.
12. Do not omit passes unless there is a good reason, and do not change a pattern for the sake of it – things can go seriously wrong.
13. Always keep an eye on the ends of the blade to see if they are digging into the ice. If they are, think carefully why this is happening and see if it improves during the full routine. If the edge on the ice can be felt with a finger there is a problem, but if it is only a shiny line it is probably not too serious and will disappear.
14. A good blade on a level pad will not leave visible lines down the length.
15. Learn to turn evenly at the ends. The corners might eventually get too low and will have to be built up carefully with extra layers of pebble (see below).
16. The more uniform a sheet of ice is cut, the least problems will develop. The corners, backboard areas and hack areas must be treated in the same spirit and kept as level with the rest of the pad as possible.
17. Believe what the snow on the blade says and do not assume that the ice pad is level.
18. Cutting the ice with a powered cutter is the cheapest and easiest way to maintain its level. Do not neglect regular use of it, and where possible cut after every four pebbles.
19. A clean ice surface makes for good curling, and saves wear on the running edges of the stones. It pays to cut the ice.
20. Cutting cannot cure a run, but it can prevent it from developing in the first place.
21. Changing the pebbling technique is the best way to change the characteristics of a sheet of curling ice. Without good pebbling the cutting will be very difficult.
22. The simplest way to see if the centreline is rising, is to play two stones exactly down the line, one on the in-turn and the other on the out-turn, at draw weight. Then play two other stones aiming at the previous stones but on the opposite hands. The last two stones should finish on the centreline, but if they don't reach the centreline is high.

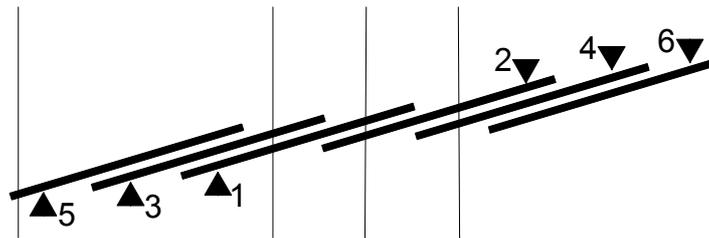
Corrective patterns

1. These are used to deal with high lines caused by uneven pebbling or compaction.
2. For highs along the four-foot lines, add a two-hole over the two-foot line in the two-hole four-pass above (see six-pass below).
3. For highs along the sidelines (where pebble has overlapped too much and built up), use a two-pass over the sidelines. Next to sideboards, remove the blade's weight from the side away from the boards, or add a weight to the side nearer the boards.
4. Extra passes can be inserted. A good one to work down the middle is the four-hole over the centreline as (above), then one-hole on the two-foot line, followed by a four-pass always in the opposite direction. This four-hole pattern also places the blade over the four-foot line after the centre passes, which is good for removing surplus pebble with some degree of safety.
5. Do not expect to deal with a high line in one visit. The safest is to cut it down gradually over a week, playing stones to test the lines and not cutting too much too soon. The best ways to find the solution to a developing problem are through caution, careful thought, practice and experience.

Dangerous patterns to use

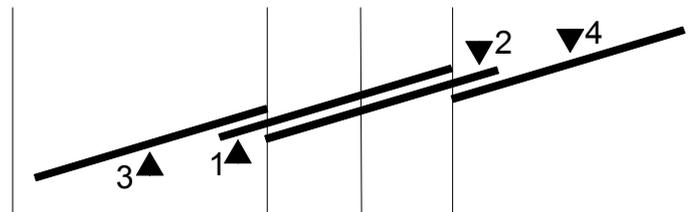
As a result of experiments done at Forest Hills, Scotland, two patterns were clearly identified as dangerous, if repeated for too long. These experiments were done over two seasons on a level pad, which was repaired by flooding when the patterns failed, and while every rink is different a level pad anywhere can be quickly ruined by the incorrect use of these two patterns.

The first is the six-pass, either two-hole or three-hole, that will quickly lower the 3/4-foot lines if used regularly. This results in the centreline appearing to be higher and so with the sidelines, with the blade tipping into the 3/4-foot lines and cutting these down even more. The reason is clear from the diagram below, showing that more pebble is removed from these areas than from the rest of the sheet, whilst not enough is removed from the centreline area. Therefore use this pattern **ONLY** when absolutely sure that it is needed.



A three-hole six-pass pattern, going clockwise

The better pattern to use for cutting down the 3/4-foot lines is the four-hole four-pass pattern, along with other patterns from the working patterns. Remember, in order to cut down a high line the blade must be evenly “balanced” over that line. The four-hole pattern is however equally dangerous to use, unless the centreline IS high and more compacted. From the diagram below the danger is obvious.



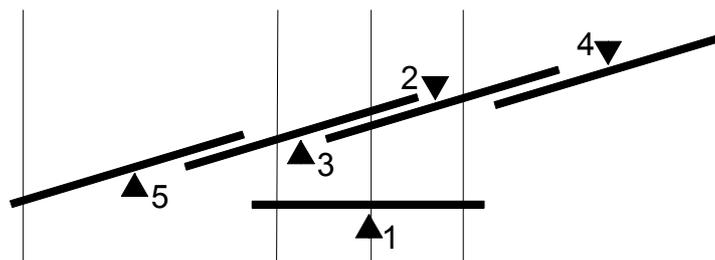
The four-hole four-pass pattern, here clockwise

The problem is that it is never easy to tell when the centrelines are becoming high after the last flood. In some rinks it can be days, in others weeks. Remember to look at the snow after every first straight-blade cut to see if there is a slight hump (that is why the first cut is over the centreline!). If there is a hump, insert the four-hole four-pass with caution. If there is too long a delay in cutting down the centrelines, the ice will become as hard and solid as crystal and be very difficult – if not impossible – to cut down.

It is important to note that the first straight-blade pass over the centreline will not necessarily reveal if the middles are high. The last pass down the centreline, after the pebble has effectively been removed, is a better indicator and, if studied regularly, will reveal exactly when the middles start rising, and so help to eliminate unnecessary cutting.

To avoid the danger of a four-hole four-pass pattern when not sure, use the level or game patterns instead, or a five-pass pattern if there isn't time for anything else. The five-pass pattern is gentler and safer in the initial stages of dealing with high centrelines.

Note: This is the safest pattern to use where unskilled volunteers help to cut the ice.

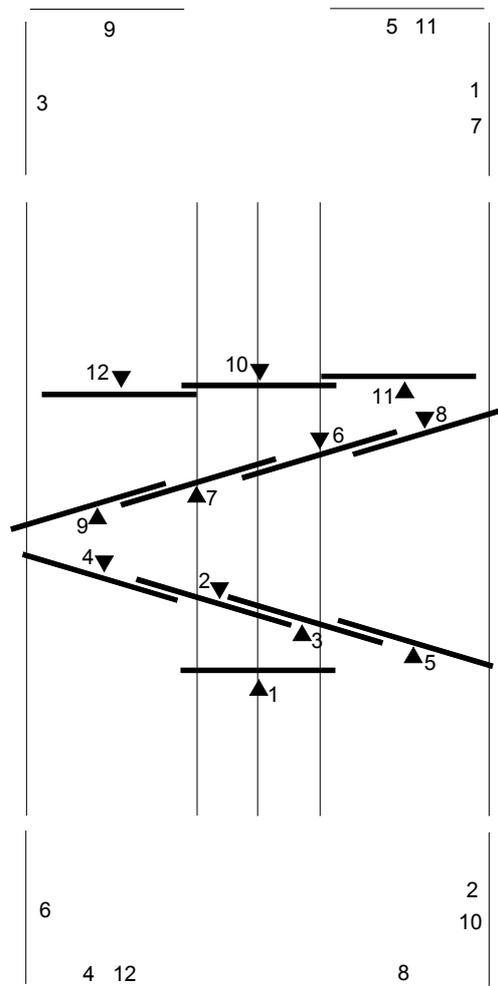


A five-pass three-hole pattern, here clockwise

As a result of the continual tests at Forest Hills the 3–4–4–3 pattern has become the norm, with occasional 1–4–4–3 patterns as needed. Currently these patterns have kept the pad level for over four months and, with the use of the icePOD (Precision Overhead Device), it is possible to prove that the pad is level within 0.05mm over the width of a sheet. The POD stretches a cable across the sheet, from which a precision dial gauge hangs to take readings at intervals, accurate to within 0.01mm.

Dumping snow

To ensure that the areas behind the backlines are cut as consistently as possible, a system was developed that seems to work better than any other. The strips behind the backlines are cut first in two directions, to remove the bulk of the pebble and so enable sliding of the blade without scarring the surface. Then the snow is dumped as illustrated below, always working with the clockwise/anti-clockwise rotation. Because every following day is the opposite, the areas are cut evenly over a week or so. The only problem is that these areas are cut more than the pad itself and gradually become lower than the backline – to deal with this the strips behind the backlines are also pebbled more by starting with a pebble across the sheets that only cover the strips between footlines and backlines.



The normal working pattern at Forest Hills (here a 1–4–4–3), also showing how the snow is dumped at the end of each pass.