# *Scottish Curling-Ice Group*

## GOOD ICE

Overview

What is good ice? Everyone has his own opinion, often influenced by whether the game had been won or lost. "Some draw, in places, at times" was a description used after a competition – that was definitely NOT good ice. "Not bad" is a common reply after a game – "not bad" does not equal "good". "Okay" does not mean good either. Yet, when a sheet of average curling ice is compared to a sheet of flipover ice, where the skating marks were still there for all to see and the pebble was nothing but humps and bumps, with straight bits and funny bits and everything else thrown in for good measure, the players might well be justified in calling it good ice.

Definition

During the writing of *Curling Ice Explained* for the WCF, the Specific Definition of Curling Ice was one of the first sections to be addressed, and one of the last to be finished. Everyone of any significance was consulted, including players, coaches, ice technicians and officials from all levels of play. It was not consensus that proved difficult to achieve, it was simply a determination to leave no stone unturned (pardon that!) in the determination to have a valid definition of curling ice.
For the draw or curl the conclusion was, and still is:
*To play an offensive game with many stones in play, the curl with naturally-matured stones (see above) should be 4 foot on a draw – not less and not more. This will allow for draws around a guard stone with adequate distance between the guard and hidden stone. It is possible with good precision to play a "freeze", and even to be able to push a hidden stone.*
For the speed and behaviour of the stone travelling down the sheet the conclusion was, and still is:
*To have the same speed and curl in the beginning of a game as at the end is important, because the teams can begin the offensive play immediately without risking too much. A good draw weight should be 24-25 seconds (hog to tee) all over the sheet from the first end to the last on both the in-turn and out-turn. There should also be good "living" in the stone, which means that the stone shouldn't slow down too fast at the end of the movement and should be easy to sweep.*
Yet, strangely, even these definitions seem vague and less than specific. This clearly illustrates that a definition of curling ice is no simple matter, and fulfilling the requirements of a definition would be much more difficult than simply writing a few words.

Curling Ice Explained was first released in April, 2004. Within the year all members of the SCIG were, by some strange coincidence, producing the same ice for their players on a daily basis. The differences in their practices were simply to allow for variations in humidity, refrigeration plant and of course the stones, but the result in all cases was 4 foot draw in 24 seconds. Only recently, during a visit to another SCIG member in Sweden who had had no working contact with any other members, the ice was discovered to be the same too, and it was certainly good ice. Why? Because they know what good ice is and are sufficiently skilled to produce it, more or less anywhere, and they will not settle for anything less.
These technicians, like the individuals who defined curling ice for CIE, are expert and competent, with many decades of experience between them. If they decide the ice is good then they are confident that it is good, and that the others will agree that the ice is good. They have only one standard and that is "good", and nothing else will be good enough. But are they right? Who says?

Who says

The players, of course. They are the customers who pay good money for the use of one sheet of curling ice. They are the loyal customers who come back year after year, never mind the weather and all else, because curling is their game and they must support it. That curler, who slides so gracefully towards the brush and releases his stone with that little push on the outturn that ensures his stone is already a foot off the line, is a valued customer and a competent curler, and there is definitely a funny line just there, but otherwise the ice is good. And that curler, who applies handle at the last moment on the inturn to fling his stone wide by at least two foot, knows very well that the ice is not good, because the stone never drew an inch. And that visiting team, well used to playing on frozen water needing strike weight to reach the hog, cannot ALL be wrong, the ice is simply too keen because all their stones are out the back. And so it goes on, every day and every week, everyone has a better idea.

A patron of a restaurant, even a poor restaurant, will order a steak (rare please) and will expect a steak to be served (rare). Bring him a well-done steak and he will most likely send it back and ask for another. Bring him a plate of mince and he'll be away out the door, never to be seen again. Yet curlers are so loyal that they will curl on virtually anything, until they get used to it, and they will call it curling ice. Change it and they will complain, because they are not used to it. Give them championship ice as near to perfection as can be achieved, and they will struggle to play on it, until they get used to it, and then there will be no going back to the old stuff. Once they know what good ice is, then they know, and no-one can tell them any different.
There are players who know what good ice is, because they have played on it. If a small girl, eight years old and who has never curled before, can deliver a stone from a standing position after a little practice and see it finish in the far house somewhere, it is good ice – the smile on her face says so (been there, seen that). If a wheelchair player can practice for two hours, delivering some 200 stones, and go home without a sore shoulder, it is good ice – the gleam in his eyes says so when he comes back for more (been there, seen that). When the world champions turn up out of nowhere for a practice and are still there four hours later, drawing in stone after stone after stone with all the joy of winning the finals, it is good ice (been there too, seen that). Yes, players know when it is good ice, because good ice is unmistakable.
Good ice is true and consistent. It is silky smooth under the slider, but not slippery. It feels gentle under the stone with no roughness transmitted to the handle, yet it is so sensitive that the smallest flaw in delivery will affect the stone. The sweepers will know that the stone will glide rather than plough, and with their sweeping they can take it exactly as far as they want to and as straight as they need to for perfection. The skip will know he can trust the ice anywhere and call all the crazy shots, the freezes, the angled raises, the gentle splits and the triple tap-up killers. There simply is nothing quite like good ice, which is what every curling-ice technician should be providing every day for every curler.
But do they? Or do they simply assume that it is good ice because they made it themselves, like a child drawing a picture and deciding it is good? After all, everyone says so, so it must be good.

## The basics

### Level

A sheet of curling ice must be level, but how level is level. A cutter's blade is 1.52m (5ft) long and, if it is a true blade, is supposed to be accurate within 0.038mm (0.0015") over its length, and good blades are. However, the sheet of ice is nearly 5m wide and it will take several passes to cut the width of the sheet, and using the wrong sequence can ruin the level. Each pass will remove around 0.5mm of pebble, and about 0.1mm of ice pad if the cutting continues beyond the pebble, which is very rough compared to the 0.038mm of precision in the blade. So, even with a precision blade, there is every risk that the pad will not remain level if it is cut incorrectly just once. Assuming that the pad was installed correctly and was level when that process finished, keeping it level is some substantial challenge. Add to that the wear caused by play and the problems of uneven pebble distribution, and the challenge borders on the impossible.
With the IcePOD now in regular use it is possible to measure the level over the width of a sheet of ice within 0.01mm over 5m. To date readings show that it is possible to keep a sheet of ice level within 0.05mm for many months, but the maintenance will be an exacting schedule with no room for mistakes. To date, also, it appears that stones will not find the flaw if the surface is level within 0.1mm over 5m. Experiments continue, but it is safe to assume that anything within 0.1mm over 5m can be considered level for the purposes of a good game of curling – anything beyond that is likely to affect the stones.
The old method of telling how level a sheet is from the snow on the blade and/or marks left in the ice will soon become too unsure to be relied on. Advances in ice maintenance are such that the tolerances become ever smaller, and a blade with a very small bow will not necessarily gather snow unevenly and/or leave marks on the pad. This method is a good guide, but not a definition of level. Also, a good blade can sometimes leave lines down the length, especially when the humidity is a little high and there is some frost on the pad, yet not even the IcePOD can find the evidence of a flaw in the level or the reason. If the IcePOD says the sheet is level then it must be level, and the shiny lines are simply as deep as the frost itself, which is less than 0.01mm thick.
In short, a sheet of curling ice can only be considered level if it is level enough for curling. It is the art of the possible that will reach a limit, and beyond that limit it doesn't matter. A sheet of curling ice is, probably, never truly level.

**Clean**

The dirt is everywhere. It is in the water as impurities, frozen into the ice, even when using deionised water for flooding. It is in the air as dust, on clothing as fibres, on the walkways as plain dirt. The brushes and pads move the dirt about (is there a brush with a vacuum cleaner attached?) and air turbulence brings more dirt into contact with the surface for it to freeze and stay.
Good ice is clean ice, but how clean is clean. A good curling rink will cut the surface of the ice every day and remove everything that can be removed, and the surrounding areas will be cleaned too, yet it takes only a tiny fragment of ice to deflect a stone from its path. Immediately the curler will blame the ice for dirt, without even imagining that perhaps he had caused the problem himself when he slid out with an upside-down Hammer brush that rattled along the pebbles. Collect the snow off one sheet after one game of curling, melt it down and put it through a filter – by no stretch of the imagination can the result be considered clean.
Clean ice is impossible, the ice only has to be clean enough. It is clean enough when the technician has done everything he can possibly do during his work routines to remove dirt and prevent dirt, and the moment the players step onto the ice his work is done. A sheet of curling ice is, certainly, never truly clean.

**Consistent**

By the time the actual playing surface, essentially the pebble, is prepared, it will be too late to correct flaws in the level or general cleanliness. These can be considered irrelevant now and, for convenience, assumed to be as level and clean as possible. The pebble, however, has to be consistent over the entire sheet and for the duration of the game, notwithstanding the influences of temperature, humidity and of course players and granite.
Pebble distribution will vary from rink to rink, from say one pebble per 1cm² to one pebble per 3cm². No matter the distribution, as long as it is consistent and even all over the sheet, which is difficult enough to achieve. The biggest problem will be the height of the pebbles, even after the surface has been nipped, as many high pebbles will have been cut in half while most lower pebbles will remain untouched and as yet not in play.
During tests at Forest Hills to calculate the surface areas of pebble and the effects of nipping and normal play, ten pebbles were selected at random and their surfaces mapped and scanned onto computer. The areas were then calculated after each successive nip and the changes were charted. The results were astonishing and nowhere near consistent. One large pebble had a surface area of 9.3mm² (probably one drop falling on top of another) while most the others were well under 2mm². After the first nip the average increase in surface area of the ten pebbles was 66%, while successive nips only increased the area by less than 10%. The pebble tested was an extra-fine pebble applied twice, with 80 swings of the arm at 40 seconds from backline to backline each time.
The tests revealed that, although the repeated nipping only increased the surface area by 10%, this had a huge effect on the amount of draw but very little on the speed. While a very consistent surface was achieved after the first nip, the consistency deteriorated fast as the nipping progressed. The same happened during normal play when the ice was allowed to warm up a little and wear faster ("go flat"), and after four ends of curling there was a huge draw not entirely explained by the warmer ice surface. It was concluded that a consistent draw and speed could only be achieved during a game if all the parameters remained constant, and of these the ice-surface temperature (IST) was the most significant – as soon as the pebble surface started wearing down, the ice lost its consistency. Humidity (frost) did not prove to be a serious problem as good sweeping could control the effect.
Accurate control of the IST is extremely difficult and has to be done in advance by about 20-30mins, based on experience and the study of many previous logs of information during similar circumstances. The heat introduced by 32 curlers into a rink is substantial, while a change in wind direction or a bright sun can also easily have an adverse effect. Many technicians try to avoid the dangers by running the ice much colder, so sacrificing some draw and increasing the speed, while others have little control over their parameters and simply accept what happens as "normal". Imagine then the problems faced by technicians in vast arenas with thousands of spectators, lighting for television, etc., trying to control the IST for five games of curling lasting for as long as three hours, it is simply frightening.
Creating a consistent ice surface and maintaining it for the duration of a game is possible and is regularly achieved, with the best surfaces inevitably created by the best and most competent technicians. Unfortunately not all these surfaces can be considered "good ice", because they do not always provide the required draw and speed. The required IST has been sacrificed, for whatever reason, to achieve a compromise that is not acceptable to those looking for good ice. However, when the required parameters are met and maintained through skill and precision, every curler who plays a game on such a surface will know that it is good ice.

Summary

Three basic aspects of curling ice have been looked at here, but there are many other influencing factors. For some, such as the air temperature and humidity, there are clear guidelines and fairly strict parameters that should be adhered to, although of course they are too often ignored. For others, such as pebble-water temperature, speed of freezing, the true effects of sweeping and of course the shape and texture of the running bands that the stones slide on, there is very little reliable data available. There is experience, observations, conjecture and much else, but no-one really knows yet what exactly does happen when a stone travels down the length of a sheet of ice to finish in such a beautiful curl.
What constitutes good ice will therefore remain a highly subjective opinion. Those who can make very good ice know what it is, but cannot really explain it, while those who cannot will simply assume that their best efforts will be sufficient. Most players who have never played on good ice will not realise that there is such a thing, while those who have had the pleasure will gradually come to realise that a particular venue is more fun to curl at than others and continue to support that venue.
The safest way forward must be to remain cautious. For technicians, they must keep learning, work harder, refine their skills and educate those who wish to learn – in time a consensus will develop of what works best in a given rink and good ice will be the result. For players, they must learn that they do have a right to complain, because in the modern world a product must be to specification to justify the cost to the customer – if this means that the customer must pay more for good ice, and he gets good ice, then the cost will be justified. On the other hand, if a technician claims to have good ice but without the consistency required by curling, and without meeting the definition set out by the WCF of 4 foot draw in 24 seconds, the customer has every right to ask for his money back.
However, the problem remains: what is good ice?

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