CURLING RINKS FOR THE FUTURE

Scottish Curling-Ice Group

Overview

From frozen surfaces covering ponds to frozen curling ponds, from enclosed areas in colder climates to buildings with artificial refrigeration in warmer climates – those were the curling rinks of the past, where the word "rink" described the playing area of a sheet of ice for a game of curling.

Evolution gradually refined the requirements until a curling rink became a building, within which were several sheets of ice, groomed and maintained for near-endless games of curling.

Now almost every championship is staged in a full-sized skating arena where sophisticated equipment has to control the parameters to guarantee the best possible curling ice, while curling rinks of the past can still provide ice for normal curling at various levels.

Now only the very best technicians will be asked to provide curling ice for serious competitions, while most older curling rinks will allow almost anyone to have a go because, after all, it is only frozen water.

Curling rinks simply have not kept pace with science, and have not allowed a structure to develop whereby new rinks can be built and where technicians can significantly improve their knowledge.

It is not true to say that the science of curling ice is new. It is more appropriate to say that the proper application of the science of curling ice is new.

Excellent curling-ice technicians like Shorty Jenkins (Canada) have studied the matter in great detail and made significant progress, and in the process also paved the way for further studies into curling ice.

Yet such were and are the complexities of the subject, and the people who have to unravel the mysteries of water, that it is only during the past ten years or so that full understanding has become a realistic prospect.

Thanks to the work of Leif Öhman (Sweden) and publication of the WCF manual Curling Ice Explained (CIE), the known science relevant to the making of good curling ice has been brought together into a structure that technicians new and old can study and learn from, but much work remains.

It is the purpose of this report to look at the problems and challenges at the root of the process, through the body of the requirements the game poses, up to the inspiration that will carry the game into the future.

All these, it seems, depend on the buildings within which the game of curling will be played, which can now be called the curling rinks for the future.

The basics

The specific definition of curling ice in CIE requires the ice surface that is played on, i.e. the pebble, to be level and consistent. Ignoring the margins of error that are so small that they do not affect the behavior of the stones, it is possible to work backwards from the ice surface.

If the pebble is not consistent and even, it will not play level. If the ice pad is not

level, the pebble will not be level. If the surface under the ice pad is not level, it will be more difficult to produce a level pad.

If the pipes within the floor are not level, the ice surface will be inconsistent. If the pipes are not correctly and evenly spaced, it will be impossible to produce a consistent surface.

If the refrigeration within the pipes is not even and consistent, the surface will not be consistent either.

If the floor has no insulation or heat mat beneath it to counter the effects of permafrost, the surface will not remain level for long.

If there is inadequate drainage underneath all this an accumulation of water can easily destroy the entire building, should this water be allowed to freeze.

Everything about the floor, under it, within it and on top of it, has to be to specification and within very small margins of error, or the ice surface will not be level and consistent.

Yes, it is possible to produce level ice on a crooked floor, but it is difficult, and it will not last long because the level will be very difficult to maintain.

A good curling rink needs a very good floor, and the floor must be fit for fifty years at temperatures between 20°C, when not in use for curling, and – 10°C, when used for curling through most of the year. The better the floor, the better the curling.

The air within a curling rink contains water in gaseous form, or even as small droplets in a fog, which could become condensation onto colder surfaces like the walls and onto the ice surface as frost.

This moisture will affect the ice surface in one way or another because of the behavior of water, which seeks always to migrate to the drier environment.

Should the air within the rink be drier than the air outside, moisture will try to migrate into the rink, and it usually will.

Should the air outside the rink be drier than the air within the rink, moisture will try to escape from the rink, and it usually will. In either case the ice will be affected, so the moisture has to be controlled.

Dehumidifiers, with the walls and roof of the building as well sealed as can be achieved, usually do this.

Unfortunately it is not that simple. In colder areas the outside air will be cold and relatively dry, while within the rink the air will be heated and so capable of "holding" more moisture, or preventing formation of droplets and condensation.

In warmer areas the opposite can be the case, with much surplus heat inside simply extracted through the floor to maintain a workable balance.

In order to understand this relationship between temperature and moisture content some complicated science has been introduced into ice-making jargon, with expressions of relative humidity (RH) and dewpoint temperature (DPT) now commonplace.

Then there is the floor temperature (FT), the ice-surface temperature (IST), the air temperature at 1.5m above the ice surface (AT), the roof temperature (RT), and the outside temperature at 1.5m (OT).

So, in order to control the IST by means of manipulating the FT, the AT and RH have to be controlled as well, or the difference in DPT between inside and outside will become excessive and ruin the ice.

Without fully understanding the science involved any technician will find it very difficult to produce good curling ice, and without a building designed to do the job he will probably lose.

It is the sad reality that most curling rinks today have to survive by trying to compensate for the vagaries of the weather outside, by using equipment that will never be a match for what nature can send to challenge us.

A good curling rink therefore needs to be sealed to prevent migration of both temperature and moisture, and fitted with the proper equipment to control the environment within the rink according to the laws of physics. The better the control, the better the ice and the better the curling.

The other essentials

The building itself is not the curling rink; it only has to provide the structure within which a curling rink can be built. The curling rink will be an insulated box within another box that holds sufficient structural strength to support many centimeters of snow on its roof, good protection from rain, wind, sun and unauthorized entry, and architecturally sufficiently pleasing for everyone to look at.

At its simplest it will be a portal structure of steel or wood with a clear span over the rink area, viewing and meeting areas, refreshment, a plantroom, some office space and of course changing rooms, with simple walls and some windows.

More often than not it will be the extras added on to the list that will cause costs to rapidly escalate out of control, as will be explored below.

Refrigeration plant is an obvious essential, with many variations on a theme. Usually the refrigeration engineers will draw on precedent from other industries as well as curling and provide what they consider to be a safe and reliable system, and usually this will work fine.

Sadly the requirements of modern curling ice has not yet penetrated the structures of design and it will be some years yet before a specific curling-refrigeration system has been designed, installed and fully tested to set the next precedent.

With many modern refrigerants already banned or replaced by yet more modern alternatives that will soon be banned, the engineers have a challenge on their hands.

As mentioned earlier, dehumidification will be essential for most curling rinks, and often humidification as well. Studies show that both these can be supplied at reasonable cost, but it is essential to install equipment that is sized correctly for the purpose intended. Too large, and the units will waste energy; too small and it will be a waste of time.

A humidification unit can also supply much needed fresh air into the sealed environment, thus saving the cost of air conditioning – fresh-air quality within a curling rink is already attracting the attention of health officials and will become a serious matter.

Desiccant units supply a certain amount of heat, and additional heat from other sources can easily be added into the ducting to ensure both adequate supply of heat and control of heat.

Considering that a curling rink is now a sealed "box", it will be dark, or certainly too dark for a game of curling. Although many countries in Europe insist that every public building should have windows for the admission of natural light, this is not a good idea for curling rinks – not only will areas of glass allow for migration of heat, but an unwanted burst of sunshine can cause havoc with the ice surface.

Artificial lighting is the norm, and for curling rinks this will now usually be fluorescent lighting of the most efficient kind. Some heating is added by lighting, but usually this is too little to be of real significance.

Refrigeration, lighting, heating and dehumidification all require energy, and the total cost is considerable. No modern curling rink can hope to survive unless it uses every opportunity not to waste energy and every opportunity to save and recycle energy, the latter usually through heat-exchange systems.

Here too there is little real information available specific to curling rinks (surplus heat is usually simply pumped into a neighboring swimming pool), but there are tried and tested systems available and the engineers are no doubt already developing more.

Energy is essential to a curling rink, and using it wisely and carefully is even more essential. Without stones a game of curling will be impossible.

Modern curling stones are now made to the highest specification than ever before and a new set will be the starting point, but so much of the behavior of the stones is dictated by the ice surface that it is impossible to make sweeping statements.

There will have to be a set of stones, and the parameters will have to be manipulated to ensure that the stones will behave as required.

Equipment to maintain the ice is now also well developed and better than ever. Without good equipment good curling ice will be very difficult to achieve and the cost of this equipment is only about 1% of the overall cost of the whole curling rink, yet so many rinks struggle on with what they have left from ten years ago.

Modern equipment, well maintained and properly used, is now an essential part of good curling ice.

The customers

Every modern curling rink has to consider its customers first. If the curling rink has to be financially viable, it has to make a profit, and it will be the customers who provide the money.

In an ideal scenario the product on sale will be excellent curling ice and ancillary facilities which the customer is prepared to pay good money for, yet this is usually not the case.

It is very much the norm that the customer still gets what he is given, he gets used to it, settles into the loyalty so typical of curling rinks and life stays that way for many a year.

Having built a modern curling rink capable of producing the very best ice for everyone, that is exactly what should now be provided, every day, every year. Only a skilled curling-ice technician can do this, and he will be well respected for his efforts – hopefully he will also be well rewarded and looked after.

There has been a tendency to fill the rink to capacity and capitalize on his good ice and so keep the cost of a game down, but this is not wise.

Suddenly the poor technician will be working so hard that it will become impossible to maintain the quality of ice, and he will be given help – usually this will be less qualified help, that costs less, and achieves less, and things simply go wrong.

It is clear that a four-sheet curling rink will need some 500 regular curlers to generate sufficient income. These curlers will typically live within 30 minutes from the rink and curl about once a week, mostly in the evenings.

Two sessions in the evening will accommodate their primary needs and get them to bed at a reasonable hour, while the ladies and seniors might have curling during a morning session and juniors in the afternoons.

Four sessions of curling in a day is within the capabilities of a hard-working technician if he has some qualified help: one session in the morning, one in the afternoon, a space to prepare the ice again and then two sessions in the evening.

With proper organization and distribution of duties these curlers can be catered for in every respect and it will be a happy, profitable curling rink.

Of course, the curlers will also want some weekend competitions, open to others as well for variation and the bonspiel spirit. Weekend competitions do not make much money, but they don't waste money either, and will simply have to be written into the system.

The occasional national or regional competitions can be accommodated too, as well as a few annual events of real magnitude. For all these the technician will be working long, long hours when he would be much better off having a rest for the week ahead, and then he will still have to face that week ahead without the rest.

It is a false economy to destroy the technician simply to please the customers, because he will simply be too tired to please them. It is therefore essential to ensure that, for such a volume of daily curling, there are sufficient competent ice technicians available to spread the load.

For an average of two full sessions of curling per day to support a community of 500 curlers over an eight-month period, three competent technicians can cover the work within the restrictions of the law.

Sufficient income can be generated to cover all the expenses of such a routine if each game costs each curler about £10 at today's prices, and curlers will be prepared to pay £10, but only if the quality is maintained.

Reduce the quality and the curlers will drift away, and before long the rink will be in trouble. The customer comes first, but don't destroy the ice technician.

The finances

It has been calculated, according to the above requirements and specifications, that a modern curling rink should not cost more than £1m, and the calculations were done in several different Western countries.

Yet there are very few examples of curling rinks being built for such a figure – the figure is usually at least twice that amount.

Often the plans expand during the consultation process as they pass through the various committees, who all add their requirements, and suddenly the rink becomes a six-sheet facility (to hold international competitions, of course), or a Centre of Excellence (to secure more funding, of course), or a multi-purpose facility (to hold exhibitions in summer and use the space, of course).

The most common modern phenomenon is to combine curling with skating, because both activities need frozen water and what better than to double the income – the real reason is total ignorance on the part of planners who can dictate the rules, because they hold the purse strings.

It is possible to build large curling rinks in areas of higher demand and provide good curling ice as described. The subject of this report is how to build smaller four-sheet rinks of the future that can be built anywhere and have every chance of financial viability, to answer the

immediate and projected needs of the game of curling for the future.

Skating rinks with flip-over ice for curling have not yet demonstrated that this approach can provide good curling ice, or is more viable than a four-sheet rink, on a reliable basis.

Serious competitions are now usually held in arenas, whether they are skating arenas or not, and this will not change – the future of curling still needs smaller community-based facilities for the game to provide the players to curl in those competitions.

A simple portal structure with an insulated curling rink and basic facilities for curling should not cost more than £1m. Add an upstairs viewing area above the clubroom and it will cost a little more.

Adding conference rooms, a gymnasium, ancillary accommodation, additional sports facilities, a swimming pool, etc. will quickly double the cost. Allow an architect to install a curved roof (because it will look better), glass walls (because it's modern) and many other refinements (because he feels like it) will soon turn the humble curling rink into a palace.

Apply for grants from agencies and many requests will be made for additional features, usually blamed on Health and Safety (but not always a bad thing); allow contractors to find out that Lottery funding is involved and they WILL load their prices. The cost of a curling rink can be a serious matter, and often a very confusing one. Keep it simple and keep the costs down.

Most councils and government agencies will support the building of public sports facilities and provide the bulk of the funding. See the humble four-sheet rink as a community facility not too dissimilar to the public swimming pool, and they will listen.

Not only the core 500 curlers will curl there, there will be many other sections of the community taking an interest from disabled players to retired seniors and corporate outings. See the humble four-sheet rink as a club similar to the local golf club with a waiting list of two years and annual fees of £1k or more, and public money will not be available.

It might work in some countries where geography has an influence, but in most countries now the cost of a private rink is no longer an option. Curling is a game for the people, build a curling rink that belongs to the nation and provides a facility for the people of that area.

As the projected costs escalate, so does the panic. Suddenly anyone who can contribute additional funding wants additional facilities, from Regional status to National status and Academy status.

A well designed curling rink that provides good ice will be all those and more, but without good ice there will be very little. Separate the functions clearly and do not confuse one with the other, cost and build the curling rink and let someone else build the others.

Yes, some functions can be incorporated with each complementing the other (such as selling heat to the swimming pool next door), but no, a curling rink cannot generate sufficient income to support all the additions.

That is a different game altogether. As for borrowing money to build a rink, this is dangerous territory better avoided.

The finances on the income side, as touched on above, will be quite simple. Expenditure MUST be covered by income, but expenditure must also be structured to provide sufficient funding to run the rink properly.

With a tradition of volunteers curling is often seen as a "good cause", but those who do the day-to-day work are not volunteers and deserve reasonable wages.

Yes, there is room for volunteers and from their ranks will come loyal workers, but not everyone can afford to work every day for nothing and even volunteers deserve to be paid an hourly rate.

Once the annual expenditure becomes clear, the income has to be structured to cover the full amount and more, or the rink will not survive. Put the structures in place to provide quality curling ice and the income will be there, even if the first year or two proves tougher than expected.

There are many ways through which to generate additional revenue, but research has shown that it is better to treat each aspect as a separate business venture. This allows for more accurate control and prevents one aspect from subsidizing another – why should one customer pay more for food so another can pay less for ice fees?

For instance, if an upstairs viewing area for competitions can be incorporated, this will largely be wasted space during most of the week. However, if the area can be fitted and used as an independent restaurant it can generate a healthy income during meal times, or even if only opened in the evenings, and the customers do not have to be regular curlers, although the bug might bite and they could become so.

Similarly the clubroom downstairs can serve snacks and drinks during curling times, or throughout the day, depending on demand. Relying on alcoholic drinks for revenue will no longer be as easy as it had been in the past, but some curlers do enjoy a beer or two while many prefer other drinks and as long as they can socialize, there will be some revenue.

Again research shows that food will generate a better revenue than alcohol, if the food is up to standard and what the customers enjoy, and the restaurant can become a viewing area as needed.

An important aspect, often overlooked, is that additional facilities require additional staff – the ice technicians will already have plenty on their hands and their spare hours will be occupied by management duties of one kind or another.

By organizing the workload carefully the extra number of staff can be controlled to within what the income of each activity allows.

The game

As always, a clear distinction must be made between the game and the sport of curling, because the two have not only very different requirements, but also different means of funding. Fortunately, for the considerations of a four-sheet curling rink for the future, the requirements for both the game and the sport are much the same.

Most national and international competitions are played in arenas, where skating ice is usually converted into curling ice, and not always successfully. The situation has already evolved where competitive curlers prefer ONLY to curl in arenas or on competitive ice, because conditions are very different.

Although the stones have become more standardized, they are also usually more aggressive to counter the colder IST needed in an arena, and so have a different parabolic curve. Many competitive curlers are already saying that the ice in some curling rinks is simply too good, because the conditions cannot be replicated in an arena.

Perhaps they are also saying that the ice in arenas is less good, and everyone should be curling on less-than-good ice.

Most competitive curlers play at their local rinks and enjoy quality ice when this is provided.

Most ordinary club curlers only curl at their local rinks and will get used to its ice with no reference to other rinks, and they will certainly complain if their own ice changes in some way, whether the ice is good or not so good.

Research has shown that club curlers improve much faster on good ice and enjoy their curling much more, so for them too good ice is the better scenario. Beginners, who have never played before, also benefit from good, keen ice and learn very quickly, while on lesser ice they struggle, become frustrated and will probably never be seen again.

The same goes for corporate groups containing two or three curlers who wish to show off their skill a little, which they can do on good ice, while the rest of the group will be beginners.

It can safely be said that all curlers benefit from good ice, and that the game benefits from good ice. Technicians refer to it as the "smile factor" – if they get the ice just so, the smiles grow and the customers are very happy to curl and come again.

It has also been observed that competitive curlers seriously benefit from good ice, because without it they cannot learn the flaws in their technique and how to correct these.

What is more, curlers who have played on good ice do not enjoy playing on much else, and this is how the future of the game will be decided. Curlers can play on any ice for a bit of social fun, but once they learn the difference and the game gets more serious, they need and enjoy only good ice.

How this will develop with regard to arenas and competition ice is not difficult to imagine, arena ice will have to improve or they will lose their competitions to curling rinks that can host larger competitions on good ice.

All it will take is a change or two in the competition format and even four-sheet rinks (with good viewing, of course) will be able to host international competitions, should they wish to do so.

Curling rinks for the future have to be aware of this. Considering that spectators introduce both moisture and heat into the playing area, whether it is a curling rink or an arena, the question must be asked whether this is a good idea.

Considering also that most competitions are now accessible via satellite television or pod casts on the Internet, perhaps the structure will evolve where spectators watch a game from the comfort of their homes.

It is clear that a four-sheet rink can be built for and equipped with television cameras as standard without any disruption to its normal use, and this will be far more cost-effective than to install a full crew with equipment in an arena.

The game of curling has evolved into the sport, and this is not likely to change. Therefore the requirements of the sport HAVE to be taken into account, but without sacrificing the requirements of the game. Ultimately, it will be proven, these requirements are very much the same.

Summary

Thanks to the science, and the dedication and hard work of a very few highly committed curling-ice technicians, the curling rinks of the future have become a realistic proposition. The knowledge and materials are available, and every day new technicians are learning how to make good use of these to provide the curling ice of the future.

It is now down to the governing bodies of curling to develop the structure and secure the funding to make these rinks a reality. There has never been a better time.

If there is a word that MUST be applied to the future, it is professionalism. From design to completion, from day-to-day curling to serious competition, only professionalism can create and safeguard the future of curling.

The old ways of frozen water is being redefined by professionals, for the new ways of making beautiful curling ice to specification.

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