

The Level-Ice control box provides real-time data and sends it to the motor that moves the cutting blade.



by Paul Marsh

# Laser Leveling: BRINGING ARENA ICE TO A WHOLE NEW LEVEL

**I**CE QUALITY: It's a topic of discussion among hockey players, figure skaters, curlers, speed skaters and recreational skaters — anyone who uses the ice in your facility. Is it good ice or bad ice? What defines good ice and bad ice? Is the ice fast or slow?

Rink operators have considerable knowledge and experience regarding ice-making principles, but, in general, most consider good ice to be smooth, fast and just soft enough to hold an edge.

Several properties can affect ice quality: smoothness, texture, friction, hardness and levelness.

## TRADITIONAL ICE RESURFACING

Prior to the invention of the ice resurfacer, arena ice was manually cleaned and hoses or barrels were pulled around the rink, laying on an even layer of hot water.

The ice resurfacing machine was a significant technological improvement in maintaining ice. The machines are generally composed of a snow container, hot

water tanks, a wash water tank, a blade, augers, a towel and a board brush. The engine or motor of the vehicle is responsible both for propelling the resurfacer and for powering the hydraulics that control the various functions, such as lowering the conditioner or raising the snow tank.

The driver has always ultimately been responsible for the quality of the ice, accomplished by visual observation and personal reaction — until now. Laser leveling is a recent technological improvement that automatically controls the cutting blade of the conditioner to achieve an accurate, level ice surface.

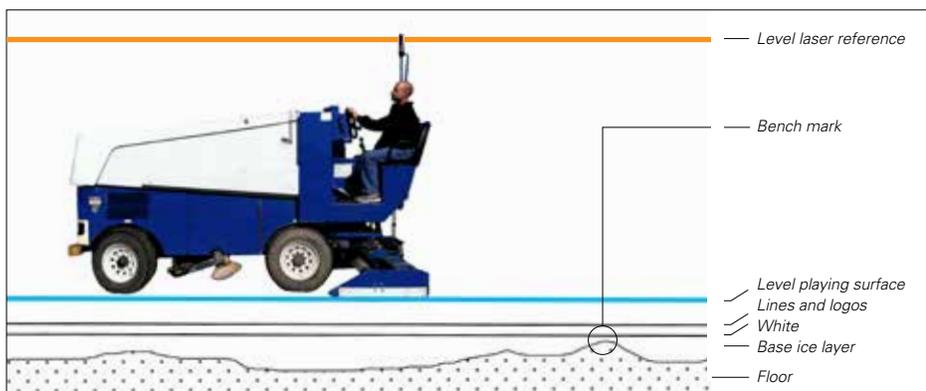
## CONTROLLING ICE THICKNESS AND LEVEL

Sixty to 70 years after the invention of the first ice resurfacing machine, the first ice leveling concept was created in Finland. It was based on technology similar to that used for the last 30-plus years in road construction, land leveling, etc.

Since the launch of this leveling system, a North American company specializing in laser and inclinometer machine control systems, Latec Instruments, has taken the ice leveling concept and further developed it to better adapt to ice resurfacing equipment and meet the challenges of ice maintenance, improving ice conditions. The manual crank is removed. An automated, computerized laser cutting system is installed.

The Level-Ice Laser Leveling System literally takes all the guesswork out of producing a perfectly level sheet of ice. The laser-controlled system provides an accurate reference point to within .5 mm. Using the most advanced receiver technology, the system controls the cutting blade of the conditioner to provide a perfectly level surface after every flood. Once the ice is level and under control, the variation is about the thickness of a credit card.





Both natural pond ice and indoor ice appear to be nothing more than frozen water, but those familiar with arenas know that artificial ice is actually a science and requires a high-tech approach. Ice maintenance must be a systematic approach: creation of the ice followed by maintenance of the artificial ice sheet in a controlled environment. Level-Ice provides the operator with real-time data regarding thickness and, essentially, its level.

## THE SYSTEM AND HOW IT WORKS

The Level-Ice System comprises four main components:

- 1. Rotating Laser** – This is mounted on a pole in the arena and is always kept at the same level within the rink. It projects a beam across the ice surface and cannot have any obstacles in its path. The beam projected against the receiver provides the data that essentially comprehends ice thickness and then controls the ice level.
- 2. Receiver** – The receiver is mounted on an electrical mast so that it will be in the path of the beam coming from the laser. The mast moves up and down as the elevation of the ice changes and sends this information to the control box.
- 3. Control Box** – This unit is conveniently mounted off the operator console; it provides the operator with real-time data for the ice surface and determines whether or not a blade adjustment is required. It sends this information to an electric motor that moves the cutting blade up and down as needed.
- 4. Motor** – The electric motor is installed in place of the manual crank. This eliminates the need for the operator to perform manual

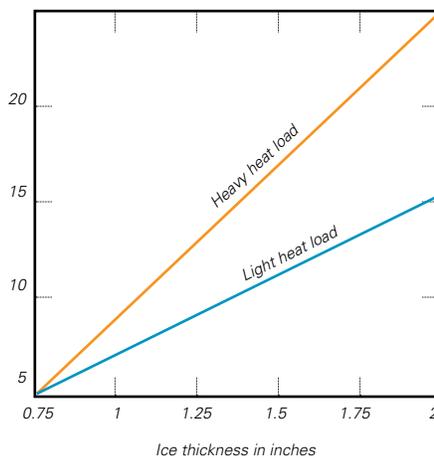
operation, provides real-time data and allows the operator to drive.

Laser leveling does not eliminate the operator, only the need to manually adjust the cutting blade, plus it provides the operator with valuable real-time data. It monitors ice thickness and then automatically controls the cutting blade throughout the resurfacing process.

Once the components are installed, the highest point in the base floor is located and the optimal ice thickness is determined (usually 1 to 1 1/2 inches, but varies by arena and whether the base is concrete or sand). The system is then programmed to this desired ice depth.

The system is fully automatic, raising and lowering the cutting blade every 1/8 of a second. It will only cut ice over the programmed ice setting, and leaves any low spots untouched, to be built up. The system is programmed for a minimum

Percentage increase in compressor work compared to ice that is 0.75" thick



Adapted from: Manitoba Hydro (<http://www.hydro.mb.ca>)

**Cut as little ice and use as little water as possible.**

and maximum cut. It can be controlled by a single person, locking out other staff. It takes the guesswork out of ice cutting and actually maintains the ice each time resurfacing occurs.

All arenas have different customers, events and needs that require different ice qualities and thickness. For example, if you have a busy hockey tournament weekend, you can build up your ice so that it is level and then start to cut it down level as well, essentially avoiding green (new) ice and providing quality level ice.

It should be noted that in the event of an emergency (e.g., a system failure), the Level-Ice System can be removed and the manual crank can be easily reinstalled in a short period of time, preventing any major downtime.

## ENERGY SAVINGS

Is this investment worth it? Will it improve ice quality and level? Will it provide a labor savings? What is the return on investment? Will it improve our overall operation?

Would you drive your car or truck without a speedometer? You could, but you likely would be ticketed eventually. What does the speedometer really do for you? It provides real-time information about the speed that you are traveling and allows you to drive at a scientifically pre-determined safe speed.

The laser ice leveling system provides operators with comparable information through the latest technology, and it helps them provide optimal ice for the end user while benefiting the bottom line.

The goal was quite simple: to provide a cost-effective system that yields better ice, time and labor savings, reduced energy costs and potentially more ice time to sell. All of this leads to an excellent return on investment.

While many arenas do not yet track statistics for this type of information, most of the more than 200 North American facilities using the system are reporting reduced labor costs, running at higher ice temperatures because of the uniform ice thickness and enjoying the ability to sell more free ice.

**Paul Marsh is general manager for Latec Instruments Inc. of Exeter, Ontario. Visit the Latec booth at the 2013 ISI Ice Arena Trade Show May 30-31 at Caesars Palace in Las Vegas.**