

PATENT PENDING



THE NEW, ASTOUNDING

ICEGUARD® ICE LEVELLING ROBOT

LENA

– THE SIMPLIFIER

**ICEGUARD HAS USED LASER TECHNIQUE IN ICE MAINTENANCE SINCE 2001.
THE RIGHT PLACE FOR THE LASER IS THE ROBOT, NOT THE ICE RESURFACING MACHINE.**

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EVERYONE BENEFITS FROM FLAT ICE



ICEGUARD® Lena – The simplifier robot is the solution for one of the biggest problems ever for ice maintenance – unlevelled ice surface. Because of this problem ice planing concentrates mainly on mid area of the rink as well on frontal areas of players' benches. As a result extra water is needed and accordingly ice quality gets poorer, not to mention higher ice maintenance cost.

Results on long run indicate that most effective way for maintaining ice surface level is to use laser for adjusting height for edger cutting blades. ICEGUARD® Lena planes ice with accuracy only laser control can do to become ideal for ice resurfacer's skids. After ICEGUARD® Lena's levelling process ice resurfacer machine can operate with full blade width and desired vertical position.

WHAT HAPPENS DURING ICE MAINTENANCE?

Frequent ice maintenance and overhauling is required for good ice quality. This is why ice resurfacing machines operate minimum eight times per day during season times.

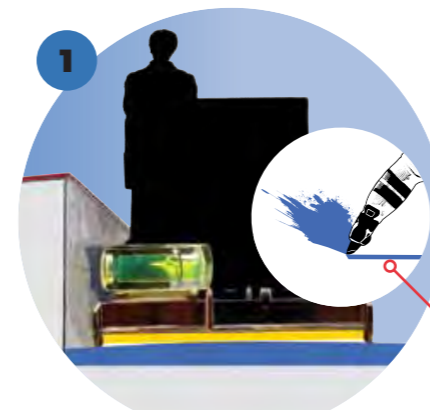
Operator starts trimming from edge areas. Cutting is defined visually. When observing operation mode of cutting blade units, one can see, that ice cannot be removed on edge areas. This is because of the fact that ice skid on edge side of the machine slides on ever growing level cutting less ice. Accordingly this will be compensated by lowering cutting blade position to increase cutting. As a result ice is cut excessively on center area of the rink.

Due to the fact that ice surface is straight on central areas of the rink, and skids below the bogey do not lift cutting blades up, one planes ice away excessively on the central areas. Ice becomes worn out. Ice thickness on central areas can be controlled only after ice surface on edge area has first been planed straight.

To minimize use of water and to avoid planing unnecessarily too much ice on central areas of the rink, ice on edge areas must first be straight. In case ice resurfacing machine will spray each time 500 l (130 gal) on rink 30 x 60 m, it corresponds to 0,3 mm of water film of the whole ice rink area. Since ice on curvature areas is 25 mm higher, it means planing excessively on central areas. This is why ice on central areas wears off 0,16 mm each time.

When operating 70 times per week by resurfacing machine as normal, it means 360 mm of ice to be removed during a 8 months' season. 240 000 liter of extra water is needed annually. This means not only excess water cost by thousands of euros, but especially on top of that extra and needless energy cost. Energy consumption is 80 times bigger during compelling phase transform from water to ice in comparison with one degree increase of water or ice temperature. Every time when operating, 100 liter of water is used unnecessarily corresponding to 70 mm of extra ice.

ONLY IN CASE ICE SURFACE IS LEVEL ICE RESURFACING MACHINE CAN PLANE THE ICE ON EQUAL THICKNESS ALL OVER THE RINK.



1 **Players are wearing out ice especially in front of players' bench area.** Ice level grows up to convex towards center of the rink. Now ice resurfacing machines keep on relocating convex ice surface formed between the two skids towards middle of the rink. Step by step ice level wave is formed in between red and blue lines.

After planing with ICEGUARD® Lena Amount of snow indicates locations where ICEGUARD® Lena has been cutting away extra ice. Now ice surface is on desired level. This is also the level ice resurfacing machines will use to define optimum ice cutting level.

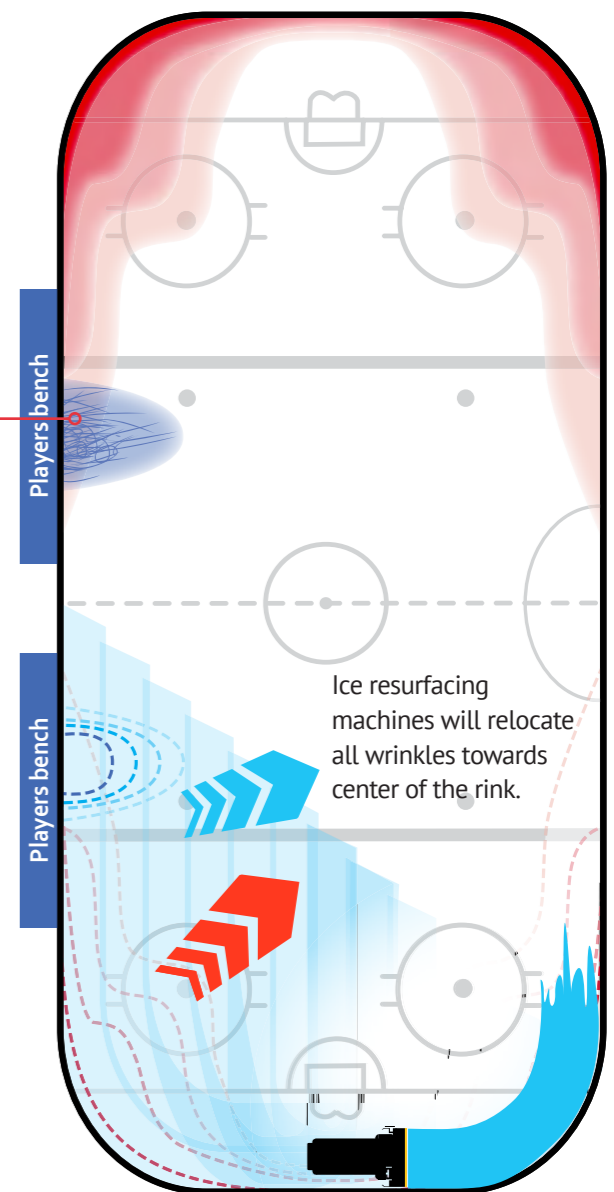


2 **How ice surface becomes concave?** Equal water film is spread all over the rink except curvature areas. Despite water flow is closed on these areas, ice surface level continues growing up without daily trimming to desired level. Laser is remarkably more accurate than any human eye. Without exception ice level on curvature areas is minimum 25 mm (1") (25) above desired level, even 30–55 mm (11/4–21/5") on more than 50 % of all rinks as shown in the picture below. Routine ice resurfacing machine operation will

relocate ice surface level deflection from edges towards center of the rink step by step.

Unintentionally ice resurfacing machines on askew position plane middle areas of the rink more than curvature areas.

In the picture number 2 we see a tilted cutting blade unit as a result of concave ice surface. Below the blade unit (yellow) empty space (white) that can be seen in between blade and ice.



Ice resurfacing machines will relocate all wrinkles towards center of the rink.

Ice is cut off around same amount as water needs to be added, in other words 0,3 mm. This is done by cutting blade unit called bogie. Bogie width of one supplier is 2 250 mm. Bogie stands on ice skids located at both ends of the bogie. These skids control cutting blade and bogie position in comparison to ice. Blades are cutting only when below skids (0,3 mm / 2 250 mm). In case one end of the bogie will be raised, say 0,5 mm, cutting blades cannot cut ice on that lifted side of the bogie.



LENA

- THE SIMPLIFIER

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THE ONLY MACHINE IN THE MARKET THAT TAKES CARE OF THE MOST IMPORTANT AREAS OF THE ICE, THE ICE AROUND THE BOARDS



ICEGUARD THE SIMPLIFIER -METHOD

The ICEGUARD robot creates a precise level with the help of a laser. This level is copied with the traditional IRM throughout the whole ice level. Due to completely even ice level the IRM is able to plane the ice evenly throughout the rink and the newly spread water is able to freeze completely to the old, cleanly planed down ice forming excellent quality ice.

TECHNICAL DATA

| | | | |
|--|--------------------|--|--|
| Length | 1,900 mm | Blade cutting depth control | Automated, laser controlled |
| Width | 800 mm | Blade horizontal tilt | Automated |
| Height | 900 mm | Blade lifting and lowering | Automated |
| Weight | 250 kg | Blade diameter | 550 mm |
| Operating voltage | 24 DC | Blade cutting height | 33 mm |
| Battery charging | Automatic charger | Blade sharpening angle | Cutting |
| Blade motor | Brushless AC motor | Blade material | Carbide |
| Blade motor power | 2,4 kW | Blade attachment | Screw fastening |
| Rotation speed | 1,800 rpm | Remote controller charging port | USB mini-B |
| Traction motors with planetary gear | | Remote controller radio frequency | 434 MHz standard, also possible to use 868 MHz |

Sales representative: