Ontario Recreation Facilities Association

Building Community Since 1947

The Cold Facts: The Ice Resurfacer Wash Water System

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Introduction

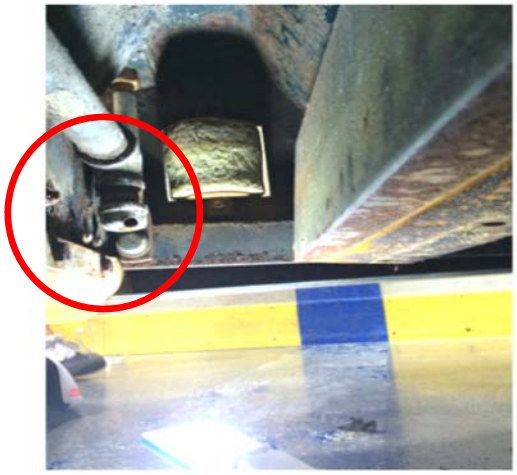
The ice resurfacer wash water system is an integrate part of the ice finishing process. It is often misunderstood, and at times, improperly used by the operator. Many fail to follow the recommended operating procedures and/or continue to bypass the manufacturers directives on its proper use; a practice that should be strictly avoided.

History

An explosion in 1996, involving the unattended and improperly filling of the wash water tank with hot water of an ice resurfacer claimed the life of operator Tim Hickman. The tragedy cannot be summarized in a few short sentences (**See: Coroner's report link in resource section of this document)**. However, it is known that it was a series of unplanned events that resulted in the loss of a young life. What is of more concern to the ORFA is that regrettably, 20-years later, many of the key contributing factors associated with the event continue to be repeated today. They include, but are not limited to, the practice of filling the wash water tank with hot water instead of cold - as recommended by the manufacturer, leaving the machine unattended while it is being filled and poor ice resurfacer storage room design.

How It Works

The wash water system is comprised of a holding tank, nozzle's mounted inside of the conditioner that spray directly into the collected snow shavings, a vacuum hose, pump, squeegee and filtering system.



The process is designed as a recirculation system. Wash water does not wash the ice, but rather assists in creating a slurry or slush mixture to aid in the repairing of minor skate cuts in the ice. There is no scrubbing action or adding of any type of cleaning agent. What is occurring is the flushing of snow and dirt from skate cuts in the ice during the resurfacing process. Snow is being cut away with loose snow generated during the skating session being collected. Water is added creating a slush compound which is proven to build ice quicker than just water. The slush is then forced into the skate cuts with the squeegee. All excess water and any debris that gets flushed from the skate cuts is vacuumed off the ice going back to the holding tank. Prior to being returned to the tank, the water is filtered to capture most of the bigger particles. Once filtered it is then reapplied to the surface repeating the process. The final step is the application of fresh hot water from the flood water system which seals in the slush and creates a flat sheet of skating ice free of cuts and gouges.

Myth: Hot Water Works Better Than Cold

Some operators convince themselves that using hot water in the wash water system makes for a better ice sheet – then pass down their poor work habits to others. Operators must respect that ice resurfacer manufacturers are the experts who are continually investing in ongoing research and development with a desire to ensure their equipment makes the best ice possible. All ice resurfacer manufactures continue to promote the use of cold water in the wash water system.

Scientifically, when an operator takes approximately 50-gallons of hot water and applies it to a frozen sheet of ice in an enclosed area, then mixes it with the snow left in the skate cuts, while dragging it along the ice sheet, and then vacuuming up the excess and returning it back into the holding tank and recycles it several times during a 10-minute ice preparation - exactly how long is it expected that the water will remain hot. In reality the operator is using several different temperatures of water during the same resurfacing. Further complicating the theory is operators who top up used wash water with hot water creating tepid water. Thus dissolving any perceived benefit of the use of hot water.

Using hot water runs the risk of significant ice, ice paint and/or logo damage should the unit stop un-expectantly, in the first lap, while having hot water trapped under the conditioner before it has had a chance to cool through the recirculation process.

Two additional facts must be stated:

1) An operator that supersedes any equipment manufacturers recommendations is breaching the Occupational Health and Safety Act Section 28 (2) (b) A worker shall not use or operate any equipment, machine, device or thing or work in a manner that may endanger himself, herself or any other worker; and;

2) Heating water only to have it become ice cold in less than 2-minutes is considered a waste of energy and often limited operational financial resources.

The Wash Water Pump and Impeller

The wash water impeller can be black or blue and is housed in a brass pump that is driven mechanically. Blue impellers are considered more durable then the black. The wash water impeller is the most vulnerable part of the system. Wash water impellers are designed to maintain their integrity in cold or hot water applications; what causes them to most often fail is the incorrect way the system is turned on and/or off. 99% of all wash water impeller failures are a direct result of operator error.

It is most important that the operator turn the wash water supply on and wait 10 seconds (or go the distance of blue line to blue line or blue line to goal line before engaging the pump). This will ensure the pump immediately gets water which is the lubricant required to keep the impeller cool to avoid a break down. Conversely when turning the system off at the end of a flood, with ¾ of a lap to go before getting to the gate, or at the center line while you are pointed way from the gate on your last lap turn off the water supply valve then immediately turn off the pump switch, there will be enough water left in the conditioner to allow the system to keep doing its job until you lift the conditioner, this way the operator avoids running the pump dry while not getting the "lake effect" that comes out from under the conditioner when it is raised.

Repairing an Impeller Failure

Changing a wash water impeller is not considered difficult and can be undertaken by most operators once trained by a competent person.

Risks:

- Impeller starts without warning – remove key or disable battery
- Pinch points – small tools will be required to remove the damaged impeller from the pump housing – wear hand protection Chemical exposure – applying a small amount of chemical (brake fluid) that dissolves rubber residue in the pump housing requires proper use of PPE - If the pump is hydraulically driven – hydraulic hoses are under extreme pressure of hot oil – inspecting hose is an important part of the equipment circle check while ongoing observation may assist in reducing hose failure

Standard Procedure

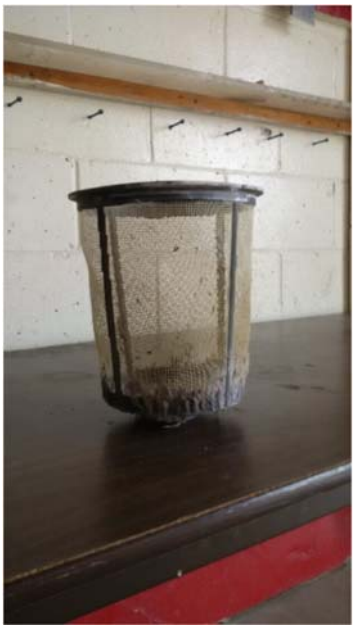
- Remove key
- Review owner's manual
- Review internal policy and procedures
- Remove pump cover plate – protect screws from falling into drains or other crevices
- Remove damaged impeller – 2-screwdrivers or pliers will assist in prying impeller off pump shaft
- Thoroughly clean inside of pump housing – use fine grit sand paper or similar item
- Install new impeller

- Replace cover and screws
- Test repair
- Enter repair in ice resurfacer log book

Note: Some machines have a check valve in the wash water flow line to maintain some water in the pump incase the operator neglects to turn on the water to the system.

The Filtering System

One of the primary roles of the wash water system is to assist in the release and collection of any foreign matter that lays on or is trapped at the top of the ice. Once released it is vacuumed up into a filter (basket). Large debris (hair, threads of clothing or equipment etc.) will become trapped in the basket which will need to be removed by (a protected) hand. Stainless steel filter baskets can be thoroughly cleaned by applying heat from a portable torch.

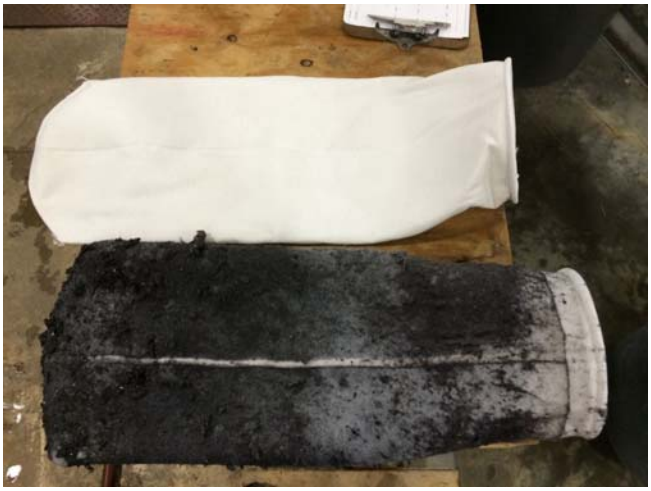


Wash Water Filter Bag

The Zamboni Co. offers a wash water mesh filter bag as a replacement part for Canadian machines. There are two options available - Mesh and Felt in two sizes. 30" long bags for 400 and 500 series machines and 16" long for the 650.

- 400-micron mesh filter bag. Re-useable and cleanable. For use in most community facilities.
- 200-micron felt filters for "high profile" facilities, such as NHL facilities that are doing their best to make the ice as good as possible. Not as easy to clean.

The bags can be used in conjunction with the normal baskets as added filtration.

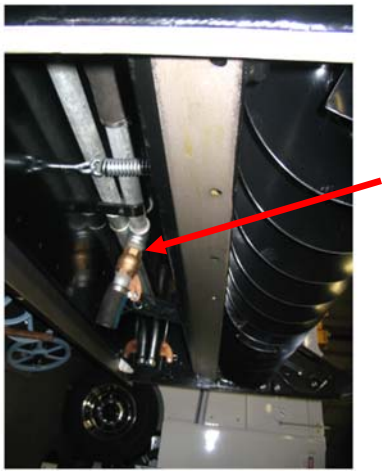


Slush in the Filter Basket

Operators who find an accumulation of slush in the filter basket are most likely not cutting an adequate amount of ice thus allowing snow and ice chips to pass under both ends of the shaving blade into the area where the wash water is being dropped creating a more concentrated slurry or slush mixture forcing the vacuum system to suck-up the slush into the basket. This can be corrected by proper blade depth adjustment.

Insufficient Water Collection

If the system seems to struggle to vacuum a sufficient amount of water back into the tank the operator should inspect the suction hose for a crack, split or blockage in the return hose or improper height from ice (hose should be ¼ of an inch above ice surface)



Wash Water System Refilling

A small or varying amount of the water in the (filled) wash water tank will be lost during each flood

dependent upon ice condition caused by the user group requiring the operator to refill or top up the tank during their shift. Failing to maintain proper water levels will contribute to impeller failure. The tank should be completely drained any time the unit will be left unused for extended periods or at the end of the day. This can be accomplished by opening the tank drain valve or by turning on the wash water control valve.

Wash Water Ice Maintenance

Operators can assist in saving energy by understanding how the wash water system can be used to control ice thickness while providing a quality and safe ice sheet. Wash water applies a small amount water to surface thus helping to reduce refrigeration load.

Common practices of wash water use include:

- Using only the wash water on the first pass of the resurfacing pattern when ice has not been heavily used along the dasherboards
- Using only the wash water on ice that was not heavily used by the previous group while the next scheduled user expects a fresh sheet of ice
- Using only wash water when the building is under extreme heat load

Proper Wash Water Use Summary

The following is considered wash water standard operating practice for a typical ice resurfacing:

- Check wash water filter system
- Close drain valve or wash water on/off valve
- Inspect wash water tank – clean if necessary – no harsh chemicals
- Fill tank with clean cold water
- Turn on water – wait 10-seconds
- Turn on vacuum – there should be an almost immediate return of water to the filter basket area – if not, shut off the wash water system and complete flood – troubleshoot and repair once the unit is back in the ice resurfacing room
- If the system is working correctly, shut off the water flow valve for the water system when approximately ¾ of a lap is left in the resurfacing process – leave vacuum on until it starts to spit a small amount of water back into the filter basket – the objective is to not have a large amount of water present when the conditioner is lifted to leave the ice surface at the end of the flood

Operator Training

Properly trained operators on the use of the wash water system will contribute to quality ice while being able to troubleshoot and respond to operational challenges. The owner's manual is always considered the first resource to assist operators with their specific make and model.

Note: Facilities and equipment differ and as such an SOP should be created giving specific risk, timing and visual activation markers to assist operators in their training.

Resources:

Hickman Coroner's Report Summary - http://orfa.com/resources/IMEO_%201%20Coroners%20Inquest%20Handout_RR.pdf

Threads of Life - http://threadsoflife.ca/about-us/the-founders/