



INDUSTRIAL MACHINE INC

*Safe Ice Resurfacer Operations*

# Safe Ice Resurfacer Operations

- ▶ This classroom-based session includes utilizing the on-site weekly maintenance inspection activities, safety and proper ways to maintain your Ice Resurfacer.
  - ▶ Ultimately, the manufacturer's owner's manual will be your recommend and main source for all equipment needs, safety and maintenance guidelines.
  - ▶ OEM manuals takes workers and management through the necessary pre-flood, flood, daily, weekly & monthly maintenance up to and including annually. Safety and its requirements including emissions testing and electrical (electrical units) usage and safety plus so much more.
  - ▶ Further, this session reinforces the benefits of log books to aid in maintaining your facilities equipment. This important tool will not only help reduce the potential for down time, it will also create a permanent records of maintenance / upkeep / safety concerns / and also be available for OH&S should your records be in question.
  - ▶ Arena and maintenance staff conducting inspections of their/your facilities equipment should be trained on how to properly do so, while knowing what to look for as potential problem areas, prior to moving any ice resurfacer, can minimize equipment failures and injuries on the ice and in your machine rooms.
- 1) Remember one very important point at the beginning of all usage,
  - 2) as soon as your Ice Resurfacer is on the ice, the operator is in control and is responsible for all incidents related to the equipment's operation and/or failure.

If your current employees arrive at work and “get on it and drive” this workshop is for them.

## GENERAL TOPICS

- ▶ Ice Resurfacing
- ▶ Current Ice Resurfacers in use today
- ▶ Ice Resurfacer Fuel Safety
- ▶ Ice Resurfacer Circle Check
- ▶ Ice Resurfacer Engine, Drivetrain, Body
- ▶ Ice Resurfacer Conditioner, Blade and Water System
- ▶ Ice Resurfacer Operation Best Practices
- ▶ Specialty Equipment
- ▶ Health and Safety Tips

# Ice Resurfacing

▶ Ice resurfacing is a specialty job that takes skill, knowledge and understanding plus a great deal of patience to become a great ice technician.

▶ Resurfacing:

So many believe the operator of the machine simply drives in circles and puts water down!

Nothing is further from the truth...

▶ Proper operations is the prep of what goes on each and every day!

- I. Morning walk around and checks of the ice resurfacers Oils, coolants, leaks, fire extinguishers, blade ok to use, machine safe to operate. (only after the building, washrooms, hallways, doors, lights, heaters, cleaned and ready to open, staff morning briefing of days activities and so on)
- II. Fill with 140 to a maximum of 160 degree hot water (ice making) cold water tank filled (wash water)
- III. Greasing and all visual inspections completed
- IV. Blade setup properly from previous operator (s)
- V. Spreader cloth washed down and ready to go
- VI. Is fuel ok and or have PLG bottles been brought in from being stored outside overnight
- VII. Nets removed from the ice sheet
- VIII. All pucks and debris cleared
- IX. All doors closed
- X. All this before one even gets to drive out on the ice to resurface it,
- XI. Thank God for COFFEE.....

# Current Ice Resurfacers in use today

- ▶ Many different types and sizes of Ice Resurfacers are in use today including but not limited to older models and even very outdated models that can be very confusing to staffing members.

## Gasoline powered machines



## Leaded Propane powered (LPG) machines



## Electric powered (battery) machines



- ▶ Standard vehicle type machines (mechanical drive and reverse)
- ▶ Hydraulic type machines (hydrostatic drive and reverse)

# Ice Resurfacers Fuel Safety

- ▶ Gasoline being used in most vehicles today is a simple pump and go type way for the general public's use and little safety or concerns are thought of as a result.
- ▶ See CSA Standard B376-M1980 (R2008), Portable Containers for **Gasoline** and Other Petroleum Fuels
- ▶ 8-hour occupational exposure limit - 300PPM hydrocarbons
- ▶ Expands with heat - Yes
- ▶ Fumes will carry in all directions making this fuel volatile and in extra need of proper storage.
- ▶ Containers must be stored outside in a lockable cage
- ▶ Never fill your ice resurfacers full of gasoline - allow expansion room in the fuel tank
- ▶ If spilled shut down all heat sources and vent room as well clean up spilled with absorbent material and dispose of properly with a company that is registered for removal purposes. City or town should have this information already within their safety manual's contact list
- ▶ Remember to always make your report a written one for your facilities protection, it can be determined after an incident what the root cause was/is and any changes in future filling steps or procedures.



# Ice Resurfacer Fuel Safety (cont.)

- ▶ Propane (LPG) is used in many arenas today and is very popular within the industry.
- ▶ On average two 44lb propane tanks are used on the ice resurfacer at the same time with a manual valve to switch between the two tanks.
- ▶ Propane will find the lowest point and expand from there, if a spill does happen shut off tanks main valves and all heat sources open all doors/windows leading to an outside air source and not into the arena.
- ▶ All containers are required to be stored outside overnight while facility is not in operations and locked in SAE approved cages
- ▶ carbon monoxide is 25 ppm, based on an 8-hour work shift



# Ice Resurfacer Fuel Safety (cont.)

- ▶ Natural Gas (NGV) has become a very popular fuel supply within Alberta
- ▶ This fuel is considered the safest fuel as to permanent tanks on your resurfacer, simple hook up of fuel supply line (feed hose) no outside storage of fuel containers
- ▶ 60 litre Faber tanks valid for 5 years within Alberta
- ▶ Pressure in system of 3000 PSI
- ▶ Yearly inspection of fuel lines, emissions testing
- ▶ Evaporates with air very quickly and has a very small window for burning



# Ice Resurfacer Fuel Safety (cont.)

- ▶ Electric machines have hi capacity battery packs that become the power/fuel for the drive system of an ice resurfacer
- ▶ The system (batteries) is charged either after every flood and or after many floods depending of charging systems ordered at time of purchase.
- ▶ The building supplies the charger and in turn the charger charges the batteries, most common is 80 volt system.
- ▶ There are no emissions to deal with



# Ice Resurfacers Fuel Safety (cont.)

It is recommended and well known all indoor facilities must have an annual emissions testing and engine tune up yearly. Always contact your authorized dealer for your outside source as the facilities emissions testing supplier. Records will always be kept for any future requirements.

Note: Emissions values are known as stoichiometric values, these values are used to determine what quality and amounts of emissions are being sent out of the combustion chamber.

Example:

The **stoichiometric** mixture for a gasoline engine is the ideal **ratio** of air to fuel that burns all fuel with no excess air. For gasoline fuel, the **stoichiometric** air-fuel mixture is about 14.7:1 i.e. for every one gram of fuel, 14.7 grams of air are required.

Proper SWP (safe work practice) must be in force and all operators must be properly trained (OH&S) PPE must be followed at all times and also signed records must be kept showing each worker has been training.

Training is also available through your OEM dealer (supplier)



# Ice Resurfacers Circle Check

- ▶ Every single days use and end of the day use requires a circle check of your Ice Resurfacers and this should also include your Ice edger.
- ▶ Morning walk around includes, oil and antifreeze checks, fuel checks, any leaks checked, wheel studs check, body panel checks, emergency kit under drivers seat check, horn and steering, brake check.
- ▶ A recorded walk around is to be filled in and kept in your main records for future use. These daily check lists will also be used for deterring and service work needed and or potential concerns or safety concerns that need to be addressed



# Ice Resurfacer Engine, Drivetrain, Body

- ▶ Your ice resurfacer safety as to operations on the ice is much more than just a walk around!!!! There's weights, drive lines, brakes springs and conditioner.
- ▶ Did you know what the weights of the machine you are operating? A Model 526 as reference weights empty 6,930 lbs. or 3.465 US Tons and full of snow and water the weight rises weights to 9530 lbs. or 4.322 US Tons
- ▶ The machine is only meant to drive between 0 - 10 km per hour and while ice resurfacing on average is driven at 50% to 70% at max speeds, this in turn will now allow the operations to consider how fast they drive and how fast they turn at the ends of the boards. Speed is now looked at as weight you are tiring to slow down and turn with.
- ▶ A good Ice Technician will take between 12 to 15 minutes per flood and no faster - (always know when someone states "I can do a flood in 8 minutes" means not being safe with your equipment and your safety)



# Ice Resurfacer Conditioner, Blade and Water System

- ▶ Your Conditioner does many things at one time
  - I. Cuts (shaves) the ice surface at 1/32” thin or soft shaving up to 1/16” heavy shaving. This is the process the operator decides during resurfacing
  - II. The blade is installed in the correct OEM recommended corresponding bolt patterns and is adjusted correctly with a blade angle gauge for optimum shaving and blade life! Average of 45 to 65 floods per blade sharpen
  - III. The water system is used to wash the ice surface and fill larger cuts with cold water, the machine then finishes the flood with hot water sealing in the cold water and causing it to freeze quickly thus filling in and having a smooth ice sheet.
  - IV. All the above let the operation know when, where and why they flood both for maintenance and safety! A dull blade can create uneven ice, washboard ice and also with needing to put extra turns on the blade creates a rear unstable issue that can cause spinning while turning.

Knowing these areas of the machine keeps the operator safer and the skaters safer, less chances of injuries to the skating public and the operator themselves.

# Ice Resurfacers Operation Best Practices

- ▶ First and foremost best operation practices is to have well trained and documented staff and management buy in...

## **A well oiled team makes all the difference!**

- i. Read and sign off on your Factory supplied manual - ask questions...
- ii. Implement all the necessary steps to have your team trained up and ready to go
- iii. Keep all records of training with new and old staffing, keep your management apprised of any changes in your operations steps - offer managers a chance to come and view the operations personally, most will
- iv. Contact ARFP and your Ice resurfacers DEALER for needed training and documentation for your records. We can offer both classroom and on ice trainings
- v. Keep your daily, weekly, monthly & yearly walk around and service records as there will be a day they are needed
- vi. Setup with your equipment dealer a PM program and also every odd season where the machine will be brought to that dealers location for its needed overhaul and complete servicing
- vii. Your equipment will become very reliable and any safety concerns would always be addressed, recorded and repaired or replaced.



## SAMPLE

### EMERGENCY BREAKDOWN PROCEDURES (SAMPLE)

1. TURN OFF ALL WATER VALVES
2. TURN OFF IGNITION KEY
3. DISMOUNT REAR FACING ONLY (3-point dismount)
4. LIFT SPREADER CLOTH TO UPPER SUPPORTS (Take a knee)
5. CLOSE BY-PASS VALVE ABOVE CONDITIONER FRAME (Close fully)
6. JACK UP CONDITIONER AS REQUIRED (Wrap arm around blade adjusting rod and place one foot on conditioner for support before the step) Push hand valve forward.
7. OPEN BY-PASS ON HYDRAULIC PUMP (Note: Turn only 1 full turn MAX)
8. UNIT READY TO BE PULLED OR PUSHED OFF ICE SURFACE

#### Special note:

These steps are required to be trained on a yearly basis before your season begins, it is recommended to do this two times per season for the added safety of all staff working with or around your ----- ice resurfacer machine. As with any new staff it is recommended they are trained during their first days orientation.

If Snow Tank is required to be lifted it will be done in the same manner as step #7, please remember that any lifted device requires by OH&S that a safety stand or locking device be installed at all times while in the jacked UP or lifted (raised) position to ensures the safety of the worker and any others around the equipment.

For all your external ----- training needs, please contact  
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# Specialty Equipment

- ▶ There are specialty items and equipment that are supplied by the OEM dealers on behalf of the ice resurfacers factory. These are addressed during overhauls and PM packages, below we will list a few items of interest
- a) **Conti Blade Changing Apparatus:** Designed to allow the customer to change the blade very safely and without the need to actually touch the blade directly. It increases safety and is an OH&S saver as to reducing accidents, possible cutting of hands and fingers, back strain, removing the blades from the scabbards with your hand, making a consistent way to change the blades. Using a 3/8" drive short - 0 to 75 lb. torque wrench will also now have the crew installing at the same torque so no matter the size of the person its all the same.
- b) **Auger Washout System:** This system can be installed on any of our Ice Resurfacers, the system will allow the operator to flush out all the snow & ice from the augers without the need to open auger covers and without the need to lift the snow tank and flush out the vertical auger by hand. With the installed system the operator hooks the water line to a fitting by the conditioner and turn water on and it will self flush the augers for you.
- c) **Auger Shutdown System:** This system will shut off the augers as soon as the snow tank is lifted eliminating the dangers of rotating augers that can cause harm, as soon as the snow tank is lowered into the working position then the system will release the augers and allow them to spin for ice and snow removal at time of flood
- d) **Natural Gas Shutoff Kit:** This system will when the natural gas line is hooked up cause the machine not to start, this was designed to stop an operator from driving away from the VRA fill station while the hose is hooked up.

# Health and Safety Tips

- ▶ Only trained and authorized personnel should operate THE Ice Resurfacer machine.
- ▶ For safe operation, read and follow the manual furnished with this machine and observe the following warnings:
- ▶ Keep all guards in place. Do not operate the Ice machine if any guard is damaged or missing.
- ▶ Check all controls and warning devices for proper operation.
- ▶ Put directional control or shift lever in neutral before “ON-OFF” switch is turned on.
- ▶ Start, turn and brake smoothly. Slow down for turns, slippery or uneven surfaces. Use extreme caution when turning or on inclines.
- ▶ Watch out for pedestrians and obstructions, check overhead clearances.
- ▶ Do not permit riders on the Ice resurfacing machine at any time.
- ▶ Do not allow anyone to stand or pass under the elevated portion of any machine.
- ▶ Be sure operating surface can safely support machine.
- ▶ Observe safety rules when handling fuel on engine powered machines and when changing or charging batteries for electric machines.
- ▶ Never cover, hide or remove any safety label.
- ▶ Follow all OH&S safety guide lines and your facilities safety procedures, not doing so can have serious effects to the health and safety of People, Equipment and Property



**END**