

Baby, It's Cold Outside!

Cold Weather Precautions for Rotorcraft

By Matt Rigsby (IHST Team Member)

After an unusually cold and snowy December night in north Texas, the day pilot reported to the medical crew that the snow and ice would have to melt from the main rotor blades and tail before they could respond to emergency calls. Though the snowy weather had cleared, the frigid temperatures remained.

Around noon, a flight request came into the hospital. The pilot, and shortly thereafter, the medical crew, performed walk-around checks before they boarded and started the engines. Snow and ice were reportedly no longer on the blades or the aircraft's tail.

The aircraft had climbed about 50 feet above the helipad when two warning horns sounded. The nose yawed to the left. The pilot lowered the collective and attempted to return to the helipad as safely as possible. The aircraft still hit the pad hard enough to spread the skids and bounce. The pilot and medical crew survived the accident, but sustained significant lower back injuries.

Ice Build-Up

Flying can be dangerous when ice and snow accumulate in or near the airframe engine inlet, whether the rotorcraft is on the ground or in the air. By taking some simple precautions, pilots can reduce the risk of an in-flight engine shutdown.

Snow and ice can build up in the engine intakes and plenums when the rotorcraft is on the ground, and when the engine or engines are off or operating at low power. When a pilot increases engine power, such as during takeoff, the accumulated snow and ice can separate from the airframe inlet surface. The engine can ingest this icy debris, resulting in decreased power or engine failure. Some of the older turbo shaft engines with axial inlets are particularly susceptible to loss of power from ice and snow ingestion.

Remember that most helicopters are not approved for flight-into-known-icing (FIKI) conditions. Pilots can expect icing when flying in visible moisture, such as fog, rain, or clouds, when the temperature falls below 5°C [41°F]. Pilots encountering such conditions should immediately seek warmer locations or altitudes. Note that *warmer* altitudes may not always be *lower* altitudes.

Winter Precautions

To further reduce risk, the FAA urges pilots to take the following steps when snow and ice conditions exist:

- Review the Aircraft Flight Manual carefully, with special attention to Limitations and Operations guidance for snow and ice.
- Use basic airmanship. Preflight by evaluating current and predicted weather obtained from Flight Service and supplemented by self-briefings. Recommended web sites include: Icing tool: <http://weather.aero/icing>, and the Helicopter Emergency Medical Services (HEMS) flight tool: <http://weather.aero/hems>.
- Install inlet and exhaust covers when the aircraft is on the ground and engines are shut down.
- Before starting engines, remove the inlet/exhaust covers and perform a complete inlet/exhaust inspection, using a flashlight. The inspection should include surfaces inside the inlet, the cowl area forward, around the inlet, and the area behind the particle separator or screen, if installed. Remove all accumulated snow or ice.
- **Do not** remove ice or snow by chipping or scraping! Use heated air or deicing fluid as appropriate, in accordance with the manufacturer's procedures. In freezing temperatures, pay particular attention to sheet ice on the bottom and forward of the inlet. This ice can also form behind particle separators. Engine preheating may be required. • Review the article "The Icing Factor" in the Helicopter Operations section of Transport Canada's *Aviation Safety Letter* (Issue 4/2007) available at: <http://www.tc.gc.ca/civilaviation/publications/tp185/4-07/winter-operations>.
- General information on helicopter safety, including risk management, training, and maintenance, can be found on the International Helicopter Safety Team (IHST) web site at www.IHST.org. The site includes safety tool guidebooks, accident analysis, safety recommendations, and other information that supports safe helicopter operations. The IHST was formed in 2005 to lead a government and industry cooperative effort to address factors that were affecting an unacceptable helicopter accident rate. The group's multi-year mission is to reduce the international civil helicopter accident rate by 80 percent.

Hidden Dangers

Back to the north Texas accident: video surveillance footage for the 24 hours before the flight showed that the helicopter had been parked outside for about five hours in blowing snow. No plugs or covers were installed over engine inlets or the exhaust. The plugs and covers were later installed, but the helicopter remained outside in temperatures ranging from 16° F to 34° F for the next 19 hours. The video also revealed that at no time did anybody look at the exhaust stack or the right side engine intake, or open any access panels before operating the helicopter.

The National Transportation Safety Board determined the probable cause of this accident was the pilot's inadequate preflight inspection and the momentary loss of engine power due to snow or ice ingestion. If you need to keep the rotorcraft on the ground for extended periods, such as waiting for clear weather, shut down the engine or engines and install covers. No matter how cold or wet the weather, nothing beats a careful and detailed pre-flight inspection, paying special

attention to engine inlet areas and aerodynamic surfaces. You'll be glad you did, and so will your passengers.

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