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In this issue

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Editorial

As we reach the year end, the winter operations and associated problems comeback reminding us of additional precautions to be exercised when operating sectors subject to icing conditions.

In this issue, we address issues related to winter operations. To convey the impact of deicing on flight safety, we look into Air Florida B737 crash. Some accidents and incidents due to frost, ice and snow are listed. This is followed by icing effects on ground and flight operations.

Your feedback is valuable. Suggestions and contributions can be sent to our office. Happy reading and many more safe landings.

Air Florida B737 crash

Based on NTSB report No. AAR-82/08

On January 13, 1982, Air Florida Flight 90, a Boeing 737-222 (N62AF) was a scheduled flight to Fort Lauderdale, Florida, from Washington National Airport, Washington, D.C. There were 74 passengers, including 3 infants, and 5 crew members on board. The flight's scheduled departure time was delayed about 1 hour 45 minutes due to a moderate to heavy snowfall, which necessitated the temporary closing of the airport.

Following takeoff from runway 36, which was made with snow and/or ice adhering to the aircraft, the aircraft crashed at 1601 E.S.T. into the barrier wall of the northbound span of the 14th Street Bridge, which connects the District of Columbia with Arlington County, Virginia, and plunged into the ice-covered Potomac River. It came to rest on the west side of the bridge 0.75 nautical miles from the departure end of runway 36. Four passengers and one crew member survived the crash.

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When the aircraft hit the bridge, it struck seven occupied vehicles and then tore away a section of the bridge railing. Four persons in the vehicles were killed; four were injured.

Air Florida Flight 90 was scheduled to leave Washington National Airport at 14:15 EST for a flight to Fort Lauderdale International Airport, FL, with an intermediate stop at the Tampa, FL. The aircraft had arrived at gate 12 as Flight 95 from Miami, FL, at 13:29. Because of snowfall, the airport was closed for snow removal from 13:38 to 14:53. At about 14:20 maintenance personnel began de-icing the left side of the fuselage with de-icing fluid Type II because the captain wanted to start the de-icing just before the airport was scheduled to reopen (at 14:30) so that he could get in line for departure. Fluid had been applied to an area of about 10 feet when the captain terminated the operation because the airport was not going to reopen at 14:30. Between 14:45 and 14:50, the captain requested that the de-icing operation be resumed. The left side of the aircraft was de-iced first [No covers or plugs were installed over the engines or airframe openings during de-icing operations].

At 15:15, the aircraft was closed up and the jet way was retracted and the crew received push-back clearance at 15:23. A combination of ice, snow, and glycol on the ramp and a slight incline prevented the tug, which was not equipped with chains, from moving the aircraft. *Then, contrary to flight manual guidance, the flight crew used reverse thrust in an attempt to move the aircraft from the ramp. This resulted in blowing snow which might have adhered to the aircraft.* This didn't help either, so the tug was replaced and pushback was done at 15:35. The aircraft finally taxied to runway 36 at 15:38.

Although contrary to flight manual guidance, the crew attempted to deice the aircraft by intentionally positioning the aircraft near the exhaust of the aircraft ahead in line (a New York Air DC-9). This may have contributed to the adherence of ice on the wing leading edges and to the blocking of the engine's P2 probes.

At 15:57:42, after the New York Air aircraft was cleared for takeoff, the captain and first officer proceeded to accomplish the pre-takeoff checklist, including verification of the takeoff engine pressure ratio (EPR) setting of 2.04 and indicated airspeed bug settings. Takeoff clearance was received at 15:58. Although the first officer expressed concern that something was 'not right' to the captain four times during the takeoff, the captain took no action to reject the takeoff. The aircraft accelerated at a lower-than-normal rate during takeoff, requiring 45 seconds and nearly 5,400 feet of runway, 15 seconds and nearly 2,000 feet more than normal, to reach lift-off speed. The aircraft initially achieved a climb, but failed to accelerate after lift-off. The aircraft's stall warning stick shaker activated almost immediately after lift-off and continued until impact. The aircraft encountered stall buffet and descended to impact at a high angle of attack. At about 16.01, the aircraft struck the heavily congested northbound span of the 14th Street Bridge and plunged into the ice-covered Potomac River. It came to rest on the west end of the bridge 0.75 nautical mile from the departure end of runway 36. When the aircraft struck the bridge, it struck six occupied automobiles and a boom truck before tearing away a 41-foot section of the bridge wall and 97 feet of the bridge railings. Four persons in vehicles on the bridge were killed; four were injured, one seriously.

NTSB attributed the following as the probable causes for the accident

- The flight crew's failure to use engine anti-ice during ground operation and takeoff,
- their decision to take off with snow/ice on the airfoil surfaces of the aircraft, and the captain's failure to reject the takeoff during the early stage when his attention was called to anomalous engine instrument readings.
- Contributing to the accident were
  – the prolonged ground delay between de-icing and the receipt of ATC takeoff clearance during which the aircraft was exposed to continual precipitation,
  – the known inherent pitch up characteristics of the B-737 aircraft when the leading edge is contaminated with even small amounts of snow or ice, and
  – the limited experience of flight crew in jet transport winter operations."

Accidents and incidents due to frost, ice & snow

CAA Aeronautical Information circular AIC 106/2004

Frost, Ice and/or snow on aircraft will adversely affect performance and handling and even small amounts have had disastrous consequences. Accidents and incidents have been caused by:

- Ice build-up on engine inlet pressure probes causing erroneous indications of engine power;
- a thin layer of ice on control surfaces inducing flutter and consequent structural damage;
- severe tailplane icing leading to a loss of control on selection of landing flap;
- very small deposits of ice on wing leading edges dangerously eroding performance;
- windscreens being obscured by snow when operating with an unserviceable heater, leading to a loss of directional control on take-off;
- attempting a take-off with wet snow on the wings and tailplane surfaces which had accumulated after earlier de-icing with diluted fluid;
- engine breather pipes freezing;
- inability to open doors after a successful landing. (Although to date such occurrences have not resulted in serious consequences, these conditions could be extremely hazardous in an emergency situation). This problem has been caused by external coverings of ice; ice in locking mechanisms, hinges and seals; and freezing moisture in pressure locking systems;
- non-use of engine igniters in potential icing conditions which, in conjunction with other factors, contributed to a double engine failure and consequent forced landing;
- very low ambient temperatures at high altitude resulting in apparent fuel freezing leading to subsequent multiple engine rundown, in spite of application of fuel heating systems. (Given a sufficiently long exposure time to low ambient air temperatures, fuel will eventually cool to this temperature which can be well below the freezing point of the fuel). Pilots should therefore be aware of the freezing points of their specified fuels and/or the operational limitations of these fuels and plan accordingly. There are certain aircraft types, including those with piston engines, where the use of special fuel anti-freeze additives are specified as being mandatory in certain conditions;
- contamination of retractable landing gear, doors, bays, micro-switches by snow; wet mud or slush. Any contamination should be removed before flight;
- wing upper surface icing due to very low fuel temperatures. Such ice is usually clear and very difficult to detect visually. In addition to any aerodynamic effects caused by this contamination of wing surfaces, there is a potential serious hazard to rear engine aircraft if this ice breaks off. This will often occur during take-off and in such cases ice ingestion and turbine damage have occurred. Typical factors favoring the formation of such ice include:

(i) Low temperature of up-lift fuel close to departure;

(ii) previous long flight times in low ambient temperatures resulting in fuel cold-soaked to 0°C or below and subsequent cooling of the wing surfaces either by the fuel itself or by conduction from surfaces in contact with the cold fuel. If this is coupled with ambient ground conditions involving high humidity, drizzle, rain or fog in conjunction with temperatures in the range of 0°C to +10°C, ice will form. (However, it should be noted that ice formation has been reported in drizzle and rain even in temperatures between +8°C and +14°C). When carrying out a physical check of the wing upper surface in such conditions it must be borne in mind that this ice may have formed below a layer of slush or snow thus compounding the detection and removal problem.

- a twin-engine airplane landing in winter conditions experienced a significant wing drop accompanied by a nose-up pitch. Despite application of power and full opposite aileron and rudder the aircraft was slow to recover and the wing tip struck the ground. Control was regained and a safe landing made. Although no ice was seen during a visual check of the wing surfaces prior to landing, the aircraft had been operating all day in icing conditions and prior to this flight had been delayed on the ground in rain conditions for 40 minutes;
- a twin-engine airplane stalled at an IAS considerably above the basic stall speed and at a much lower than normal angle of attack; the approach to the stall was so insidious that the pilot was unaware that the aircraft had stalled. The pilot did not have the expected visual cues on the rapid accretion of ice and the action of the autopilot in correcting for the aerodynamic effects of the accretion was to actually drive the aircraft further into the stall configuration. Heavy stall buffeting, which was mistaken for propeller icing caused the pilots difficulty in reading instruments. The temperature was much warmer than usual and large water droplets were present;
- a twin-engine airplane stalled on the approach to an airport, probably as a result of becoming uncontrollable at a speed well above its stalling and minimum control speeds. It was deduced that its handling and flying characteristics had been degraded by ice accumulation;
- Another twin engine airplane suffered a double engine failure as a result of ice ingestion. There have been a number of reported flame-outs from this cause, most of which have been suspected as being due to either late or non-selection of engine icing protection systems

WINTER OPERATIONS

Dr.M.S.Rajamurthy

Introduction

In cold winter, precipitation in the form of frost, snow and ice can occur either on ground or in flight or both, thus affecting all phases of flight. To ensure flight safety it is imperative that the deck crew understand the hazards of aircraft operations in these conditions and appreciate the importance of a thorough pre-flight preparation and appropriate actions during various phases of flight from takeoff to landing.

Air Florida B737 accident showed the disastrous effect of crew's failure to anti-ice the engines and their decision to take off with contaminated airfoil surfaces of the aircraft.

Three specific aspects of Flight operations in cold weather are:

- Aircraft contamination in flight
- Icing effects, de/anti-icing on ground
- Operation on contaminated runways

Aircraft contamination in flight

Any contamination of aircraft aerofoil surfaces will adversely affect performance and handling. Even small amounts of contamination can have disastrous consequences. It is therefore important that any flight in icing, or potential icing conditions is conducted fully in accordance with the icing clearance of the aircraft. There have been many accidents that occurred due to the negligence during a particular phase of flight.

Icing conditions generally occur at Outside Air Temperature (OAT) slightly positive down to–40ºC and more likely around FL100. Severe icing rarely occurs below –12ºC, but slightly positive OATs do not protect from icing. Icing conditions can be potentially met at any FL. High accretion rates are not systematically associated with Cumulonimbus; Stratiform clouds can ice very severely!

The build-up of ice in flight may very rapidly degrade aircraft performance and controllability and pilots should avoid icing conditions for which their aircraft are not approved.

When encountered with icing conditions in flight

- In addition to using Nacelle Anti Icing (NAI) and Wing Anti Icing (WAI) as per procedures, deck crew should keep an eye on the icing process: accretion rate, type of clouds.
- When rapid icing is encountered in Stratiform clouds, a moderate change of altitude will significantly reduce the rate. It is obligatory for the ATC controller to accept altitude change in these cases.
- Crew should check regularly and thoroughly for the build-up of ice.
- It is important to note that Ice detection system on Airbus aircraft are advisory systems and do not replace AFM procedures.
- On some types of aircraft, when ice is present on the tailplane, lowering of flap may cause a reduction of longitudinal control. When this happens, the tailplane can stall with a subsequent loss of control from which it may not be possible to recover in the time and height available. Allowing the speed to increase with the flaps extended may also increase this risk of tailplane stall.

If longitudinal control difficulties are experienced and ice formation on the tailplane is suspected, it may be prudent not to lower flaps, or to immediately change the flap setting. *It is important that this condition, caused by icing, is not confused with normal pitch changes associated with flap selection or de-selection.* Before a decision is taken to carry out a flapless or partial flap landing, the landing performance aspects of such a decision must be assessed. If runway length and/or condition are limiting factors diverting to a more suitable aerodrome should be considered.

- Operation of anti-icing or de-icing equipment can affect performance and fuel consumption. These effects must be accounted for flight in icing conditions.

Icing effects, de-icing and anti-icing on ground

The aircraft ready for takeoff should be free from deposits of frost, ice and snow. An external inspection has to be carried out for possible frost or ice.

Clear-ice cannot be visually detected. Fine particles of frost or ice , the size of grains of table salt and distributed sparsely can destroy enough lift to prevent a takeoff. This may not be clearly visible from a distance. NTSB, USA has issued a safety alert on aircraft icing in which it recommends physically touching the wing surface to ensure that it is free from this kind of ice formation.

A thin layer of ice or frost on the upper wing surface can do as much damage to lift as much as visible ice contamination. Strict procedures and checks must be applied.

Poor decision making as to whether or not to de-ice/anti-ice is probably the single biggest cause of icing related fatal accidents. The importance of making a safe decision cannot be over emphasized.

If necessary the aircraft should be de-iced. For de-icing and anti-icing only fluids approved for the purpose should be used. Different types of fluids are available (type I, II, and IV). They differ in chemical composition, viscosity and their thickness thus providing variable holdover time. The efficiency of the fluid under varying atmospheric conditions is dependant upon the correct mixture strength and methods of application, which must be strictly in accordance with recommended procedures.

For example, using fluid diluted with water will effectively remove ice; however, its ability to prevent further ice formation will be significantly reduced. Under certain conditions the fact that the aircraft surfaces have been made wet will actually enhance further accumulation, leading to a dangerous situation if there is a considerable delay between de-icing and take-off.

After removal of ice, if precipitation is present or conditions are conducive to frost formation, a fluid with anti-icing properties should be applied. The important aspect of anti-icing is the associated holdover-time. This defines the protection period and depends on the precipitation, OAT and the type of fluid used for anti-icing. *Anti-icing fluids flow off the aircraft before rotation and provide no in-flight ice protection.*

Reporting Term	Surface Condition
DRY	The surface is not affected by water, slush, snow or ice. NOTE: Reports that the runway is dry are not normally passed to pilots. If no runway surface report is passed, the runway can be assumed to be dry.
DAMP	The surface shows a change of color due to moisture. NOTE: If there is sufficient moisture to produce a surface film or the surface appears reflective, the runway will be reported as WET.
WET	The surface is soaked but no significant patches of standing water are visible. NOTE: Standing water is considered to exist when water on the runway surface is deeper than 3 mm. Patches of standing water covering more than 25% of the assessed area will be reported as WATER PATCHES and should be considered as CONTAMINATED.
WATER PATCHES	Significant patches of standing water are visible. NOTE: Water patches will be reported when more than 25% of the assessed area is covered by water more than 3mm deep.
FLOODED	Extensive patches of standing water are visible. NOTE: Flooded will be reported when more than 50% of the assessed area is covered by water more than 3 mm deep.

Engine blanks and pitot/static covers should be in place before de-icing. Particular attention should be paid to all leading edges, control surfaces, flaps, slats, their associated mechanisms, hinges and gaps.

All orifices and guards (e.g. generator cooling inlets, fuel vents, APU inlets, pressurization inlets and outlets, static plates, etc) and exposed operating mechanisms (e.g. nosewheel steering, emergency door and window locks, etc) should be cleared of snow or slush and de-iced when so recommended.

As the ingress of moisture, snow, rain and slush to door seals is more likely to occur when the doors are open, the time that they are open should be kept to the minimum practicable and a check made for contamination prior to departure.

Excessive use of any non-volatile, viscous de-icing fluids on control surfaces may create out of balance problems by increasing the weight of the surfaces to the aft of the hinge points. Deposits left in operating mechanisms, hinges and gaps may re-freeze during flight and jam controls. Some de-icing fluids can also dilute or wash away essential lubricating greases.

Implications of cockpit indications should be fully understood. Verify, by visual inspection, or by other recommended independent means, the satisfactory operation of any de-icing and/or anti-icing systems.

Ice may block the pitot static system, or melting ice or heavy rain may cause water to enter the pitot static system causing loss or intermittent indications of airspeed. On fly-by-wire aircraft, erroneous airspeed indications may cause other system failures.

Deck crew should ensure that they are familiar with how to check pitot heat if it is listed as a crew task in the walk around inspection. *Deck crew must understand the abnormal checklist procedures associated with loss of air data, locating alternate static sources, etc.*

On some types of engines, icing of engine pressure probes can cause an over-reading in instruments used to indicate engine power delivery. To minimize this possibility and thus of damage to, or flame-out of, the engine, engine anti-icing should be switched on if icing conditions are present or possible. Engine icing can be assumed to be possible if the OAT is less than +10°C and the RVR is less than 1000 m or there is precipitation or standing water.

Operations on contaminated runways

Operations on contaminated runway should be avoided whenever possible. While airports make every effort to keep runways clear of snow, slush and water, complete clearance cannot be sustained at all times. A short delay in take-off or a short hold before landing can sometimes be sufficient to remove the contaminated runway risk. If necessary a longer delay or diversion to an aerodrome with a more suitable runway should be considered.

The runway contaminants could be either Hard contaminants (compacted snow and ice) which reduce the friction forces or Fluid contaminants (water, slush, and loose snow) which reduce the friction forces, create an additional drag (due to contaminant spray impingement and contaminant displacement) and may lead to hydroplaning.

This leads to an increased accelerate-stop distance and increased accelerate-go distance. This impact on the accelerating performance leads to a limitation in the depth of the contaminant for takeoff. The result is a lower takeoff weight which can be significantly impacted when the runway is short.

Manufacturers publish takeoff and landing performance according to the type of contaminant, and to the depth of fluid contaminants.

To minimize the performance loss, flap setting and takeoff speeds should be optimized. Increasing the flap and slats extension results in better runway performance by reduction of accelerate-stop and accelerate-go distances. However, presence of an obstacle in the takeoff flight path could still require a lower flap setting for a better climb performance. An optimum is usually found manually by a quick comparison of the different takeoff charts. The Airbus LPC (Less Paper in the Cockpit) enables an automatic computerized selection of the optimum flap.

The takeoff speeds, namely V_1, V_R and V_2 have a significant impact on the takeoff performance. High speeds generate good climb performance. But this means longer time on the runway, increased takeoff distance and degraded runway performance. This calls for lower speeds. But again, the presence of an obstacle may limit the speed reduction and the right balance has to be found. Airbus performance programs, used to generate takeoff charts, take advantage of the so called "speed optimization". The process will always provide the optimum speeds.

The FLEXIBLE THRUST principle, used to save engine life by reducing the thrust to the necessary amount, is not allowed when the runway is contaminated. Operators can take advantage of the DERATED THRUST. The main difference between Flex thrust and Derated thrust is that, in the case of flexible thrust, it is allowed to recover maximum thrust (TOGA), whereas it is not allowed to recover maximum thrust at low speeds in the case of Derated thrust.

When an engine is derated, the associated V_{MC} (Minimum Control Speed) is reduced. This V_{MC} reduction allows even lower operating speeds (V_1, V_R and V_2) and, consequently, shorter takeoff distances. *In a situation where the performance is V_{MC} limited, derating the engines can lead to a higher takeoff weight.* Due to lower speeds, it is easier to control the aircraft in case an engine fails.

The presence of water on the runway is reported as indicated in the table above. When the reporting is DRY, DAMP OR WET, for performance runway should be considered as uncontaminated. When the reporting is water patches or flooded, the runway should be treated as contaminated.

ICAO Annex 14 (Aerodromes) requires airports to conduct periodic surveys of runway surface friction. If a survey indicates that the runway surface friction characteristics have deteriorated below a specified Minimum Friction Level, that runway will be notified via NOTAM as 'may be slippery when wet'. The term slippery should not be confused with the term icy.

When a runway is notified as such, aircraft operators may request additional information relating to that notification from the aerodrome operator. However, any performance calculations or adjustment made as a result of this information is the responsibility of the aircraft operator.

During taxiing in icing conditions, the use of reverse thrust on engines in pods should be avoided, as this can result in ice contamination of leading edges, slats and other flight critical devices. For the same reason, a good distance behind the aircraft ahead should be maintained. *In no circumstances should an attempt be made to de-ice an aircraft by positioning it in the jet efflux of the aircraft ahead.*

Before take-off ensure that the wings have remained uncontaminated by ice or snow. Operate the appropriate airframe and engine anti-icing or de-icing controls, before, during and after take-off in accordance with the AFM, FCOM and QRH. *Take-off power and aircraft performance should be monitored on more than one instrument.*

When operating from contaminated runways the following procedures should be considered in addition to those described earlier like de-icing, anti-icing etc.

- Take-offs should not be attempted in depths of dry snow greater than 60 mm or depths of water, slush or wet snow greater than 15 mm. If the snow is very dry, the depth limit may be increased to 80 mm. In all cases the AFM limits, if more severe should be observed;
- ensure that all retardation and anti-skid devices are fully serviceable and check that tires are in good condition;
- do not attempt a take-off with a tail wind or, if there is any doubt about runway conditions, with a crosswind in excess of the slippery runway crosswind limit. In the absence of a specified limit take-off should not be attempted in crosswinds exceeding 10 Kt;
- taxi slowly and adopt other taxiing techniques which will avoid snow/slush adherence to the airframe or accumulation around the flap/slat or landing gear areas. Particularly avoid the use of reverse thrust, other than necessary serviceability checks which should be carried out away from contaminated runway areas. Avoid taxiing too closely behind other aircraft and be cautious of making sharp turns on a slippery surface;
- power setting procedures appropriate to the runway condition as specified in the AFM should be used. Rapid throttle movements should be avoided and allowances made for take-off distance increases;
- Pilots in command should take the following factors into account

(a) The dimensions and nature of any overrun area that is available, and the consequences of an overrun off that particular runway;

(b) weather changes since the last runway surface condition report, particularly precipitation and temperature, the possible effect on stopping or acceleration performance and whether subsequent contaminant depths exceed Flight Manual limits.

JAR-OPS 1 requires that at the flight

planning stage the landing distance requirements at the destination and alternate aerodromes are satisfied taking into account the runway surface condition. It follows therefore that if the runways at the destination or alternate aerodromes are forecast to be contaminated then approved landing distance data, appropriate to the anticipated conditions must be available in order to satisfy this requirement at dispatch.

In all cases however, attempts to land on heavily contaminated runways involve considerable risk and should be avoided whenever possible. If the destination aerodrome is subject to such conditions departure should be delayed until conditions improve or an alternate used. It follows that advice in the Flight Manual or Operations Manual concerning landing weights and techniques on very slippery or heavy contaminated runways is there to enable the Commander to make a decision at dispatch and, when airborne, as to his best course of action.

Depths of water or slush, exceeding approximately 3 mm, over a considerable proportion of the length of the runway, can have an adverse effect on landing performance.

Under such conditions hydroplaning is likely to occur with its attendant problems of negligible wheel-braking and loss of directional control. Moreover, once hydroplaning is established it may, in certain circumstances, be maintained in much lower depths of water or slush.

Crews should be familiar with the characteristics of hydroplaning, as its symptoms can be confused with a brake failure.

A landing should only be attempted in these conditions if there is an adequate distance margin over and above the normal Landing Distance Required and when the crosswind component is small. The effect of hydroplaning on the landing roll is comparable with that of landing on an icy surface and guidance is contained in AFMs on the effect on the basic landing distance of such very slippery conditions. If a runway is found to be slippery during the landing roll the handling pilot should reduce speed to taxi speed before attempting to turn off the runway.

Low Temperature effect on Altimetry

- Very low temperature may create a potential terrain hazard and could be the origin of an altitude/position error.
- Corrections have to be applied on the height above the elevation of the altimeter setting source by increasing the height of the obstacles or decreasing the aircraft indicated altitude/height.
- Minimum OAT should be established and specified for using approach and takeoff procedures if FINAL APPR mode (V-NAV in approach) is intended.
- When OAT is below the minimum temperature indicated on a takeoff chart, the minimum acceleration height/altitude must be increased.

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1."Getting to grips with cold weather operations - a flight operations view", Airbus Industrie.

2."Frost, Ice and snow on aircraft", AIC 106/2004, Nov.11,2004,CAA, UK

3."Risks and factors associated with operations on runways affected by snow, slush or water", AIC 86/2007, sept.13,2007,CAA, UK

4."Pilots urged to beware of aircraft upper wing surface ice accumulation before takeoff", NTSB Safety Alert, SA-06, September 2006, NTSB, USA.

Web Watch

http://aircrafticing.grc.nasa.gov/courses_ground.html — *a pilot's guide to ground icing—all about ground icing problems, de/anti-icing fluids, de-icing and anti-icing aircraft*

http://aircrafticing.grc.nasa.gov/courses_inflight.html — *a pilot's guide to in-flight icing— all about in-flight icing problems*

PHOTO OF THE MONTH

Deicing the eco-friendly way!

AeroVis Airlines (Rovno) of the Ukraine has a different approach to dealing with the tough winter flying conditions.

After a snowstorm the crew came to prepare the aircraft for the next flight. They found some long brushes and cleaned the aircraft of snow and ice and they were ready to go! A simple eco-friendly method as no chemicals are involved!

The Confidential Aviation Hazard Reporting System (CAHRS) provides a means of reporting hazards and risks in the aviation system before there is loss of life, injury or damage. It is open to anyone who wishes to submit a hazard report or safety deficiencies confidentially and non-punitively. Reports help to identify deficiencies and provide safety enhancement in areas of aviation. CAHRS forms can be collected at different location of KAC (i.e. Flight Dispatch) Premises. Completed forms can be dropped in FS&QA allocated box at Flight Dispatch or e-mailed to kwioeku@kuwaitairways.com or faxed to 00965-4749823 or mail to Flight Safety and Quality Assurance office, Operations Department, P.O. Box 394, Safat 13004, Kuwait Airways –Kuwait.