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Communication and Coordination Keys to Safe and Effective Winter Operations

Airports in areas that experience regular and substantial snowfall and icing conditions need to develop comprehensive removal programs to minimize winter operational risks.

Editorial Staff Report

Coordination and timely communication are the keys to effective airport winter operations, recent reports compiled by the U.S. Federal Aviation Administration (FAA) say.

Airports faced with substantial snow and ice removal tasks, the FAA says, need to develop clearly defined procedures to ensure that ramps, taxiways and runways are safe for aircraft operations. These procedures and strategies are also echoed by other aviation/regulatory agencies.

"All airports subject to annual snowfall of several inches or more or icing conditions should have a snow committee," according to a recent FAA advisory circular (AC) on airport winter safety and operations. The FAA also suggests that every airport in frequent and heavy snowfall areas set up a snow control center to coordinate all snow and ice control activities.

In addition, the FAA recommended that every airport in such areas should have a written snow removal plan that "states the procedures, equipment and materials to be used by the airport in removing snow and ice."

The airport snow committee "expedites decision-making, reduces the response time for keeping runways, taxiways and ramp areas operational and improves the safety evaluation process that determines when or if a runway should be closed."

Such a committee would be comprised of representatives from airport management, operational staff, airline flight operations, air traffic control (ATC), fixed-base operators, flight service stations (FSS) and weather services, the FAA said.

A snow control center, the FAA said, is designed to be a prime source and clearinghouse of field condition information. The snow control center would also inform air carriers and ATC of expected runway closing and opening times.

"Communication between ATC tower and snow and ice control equipment (and supervisors' vehicles), and other support elements needs to be provided," the FAA said.

The written snow removal plan, according to the FAA, should "set out ... objectives and the priorities assigned to airport movement areas."

The plan should also "define areas of responsibility, es-

tablish operational requirements and procedures and define relationships with contractors (if used)," the FAA advisory circular said.

The [snow removal] plan should address "any unique environmental, climatic and physical conditions affecting the airport. Elements ... included are preseason preparation, snow committee composition, snow control center location, equipment, personnel training, weather reports, field condition reports, clearance criteria, clearance priorities, supervision and communications."

The FAA noted that each plan must be flexible enough to adapt snow and ice removal operations quickly to changing weather conditions and operational changes. It said two-way radio communication between snow and ice control crews and the coordination centers was essential.

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"All units operating on runways and taxiways should be able to communicate on the appropriate airport advisory frequency or be under the control of a radio-equipped vehicle," the FAA said.

According to the FAA, preseason preparations should include review and checks of:

- Equipment and supplies. Snow and ice removal equipment should be repaired and spare parts ordered. Ice control chemicals and abrasives should be ordered and stockpiled.

- Training and communications. Practice runs should be made with the equipment in typical operational scenarios. Crews should be trained in proper communications procedures and terminology.

- Installation of snow fences. Fences should be set up immediately before the onset of the snow season. They should be placed in areas where previous observation has shown their effectiveness in reducing accumulation.

- Identification of disposal areas. Snow storage areas should be chosen with careful consideration given to drainage characteristics. They must not interfere with aircraft operations and navigational aids.

The FAA underscored the importance of accurate reporting of weather and runway conditions.

"Appropriate response to a snow or ice removal event depends on accurate information about an approaching storm and the likely effect of precipitation on airport surfaces," the FAA said. "The snow or ice removal task can be reduced and costs lessened by a prompt, effective response to a storm warning. In addition, unnecessary callouts and other mobilization costs can be eliminated by responding appropriately to accurate storm forecasts."

Pavement surface condition sensors are also recommended in the FAA advisory circulars. The FAA said the sensors, embedded in the pavement, provide a precise measure of the pavement temperature and indicate the presence of water, ice or other contaminants. The sensors also transmit this information directly to the snow control center, thus helping shape snow and ice control strategy.

"Sensors are particularly valuable in the timing of anti-icing applications of chemicals," the FAA said. "If ice or compacted snow has accumulated on pavement, knowledge of the pavement temperature will guide selection of chemical and application rate to achieve clearance within a specified time with the minimum amount of material."

Runway friction testing is also crucial, the FAA said. "Airports serving turbojet aircraft during winter operations should have trained personnel and approved equipment to carry out runway friction testing."

The FAA said that pilot braking action reports sometimes are not representative of actual runway braking conditions. "Many airports use runway friction-measuring equipment to provide an indication of the existing friction on runways contaminated by snow or ice during aircraft operations and during snow removal operations."

The testing is done by using either continuous friction-measuring equipment (self-contained or towed) or decelerometers. The FAA said use of continuous friction-measuring equipment is more precise, although neither device gives reliable data if operated on more than two inches (50 mm) of loose snow or $^1/_2$-inch (13 mm) of slush.

"Decelerometers do not provide a continuous record of pavement friction, do not give reliable results on wet pavement, and are thus approved only for winter operational runway surveys," the FAA said.

Accurate runway friction testing requires close coordination between ground crews, ATC, airlines and the snow control center, the FAA said.

"The airport operator should furnish appropriate communications equipment and frequencies on all vehicles used

in conducting friction surveys," the FAA said. "This will ensure that airport operations personnel at both controlled and uncontrolled facilities can monitor appropriate ground control and/or airport advisory frequencies."

Snow removal operations, the FAA said, also require close cooperation between the snow control center, ATC, FSS and airport management to ensure a prompt and safe response.

In addition to snow fences, snow trenches also are effective in reducing the amount of drifting snow on runway. (Figure 1).

Multiple trenches spaced at about 10 feet (3 meters) apart can reduce further drifting and be used to store more snow, the FAA said. It said that trenches should be excavated no nearer than 50 feet (15 meters) from a runway.

When weather conditions begin to deteriorate, NOTAMS (notices to airmen) should be issued immediately advising airport users of unusual airport conditions, the FAA said.

Snow clearance from runways is best accomplished by operating plow teams in echelon, using a number of displacement plows to move the snow, with a minimum of rehandling, into a "windrow that can then be cast beyond the edge lights by a rotary plow."

An effective snow removal program must also ensure that:

- Equipment movements (on runways) are carefully timed and coordinated to ensure an orderly turnaround and safe reentry at the start of the return pass.

- Snowbanks adjacent to runways, taxiways and aprons are reduced to provide wing overhang clearance and to prevent operational problems caused by ingestion of ice into turbine engines or propellers striking the banks.

"This profile should be checked for the most demanding airplanes used at the airport to ensure that props, wing tips, etc., do not touch the snow with a wheel [positioned] at the edge of the full-strength pavement."

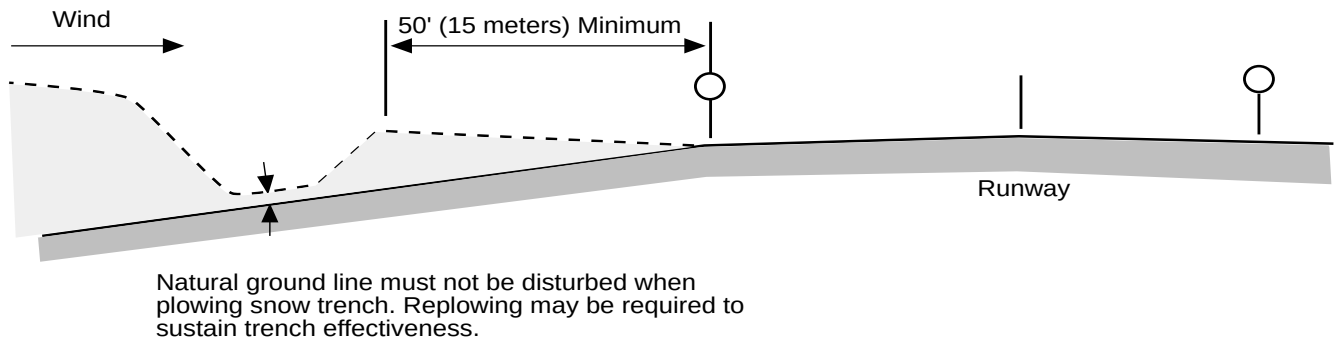
- Movement areas where aircraft operate at high speeds (such as turnoffs) should receive the same snow and ice control attention as runways. "Areas of low speed operation such as taxiways and ramps can also be critical under some conditions. Directional control and braking action should be maintained under all conditions."

- Great care is taken while removing snow from arresting barriers, which airports with joint military operations may have installed near the end of the active runway or at the beginning of the overrun area. "Barriers located on the runway should be deactivated and pendants removed prior to snow removal operations. Snow should be removed to the distance required for effective runout of the arresting system."

- The faces of all signs and all lights are kept clear of snow and in good repair. Priority should be given to lights associated with holdlines and the instrument landing system (ILS).

The FAA said that anti-icing is preferable to deicing whenever possible. [Ice removal is called deicing. Anti-icing prevents the formation of ice for a period of time.]

Dry snow does not often form a strong bond with the runway surface even under heavy and frequent wheel passes. However, wet snow and ice quickly develop such a strong bond that "mechanical removal is either diffi-



Source: U.S. Federal Aviation Administration

Figure 1

cult, slow or damaging to the pavement. Thus, the primary effort should be directed at bond prevention."

Anti-icing is accomplished by concentrating either thermal or chemical energy at the pavement surface, the FAA said.

"Because of the high cost of installing pavement heating systems and the large amounts of energy required to maintain the surface above freezing prior to the onset of precipitation, deicing/anti-icing with approved airside chemicals is generally more economical."

All such chemicals should be applied based on pavement temperature rather than air temperature, the FAA said.

Deicing chemicals should be applied on ice $^{1}/_{16}$-inch (1.5 mm) or less in thickness, according to FAA specifications.

The FAA guidelines added: "The recommended chemical form for anti-icing is liquid, although solid chemicals can also be effective in this application. A dry solid chemical has the disadvantage that if applied to a cold, dry surface it may not adhere and therefore may be windblown or scattered by aircraft movements. However, certain physical properties of a solid, such as its bulk density, particle shape, etc., may reduce these tendencies. Regardless, wetting a dry anti-icing chemical, either during distribution or before or after loading into the application vehicle, improves the ability to achieve uniform distribution and improved adhesion."

U.S. standards for airside chemicals are either established by the FAA or based on specifications outlined by professional organizations such as the Society of Automotive Engineers (SAE) or Aerospace Material Specifications.

Approved fluids for runway and taxiway operations are solutions with about a 50 percent glycol base and those with a potassium acetate base. Solid compounds include airside urea, calcium magnesium acetate and sodium formate.

The most effective landside chemicals used for deicing/anti-icing are from the chloride family, e.g., sodium chloride (rock salt), calcium chloride and lithium chloride. But these chemicals are highly corrosive to aircraft and cannot be used in aircraft operational areas.

"When any corrosive chemical is used, precautions should be taken to ensure that vehicles do not track these products onto the aircraft operational areas," the FAA said.

The FAA also cautioned airport operators to monitor closely the environmental impact of chemicals used in snow and ice removal programs.

"With the increased accountability placed on airport operators to manage deicing/anti-icing chemical runoff, they should request vendors to provide environmental data," the FAA said. ♦

AIRPORT OPERATIONS

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