

Snow time to lose

Extreme winter weather can cause havoc for airports and significant headaches for passengers as freezing conditions and impaired visibility see operations grind to a halt. Chloë Greenbank explores some of the latest developments to help air transport hubs maintain safe, efficient operations during the winter months.

Every year airports across the world are forced to temporarily close their runways and cancel flights in response to extreme winter weather conditions.

In January this year, Manchester Airport – a key regional gateway to the north of England – closed its runways for around two hours due to heavy snow.

While a two-hour closure doesn't sound too bad on the surface, it had a knock-on impact on operations for a prolonged period as cancelled flights were rescheduled and delayed passengers had to be accommodated, causing further delays.

Similarly, Sioux Falls Regional Airport in South Dakota in the US was also forced to close temporarily at the beginning of January amid major snowfall. Lingered flight disruptions continued into the following days as airlines cleared the backlog of flights. It's a common scenario during the winter months.

According to the Federal Aviation Administration (FAA), inclement weather conditions are the most significant cause of flight delays, making up nearly 70% of all delays exceeding

15 minutes in the average year. It also impacts safety. While human error is the most common cause of accidents, the weather is a primary factor in nearly 25% of all aviation accidents.

Underlining the need to ensure airports can stay open, operational and safe during extreme winter weather, the FAA awarded more than US\$72.6 million for snowploughs, de-icing equipment and new or upgraded buildings to store this equipment to airports across the US in 2022.

The funding, which has been allocated from the FAA's Airport Improvement Program, also recognises the financial challenges that regional hubs continue to face as they build back following the

global pandemic. The funding was awarded to 85 airports in 28 states.

"We can't let winter weather stop aircraft from safely landing and taking off," says FAA Associate Administrator for Airports, Shannetta Griffin. "This funding will help keep airports operating this winter and get passengers and cargo to their work, families and vacations safely."

BE PREPARED

Having the equipment available to respond to freezing conditions and snow-covered runways is one part of the equation. Having a robust snow plan (which often requires extensive planning all year round) in place to ensure the equipment can be used efficiently and safely is also vital.

At Stuttgart Airport in Germany, where snowfall is common between November

and January, planning for winter weather is integral to operations.

A spokesperson for the airport tells *Regional Gateway* that time is of the essence with freezing conditions.

"In cold temperatures and snowfall, the runway taxiways and apron must be cleared and de-iced in the shortest time possible so that air traffic can continue to operate safely."

When it is deemed necessary, the 3,345-metre-long runway is closed for a short period of time (no more than 30 minutes) to clear it of snow and ice. No aircraft can take-off or land during this period. Integral to this process is the airport's winter service team.

"Around 180 employees from various airport departments are on call during the winter months, with 60 volunteers on call every day," says the spokesperson. "They are a well-coordinated team supported by the most accurate weather forecasts available."

To help enhance its winter services even further, Stuttgart teamed up with Aebi-Schmidt and Volk Fahrzeugbau in 2022 for its SmartFleet project to integrate autonomously operated snow-clearing vehicles and equipment.



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Runway sweepers equipped with the Aebi Schmidt AirfieldPilot were able to clear runways, taxiways and the apron of snow and ice in a completely automated way.

“The potential of autonomously operated vehicles for airports became very clear during the SmartFleet project,” says the spokesperson. According to Aebi Schmidt, automated vehicles are not only more efficient and cost-effective, they contribute to greater safety, lower fuel emissions and fewer breakdowns.

DATA-DRIVEN APPROACH

Christiann Hen, Chief Customer Officer at Assaia (an aviation software company), believes that autonomous vehicles and robotics have an increasingly important role to play in managing winter operations.

“In particular, autonomous de-icing vehicles and snow ploughs are on the horizon,” he notes, adding that key to their success is their efficiency during turnarounds.

“These vehicles require a high level of intelligence to navigate their direct surroundings. In addition, for autonomous vehicles to operate efficiently within an airport environment, especially during snow events, data about ongoing operations is required.”

Assaia’s predicted off-block time (POBT) allows for real-time information on when flights are going to leave their gate, information about taxi routes and times from the gate to the de-icing pad, as well as de-icing times and taxi routing and time to get from the de-icing pad to the runway. “It allows for an ideal schedule to be created for the

autonomous snow clearing squad,” says Hen. “This data-driven and integrated approach ensures the airport can reduce congestion on taxiways and the runway while minimising the impact on traffic and thus on-time departure of flights.”

COLD START

Bottlenecks caused by a build-up of traffic as departing aircraft are required to undergo a de-icing process are a common situation during extreme winter weather conditions. They often result in taxiways and crossings being blocked while aircraft wait to be de-iced. This in turn can disrupt the flow of arriving aircraft on their way to the gate.

“The key to prevent all this is of course to only release aircraft from their gate if you know they have a direct taxi to the de-icing pad where they can be seen to quickly,” says Hen.

“The management of this depends on the throughput of the de-icing pad, but also on the number and timing of aircraft which are ready for departure. The latter we already predict with POBT, however we could theoretically also predict the pad throughput based on the aircraft type, weather conditions and so on. With

these ingredients, we can create a support system to help give pushback clearances to make maximum use of the available capacity without the risk of blocking the aircraft.”

ACCURATE ALERTS

Early weather warnings and accurate situational awareness is also critical to airports during the winter months.

Rosi Parisi, Product Application Manager, Weather and Environment at Vaisala, says: “When it comes to winter weather, the best aviation weather management systems incorporate a wide range of sensors to produce the most valuable real-time reports and alerts.

“Empowered with such solutions, decision-makers can improve the effectiveness and timeliness of weather impact mitigation plans to help avoid or take precautionary measures in inclement conditions.”

She underlines that a system of sensors that inform operators as accurately as possible of incoming weather fronts, runway surface conditions and visibility is the best way to prepare.

Beyond weather radar, airports can also utilise technology such as ceilometers and in-ground runway monitors to collect a wealth of accurate data.

Parisi cites how Vaisala recently worked with Minneapolis-Saint Paul Airport to modernise its runway weather system using the Vaisala RWS200 and Navigator software.

With airports depending on real-time awareness to keep runways, taxiways and ramps safe and operational, as well as ensuring safe operations for staff, Vaisala’s Runway Weather Information System (RWIS) is designed to provide airports with critical information to make informed decisions about treating, clearing and maintaining airport surfaces.

“The weather station’s high-grade components and materials are built to withstand almost anything nature can throw at them,” says Parisi. “Unlike competing systems, RWS200 provides sophisticated pavement state analysis,

algorithms for ramp and runway condition analysis, remote service features and smart power logic in the event of main power failures.”

PLAYING BALL

While maintaining smooth, safe operations for both passengers and staff is the primary aim for airports during freezing conditions, environmental requirements push airports to think outside the box when it comes to winter services, says George Mensonides, Managing Director at Snocom.

His company has developed the Snowcuber as a revolutionary approach to more efficient and safer snow removal.

“With environmental regulations forcing airports to reduce the risk of contaminating local sewerage systems, an increasing number of airports are being banned from disposing of snow into surrounding fields. Subsequently, we are seeing increased demand for the transport of snow to dump sites,” says Mensonides.

To help address the issue of snow clearance at airports, Mensonides explains how the Snowcuber works by likening the process to making snowballs.

“When you make a snowball, you

probably don’t realise it but at that moment you take out all the air – in fresh snow there is around 90% air – to reduce the volume. On the apron, the air is still in the snow. We developed the Snowcuber to essentially replicate that process of forming snowballs.”

By compressing the snow and getting rid of the air to make it more compact, the Snowcuber reduces the volume before loading it on to a truck.

“This patented technology enables airports to preserve their capacity and reduce the number of dump trucks, as well as movements, operational expenditures and emissions,” says Mensonides.

Amsterdam Schiphol Airport and Paris Charles de Gaulle already use the Snowcuber and Snocom is in discussion with Zurich Airport to order two of the snow machines.

As Mensonides concludes, it’s no longer just a case of clearing snow and ice as quickly as possible.

“Constantly changing weather conditions require airports to consider new innovations that not only help ensure safe, efficient operations but which will also enable them to respond to climate challenges in the future.” ■

The SmartFleet project has been used to test autonomous vehicles and equipment.



Vaisala’s Runway Weather Information System in action.



Real-time reports: aviation weather management systems incorporate a wide range of sensors.

