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Flight Crews and De-Icing Personnel Working together in Temporary Teamwork for safe Skies

1. Introduction

Flying aircraft in winter conditions is not an abnormal condition - but it does require more attention to detail and some specific knowledge. It is normal to be relieved at the end of winter and to relax a little as the threat subsides, but the memory of winter needs to be preserved for the next seasonal repeat. This “winter threat” also requires a high level of additional team-work between flight crew and ground staff. For a fairly short periods of time flight crew and ground staff are focused on one objective: the safe take-off of the aircraft, and must therefore work together towards a common aim.

In this article we will be speaking about this important interaction between flight crews and ground crews and how their complementary action can enhance safety. Pilots ultimately have responsibility for their aircraft and, in winter, they need more input from ground crews, in order that their decision making is fully informed

2. Importance of proper Training

It is of prime importance that all ground de-icing personnel of whatever grade or function are fully trained to recognize icing of all types and in all forms – even to recognize the conditions prevailing when ice or frost can form (active icing conditions).

A good pair of eyes is crucial in many ways to the safety of the aircraft. Ground staff can sometimes be the only way that flight crews (in the cockpit) can be informed of icing safety issues on their aircraft in unseen areas.

All crews (flight and ground) need regular training for winter operations and this needs to be constantly in the memory – not something which is put to the back of the mind in summer and therefore comes as a shock - next winter.

Another aspect of the flight/ground crew interaction, is that flight crews are not always ‘informed’ on AMM Procedures (de-icing etc) and ground crews are not generally ‘informed’ on FCOM content. Some general cross training for both crews serves to improve the flow of information between both.

The worst statistics for dispatch reliability, loss of aircraft slots and even cancellations tend to occur in the October/November period every year, when this transitional period into winter operations has not been properly prepared for.

The best time to prepare for this is in August/September, using simulators if possible but certainly practicing procedures and scenarios and refreshing the memories of what happened last winter.

3. Typical De-icing Procedure

There is no ‘typical’ operation – all airports are different, the buildup of activity is ‘organic’ and activities occur differently in different locations. A de-icing procedure, which is inherently good for Bolivia may not be the best for Siberia or Paris. This is why all authorities require each airline to write their own individual procedures for their own locations and to work with de-icing service providers to ensure the procedures they create are correct for their aircraft.

4. Importance of proper Teamwork

To illustrate the importance of good flight crew / de-icing personnel teamwork, we have split a winter ground operation workflow into the following representative phases:

- ▶ Pre-Boarding
- ▶ Start of Engines and Taxi to De-icing Pad
- ▶ Ground De-icing
- ▶ Taxi to Runway
- ▶ Pre Take-Off

And for each phase, we look at how their complementary action can enhance safety.

4.1 Pre-Boarding

After receiving the weather briefing aircrew will inspect the exterior of the aircraft during their pre-flight inspection. At this time the flight crew may request de-icing or further anti-icing depending on the aircraft condition and the weather. (The aircraft may or may not have been treated prior to their arrival. It is more likely now that the aircraft is boarded first and then de-iced on the way to take-off via the de-icing pan.)

Flight crew should also remember that the ground crew are outside ‘in’ the weather and may have advice on the immediate conditions prevailing.

The three different contamination checks required to be accomplished

1. Pre-Flight Contamination Check

- ▶ Normally accomplished by the flight crew. However in the absence of the flight crew the Controller (De-Ice Coordinator) can accomplish the check.

2. Post De-Ice Contamination Check

- ▶ Accomplished by the De-Ice Inspector.

3. Pre Take-Off Check

- ▶ Accomplished periodically during taxi out and prior to take-off by the flight crew.

note

Various different terms can be used to describe the activities of people on the team:

- One person should be designated as the manager or responsibility holder for all de-icing activities. He or she would normally be called the Controller, De-Ice Coordinator, sometimes also ‘Ice-Man’.
- One person must be designated as the inspector – normally called ‘De-Ice Inspector’. This person is responsible for making sure and confirming that the aircraft ‘critical surfaces’ – wings, stabilizers and fin are free from frozen contamination (contamination = ice, frost, snow etc). The final required method is by touching the aircraft wing skin (Tactile Test). This person can be anyone from the teams. Different airports have different personnel configurations; what is important is that one person is designated for this responsibility.

4.2 Start of Engines and Taxi to De-icing Pad

Understanding the significance of Holdover Times (HoT) is important as these will directly affect the pre-flight phase planning. Prepare the aircraft for de-icing – close intakes, and outflow valves. Set aircraft in Ditch mode.

Anti-icing is a less aggressive stage which ensures the aircraft remains clear of contamination for the required time.

Aircrew need to remind themselves that they are following procedures (FCOM) and are highly occupied with cockpit work and preparation. Any extra information and assistance they can get from ground crew should not be forgotten or dismissed.

4.3 Ground De-icing

De-icing procedures are basically written and designed to remove ‘contamination’ from the aircraft critical surfaces. Fuselage cleaning and front fuselage cleaning needs to be performed carefully to ensure aerials are not damaged and windscreens and wipers are not clogged with fluid.

Ground crews are local, often pilots are not. That means that although

pilots will be given a weather briefing, often the ground crew can give details for short local changes, which can be valuable to pilots.

Here the aircrew and the ground de-icing crew come together. The flight crew taxi the aircraft into position on the de-icing pan and the de-icing vehicles drive up to the aircraft. If necessary, the aircraft is de-iced and anti-iced, in accordance with the pilot’s request and the prevailing weather conditions.

The ground de-icing crew should consist of a Controller (De-Ice Coordinator), the relevant number of vehicle drivers and de-icing lance operators and a De-Ice Inspector. There must always be a ground De-Ice Inspector, qualified locally and to national and international standards to confirm to the pilot that the de-icing has been effective and that the aircraft carries no contamination before moving off to the flight area.

In most cases the preferred method of confirmation is by ‘Tactile Test’ – or basically, De-Ice Inspector will touch the aircraft wing surface with bare fingers (fig. 1). This is probably still the only trusted method of confirming the wing is clear of contamination – particularly clear-ice (fig. 2).

4.4 Taxi to Runway

When the aircraft is ready and declared free of ice, the flight crew will taxi on towards the runway. Flight crew still need to be vigilant to watch the time and ensure HoT is not over-run, weather conditions do not change and the aircraft starts to collect contamination. If in doubt turn back.

Use as much of the ground resource as possible and keep checking that no contamination has formed or stuck.

Aircrew must also be vitally aware that contamination can grow in areas they cannot see. For example, in extreme low temperatures and in precipitation, particularly snow, it is possible for the precipitation to hit the windscreen and melt. The windscreen (externally) is not necessarily at a very high temperature but hot enough not to freeze. Thus any clear melt water will run down the side of the aircraft underneath the windscreen and out of the pilot's vision. If the aircraft is required to return for re-treatment and the time builds, this can build a fairly thick ice-bridge which may cause a problem with unreliable airspeed at a later time, because it will deflect the airflow away from the pitot tube (fig. 4, 5 and 6).

If an aircraft is slow to take-off for any reason and needs to be de-iced again or retreated for anti-icing (sometimes more than once) aircrew must bear in mind the potential growth of these ice-bridges and their potential to cause 'unreliable airspeed' indications during take-off. This is not to be confused with unreliable airspeed caused by ice crystals in cruise.

4.5 Pre Take-Off

For the previously described situations it would be necessary for ground crew to approach the aircraft, for example to confirm icing on the front fuselage. If that is the case, it is the responsibility of the flight crew to call them forward and ensure their safety.



Figure 1
Tactile Test



Figure 2
Clear-ice contamination on the wing

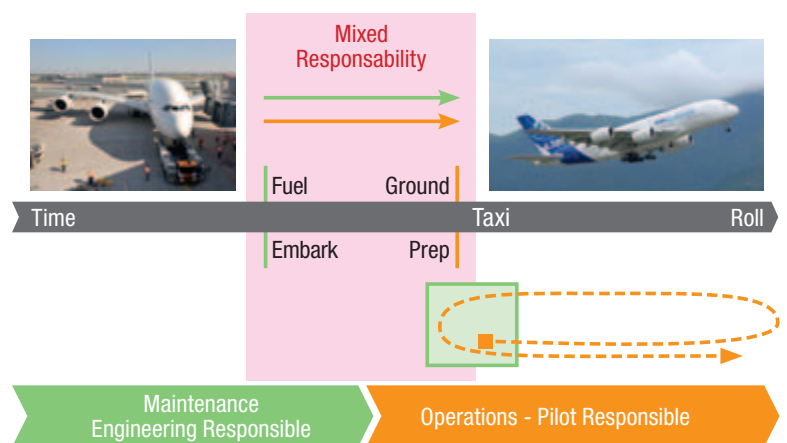


Figure 3
Under all the above conditions, it is necessary for ground crew and resources to be available to pilots until roll to take-off

5. Conclusion

1. Know your de-ice and anti-ice procedures

2. Be ready to adapt:

There are good rules and procedures, but we cannot be rigid as the weather situation can alter quickly. All situations need to be treated with intelligent adaptation.

3. Maximise Teamwork:

Good team work between flight-crews and ground crews is an essential ingredient of safe winter operations.

Ground crew local knowledge may be invaluable – it should be sought and used by flight crews.

Flight crew have the ultimate responsibility but they need to make use of ground crew capability until the latest possible moment.

4. Always maintain vigilance:

It leads to improved safety levels.

References

A320 Family, A330/A340, A380:

- ▶ Flight Crew Operating Manual (FCOM): PRO SUP - ADVERSE WEATHER - COLD WEATHER
- ▶ Flight Crew Training Manual (FCTM): NORMAL OPERATIONS - SUPPLEMENTARY INFORMATION - COLD WEATHER
- ▶ Aircraft Maintenance Manual (AMM): Chapters 12-30-00 and 12-31-00 Complete

A300/A310:

- ▶ FCOM 2.02.13 - PROCEDURES AND TECHNIQUES - INCLEMENT WEATHER OPERATION; OPERATION IN ICING CONDITIONS
- ▶ FCTM 2.34.10 - SUPPLEMENTARY INFORMATION - INCLEMENT WEATHER COLD WEATHER OPERATIONS AND ICING CONDITIONS
- ▶ AMM: Chapters 12-30-00 and 12-31-00 Complete

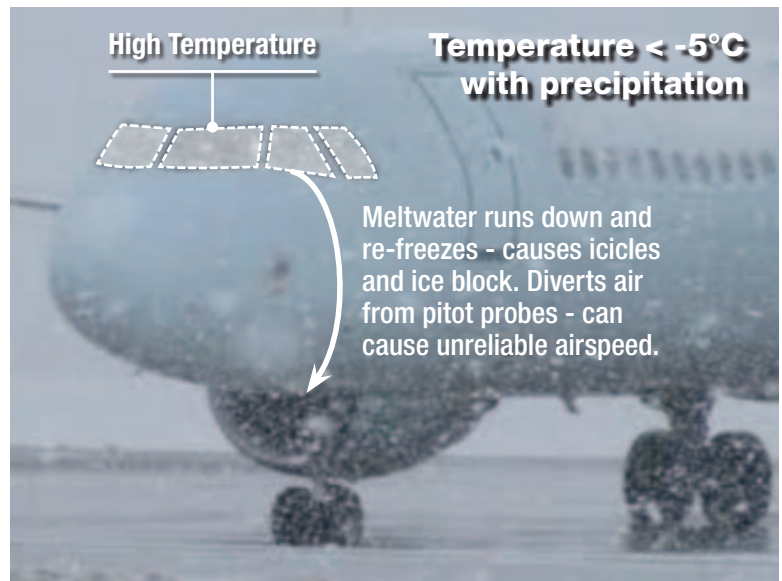


Figure 4
In poor visibility during extreme weather conditions, the ground crews need to be as close as possible to see clear ice on the front fuselage



Figure 5
Clear pitot tube



Figure 6
Ice bridge causing deflection of airflow away from pitot tube

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A350 XWB
First flight of A350 XWB at Toulouse-Blagnac Airport

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