
Presented By
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To the
INTERNATIONAL WINTER OPERATIONS CONFERENCE MONTREAL
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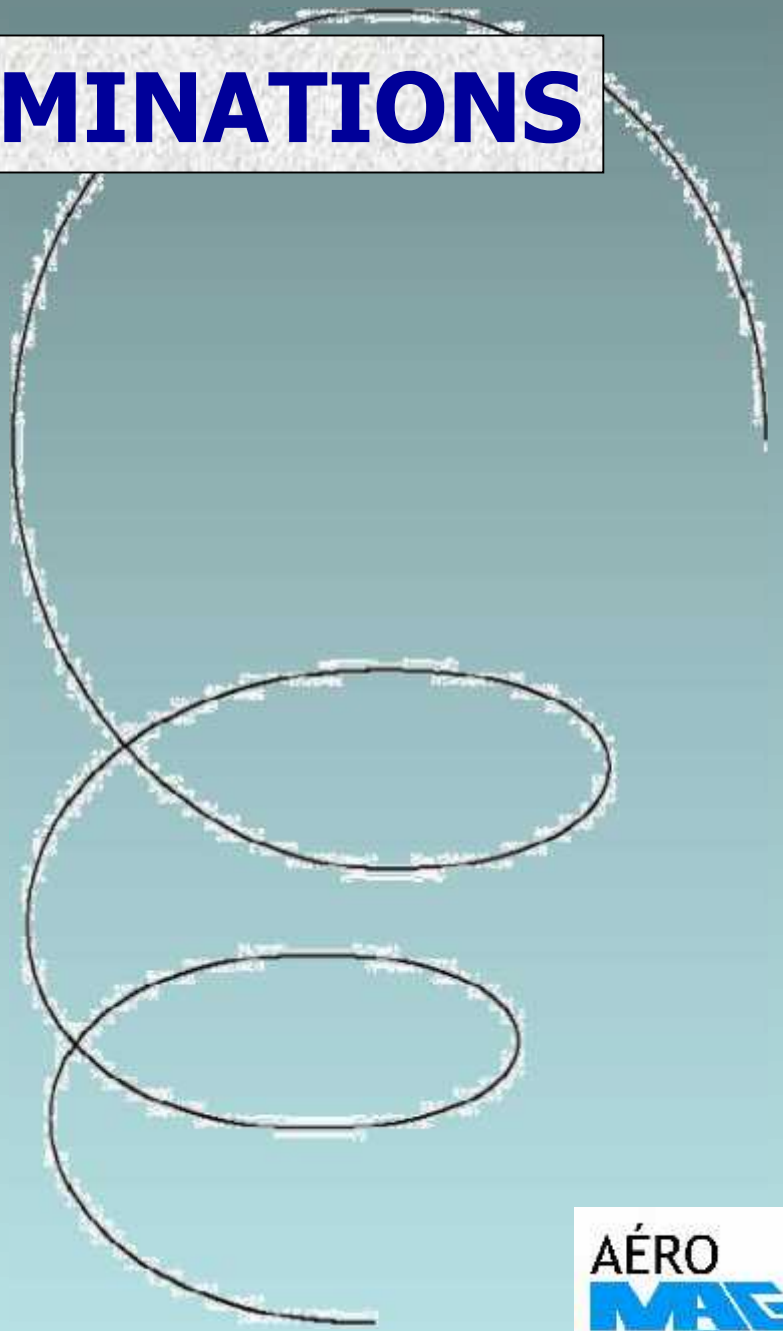
OPERATIONS UNDER GROUND ICING CONDITIONS

DE-ICING OPERATIONS

- **WINTER CAN CREATE SEVERE AND ADVERSE CONDITIONS FOR THE AVIATION INDUSTRY**

TYPES OF CONTAMINATIONS

- FR0ST
- FREEZING RAIN
- ICE
- SNOW
- SLUSH



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GROUND ICING CONDITIONS

GROUND ICING CONDITIONS exist when any of the following CONTAMINANTS *adhere to* or *may adhere to* the aircraft's CRITICAL SURFACES…

EXAMPLES OF CONTAMINATIONS

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GROUND ICING CONDITIONS - CONTAMINATION

- FROST

GROUND ICING CONDITIONS - CONTAMINATION

- FREEZING RAIN

GROUND ICING CONDITIONS - CONTAMINATION

- ICE

GROUND ICING CONDITIONS - CONTAMINATION

- SNOW

GROUND ICING CONDITIONS - CONTAMINATION

- SNOW

GROUND ICING CONDITIONS - CONTAMINATION

- SLUSH

CANADIAN ICING REGULATIONS - PRE DRYDEN

"No person shall commence a flight when the amount of frost, snow or ice adhering to the wings, control surfaces or propeller of the aircraft may adversely affect the safety of the flight."

REGULATION IN 1989

HISTORICAL ACCIDENTS DUE TO CONTAMINATION

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ACCIDENT HISTORY

Failure to DEICE or ANTI-ICE as required can have catastrophic consequences…

ACCIDENT HISTORY

From 1969 to 2005 accidents related to GROUND ICING have caused over 500 deaths and resulted in a significant loss of property.

JAN 13, 1982 WASHINGTON D.C

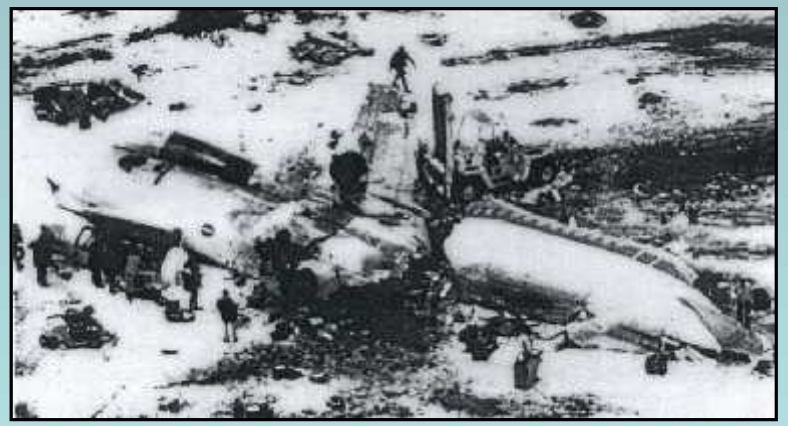
CAUSES

The causes were the crew's failure to use the engine anti-icing system during takeoff and failure to de-ice the plane a second time before takeoff with snow/ice on the critical surfaces of the aircraft.

The crew's inexperience in icing conditions was a contributing factor.

NOV 15, 1987 DENVER, CO, USA

- DOUGLAS DC-9-14
- AIRCRAFT CRASHED DURING TAKEOFF
  - Rapid rotation
  - Excessive delay after first deicing
  - Failure to deice a second time
- 28 FATALITIES



MAR 10, 1989 DRYDEN, ON, CANADA

- FOKKER F28-1000
- AIRCRAFT CRASHED DURING TAKEOFF
  - Contamination on critical surfaces
  - Major investigation and inquiry conducted
  - Resulted in new regulations for Canada
  - 24 FATALITIES

DEC 27, 1991 STOCKHOLM, SWEDEN

- MD-80

- AIRCRAFT CRASHED AFTER TAKEOFF
  - Improper / incomplete deicing
  - Ice ingested into engines
  - Reached 3000’
  - Double engine failure

MARCH 22, 1992 NEW YORK, NY, USA

- FOKKER F28-4000
- AIRCRAFT CRASHED AFTER TAKEOFF
  - Snowy conditions
  - Contaminated wings
- 27 FATALITIES

JAN 4, 2002 BIRMINGHAM, ENGLAND

- BOMBARDIER CHALLENGER

- AIRCRAFT CRASHED DURING TAKEOFF
  - Frost observed on wings
  - Crew failed to have aircraft de-iced
  - Crew fatigue & jet lag

- 5 FATALITIES

NOV 29, 2004 MONTROSE, CO, USA

- BOMBARDIER CHALLENGER
- AIRCRAFT CRASHED DURING TAKEOFF
  - Under investigation
  - Reports of icing conditions
- 3 FATALITIES

ACCIDENT HISTORY

There are also many incidents - that could have become accidents - that are related to the lack of de-icing.

For example, a Fokker F28 Mk70 in Turin Italy, failed to deice properly and ingested clear ice into engines during take-off. It required an emergency return and landing.

No injuries, however substantial damage to both engines.

ACCIDENT HISTORY

Many of the early accidents were the driving force behind significant worldwide regulatory changes.

CANADIAN ICING REGULATIONS CHANGED AFTER THESE ACCIDENTS

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CANADIAN ICING REGULATIONS - PRE DRYDEN

- ***FROM***

  "No person shall commence a flight when the amount of frost, snow or ice adhering to the wings, control surfaces or propeller of the aircraft may adversely affect the safety of the flight."

REGULATION IN 1989

CANADIAN ICING REGULATIONS - POST DRYDEN

TO NEW REGULATION:

"No person shall conduct or attempt to take-off in an aircraft that has frost, ice or snow adhering to any of its critical surfaces."

CAR 602.11 - *AIRCRAFT ICING*

FROST

ICE

SNOW

HISTORICAL ACCIDENTS INVOLVING DE-ICING PERSONNEL

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GROUND DE-ICING PERSONNEL INJURIES AND FATALITIES

MIRABEL/MONTREAL INTERNATIONAL AIRPORT
JANUARY 21, 1995

THREE DE-ICERS DIED WHEN A B747 AIRCRAFT STARTED TO MOVE FORWARD AND OVERTURNED TWO DE-ICING VEHICLES THAT WERE STILL IN FRONT OF THE AIRCRAFT`S HORIZONTAL STABILIZERS

GROUND DE-ICING PERSONNEL INJURIES AND FATALITIES

CALGARY INTERNATIONAL AIRPORT
DECEMBER 22, 2009

DE-ICER FELL MORE THAN SIX METRES TO HIS DEATH WHILE DE-ICING AN AIRCRAFT

GROUND DE-ICING PERSONNEL INJURIES AND FATALITIES

AMSTERDAM AIRPORT (NETHERLANDS)
DECEMBER 1ST, 2010

DE-ICERS RECEIVED SERIOUS INJURIES WHEN A B-747 AIRCRAFT WAS MOVING OUT OF THE STAND AND TURNING WHEN THE AIRCRAFT`S HORIZONTAL STABILIZER KNOCKED THE DE-ICING VEHICLE OVER

CANADIAN ICING REGULATIONS

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CANADIAN ICING REGULATIONS

NEW REGULATION TO IMPROVE SAFETY

CONTAMINATION TRAINING IS NOW REQUIRED

FOR….

- PILOTS
- CABIN CREWS
- FLIGHT DISPATCHERS AND FLIGHT FOLLOWERS
- DE-ICING EQUIPMENT OPERATORS
- MAINTENANCE CREWS

622.11, 722.76, 723.98, 724.115, 725.124

CANADIAN ICING REGULATIONS

NEW REGULATION:

The personnel that can conduct contamination inspections are now specified.

These personnel will be trained and must be qualified.

CAR 602.11 (5)

CANADIAN ICING REGULATIONS

NEW REGULATION:

All Airline Operations require a ground de-icing/anti-icing program that must conform to prescribed standards.

705 / 622.11

CANADIAN ICING REGULATIONS

NEW REGULATION:

The air operator's de-icing/anti-icing procedures must be described in an appropriate company manual(s).

The responsible personnel must be identified, and procedures particular to each type of aircraft must be specified.

622.11 5.0 Aircraft De-icing/Anti-icing Procedures

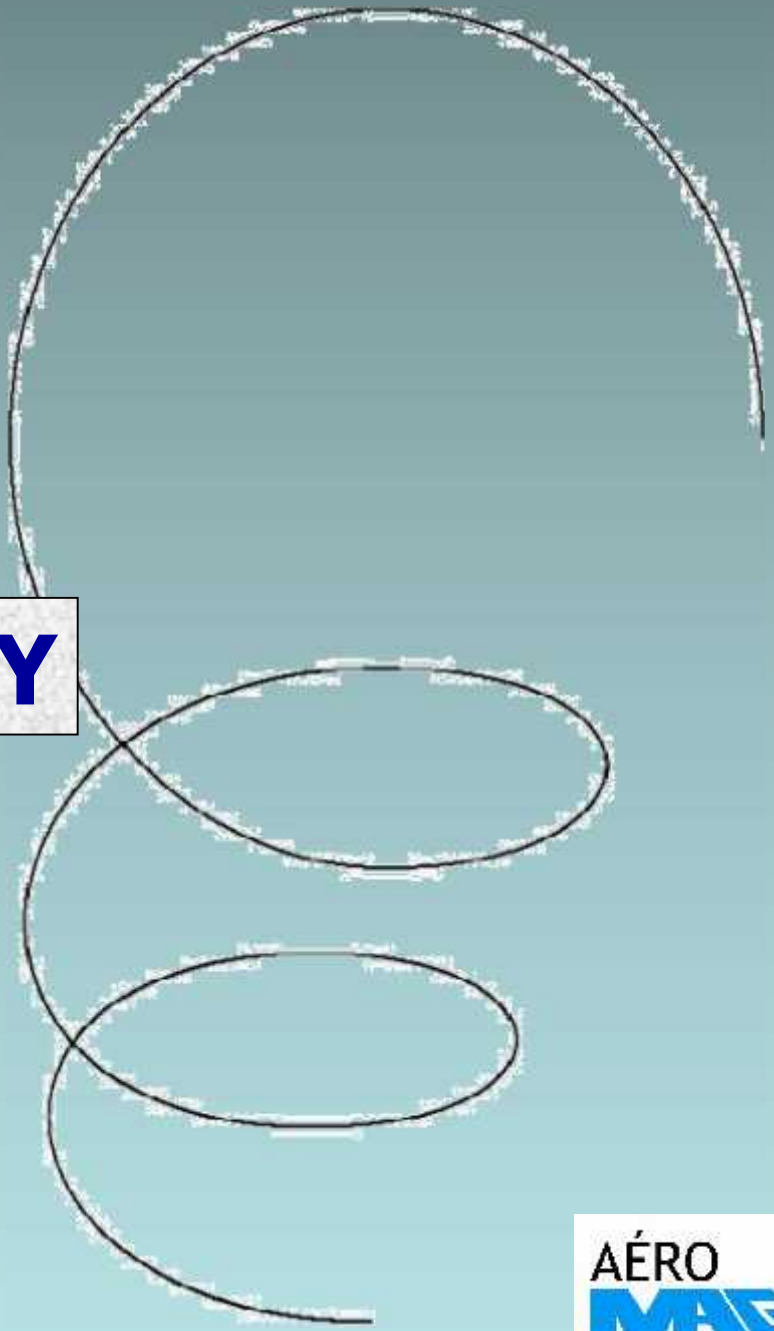
CANADIAN ICING REGULATIONS

NEW REGULATION:

If “a crew member of an aircraft observes that there is frost, ice or snow adhering to the wings of the aircraft, the crew member shall immediately report that observation to the pilot-in-command, and the pilot-in-command or a flight crew member designated by the pilot-in-command shall inspect the wings of the aircraft before take-off.”

602.22(6)

SAFETY



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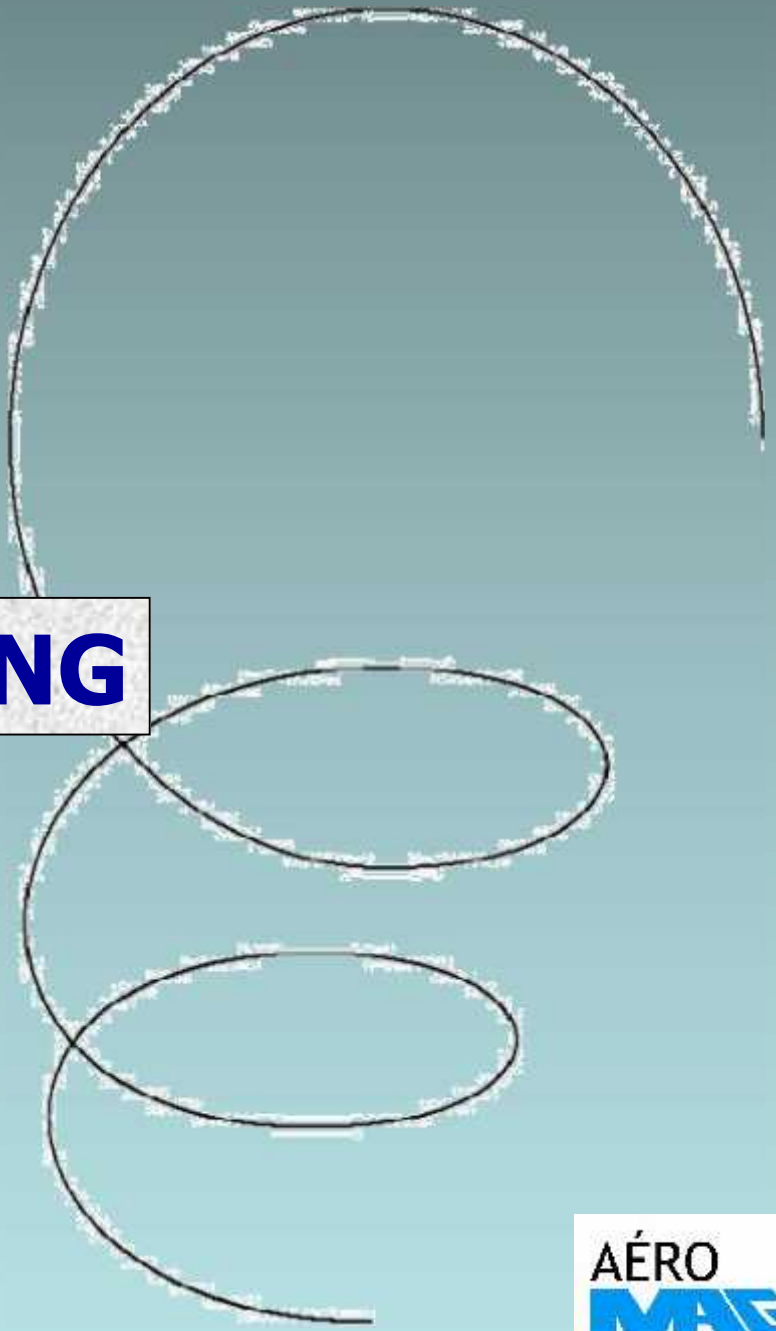
- Standards and Procedures
- Training
- Audits

TRAINING



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PERSONNEL TRAINING

- **CDF / DDF**
  - **EACH EMPLOYEE MUST SUCCESSFULLY COMPLETE :**
    - **INITIAL**
    - **RECURRENT**
    - **BOTH TRAININGS INCLUDE THEORY AND PRACTICAL**

ON TIME PERFORMANCE

ON TIME PERFORMANCE IS VERY IMPORTANT

BUT

IN ICING CONDITIONS IT IS BETTER TO BE A FEW MINUTES LATE AND BE SAFE

CONCLUSION

Dr. James Reason stated:

“We cannot change the human condition, we can change the conditions under which humans work.”

“When an adverse event occurs, the important issue is not who blundered, but how and why the defenses failed.”


Thank you