Liquid Water Equivalent
Operational Demonstration
Overview

• LWE systems
  • How they work
  • What improvements they provide
• FAA-sponsored Operational Demonstration
  • Test results
The Challenge

During winter weather conditions the Captain needs an accurate, reliable and straightforward way to answer one question:

Am I safe to take off?
The Problem

• Current methods to measure snowfall intensity are
  – Imprecise (visibility-based)
    • Operational restrictions
  – Complex for the pilots
    • Distractions at critical times
    • Safety risk
Simplify

• Our fluids are getting better

• Our operations are safer

• Our documentation and processes are getting more complex

• Complexity creates safety, operational and compliance risk
How Do We Simplify?

• Provide the Captain with a simpler way to know the effectiveness of the anti-ice fluid, that is also more precise.

Liquid Water Equivalent

LWE
Anti-Ice Fluids

- Water absorption capabilities are precisely known
- Measure accumulated water since application of anti-ice fluid
Am I Safe to Depart?

Compare the accumulated water to the absorption capability of the fluid

Is the fluid saturated?

No – take off

Yes – don’t take off
Two Approaches

• Modified Holdover Time
  – SureWx

• CheckTime
  – Vaisala
ACARS Message to Crew

ACARS-MESSAGE 01/01
UP0099 /20 ANC-SDF
CHECK TIMES FOR ANC
AS OF 1512L/0012Z
--
1231L/2131Z CPGA
1335L/2235Z GTYPEIV
1453L/2353Z AGTYPE1

VIEWED
<RETURN 00:15
Anti-iced at 1430L/2330Z

ACARS-MESSAGE
UP099 /20 ANC-SDF
CHECKTIMES FOR ANC
AS OF 1512L/0012Z
--
1231L/2131Z CPGA
1335L/2235Z GTYPEIV
1453L/2353Z AGTYPE1

<REJ \n<RET

ACK>

<RET

Anti-Ice Time 1430

CheckTime 1231

Is CheckTime earlier than Anti-ice time?

Yes

Takeoff is authorized

No

WARNING: DO NOT TAKEOFF

<REJ \n<RET

ACK>
Improvements Based on LWE

• Reduction of the need for Type IV in very light or light snow
  – Environmental benefits
  – Cost savings
• Extended fluid effective time
• Elimination of PTOCC
  – “Heavy Snow” no longer matters
## Holdover Table Procedures

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**Ascertain:**
- Time of day (day/night)
- OAT
- Visibility (tower/ground)

- Accomplish the Snowfall Intensity Flow Chart to determine applicable snowfall intensity
  - Is the snowfall intensity Heavy?
    - If yes, do not depart unless PTOCC inspection is available
    - If no, refer to the Holdover Table for the type of fluid used

- Determine holdover time based on very light, light or moderate snowfall intensity
- Monitor snowfall intensity and METAR changes during taxi. If conditions are changing, adjust holdover time as needed.
- At end of runway, make a final review of your holdover time.
- If holdover time has been exceeded, return to ramp for additional de-ice/anti-ice treatment.

## LWE Procedures

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**Request information via ACARS.**
- Monitor information during taxi if conditions are changing
- Make final request within five minutes of departure.
- If time has been exceeded, return to ramp for additional de-ice treatment.
Operational Demonstration

Vaisala – Alaska, ExpressJet, UPS
SDF, ANC, MSP, DEN, ORD

Purpose – demonstrate accuracy and reliability of system interfaces
Certification

UPS was the Lead Carrier

- Created ACARS interface
- Accomplished SMS Risk Assessment
- Created and coordinated procedures and training
- Provided training module to Alaska and ExpressJet

Coordinated approval through CMO
- Approval granted on Feb 19
CheckTime Results

System functioned as designed

• 1700 information requests
  – All responded to within seconds
  – All responses were accurate
  – No system failures

• 400 aircraft departed in winter wx conditions under CheckTime procedures
LWE Limits

• FAA imposed a 25 g limit of the ops demo
• With moderate wind, even light snow often showed excessive LWE
• When needed most, the CheckTime system returned an ERROR message
• FAA has raised this limit to 50 g
Other Forms of Precipitation

- Restriction only to snow is very limiting
- Looking forward to the inclusion of other forms of precip
  - Freezing drizzle / rain
  - Ice pellets
Pilot Critiques

Pilots liked the simplicity
– No snowfall intensity tables
– No holdover tables

Look-back was confusing at first
– Training made a difference
– Got used to it
Successful Demonstration

Airlines now able to request authority to use HOTDS

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Questions?