Global Reporting Format

Reporting of Runway Conditions Relevant to Aeroplane Performance

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Webinar on the Global Reporting Format (GRF)
10/03/2021

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Effect of Runway Condition on Aircraft Performance

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Effects on Performance

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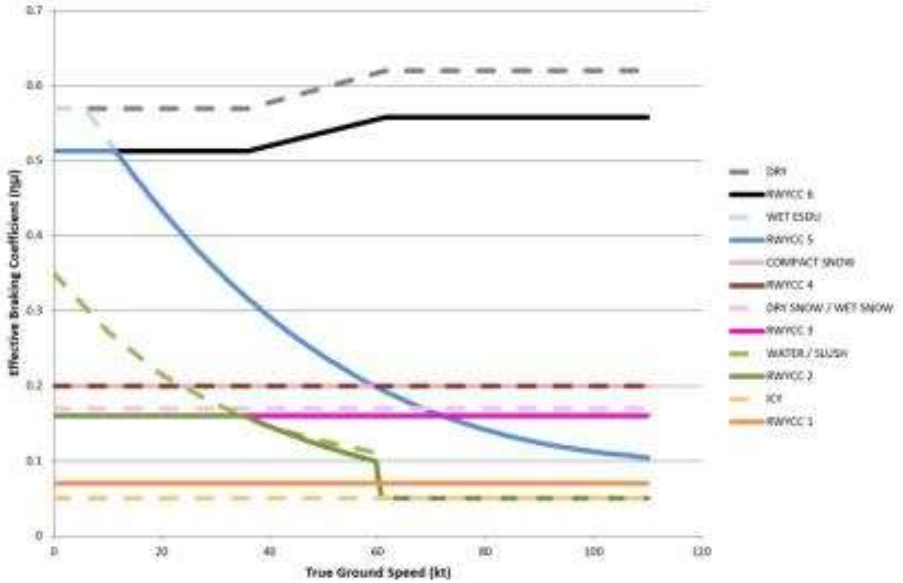
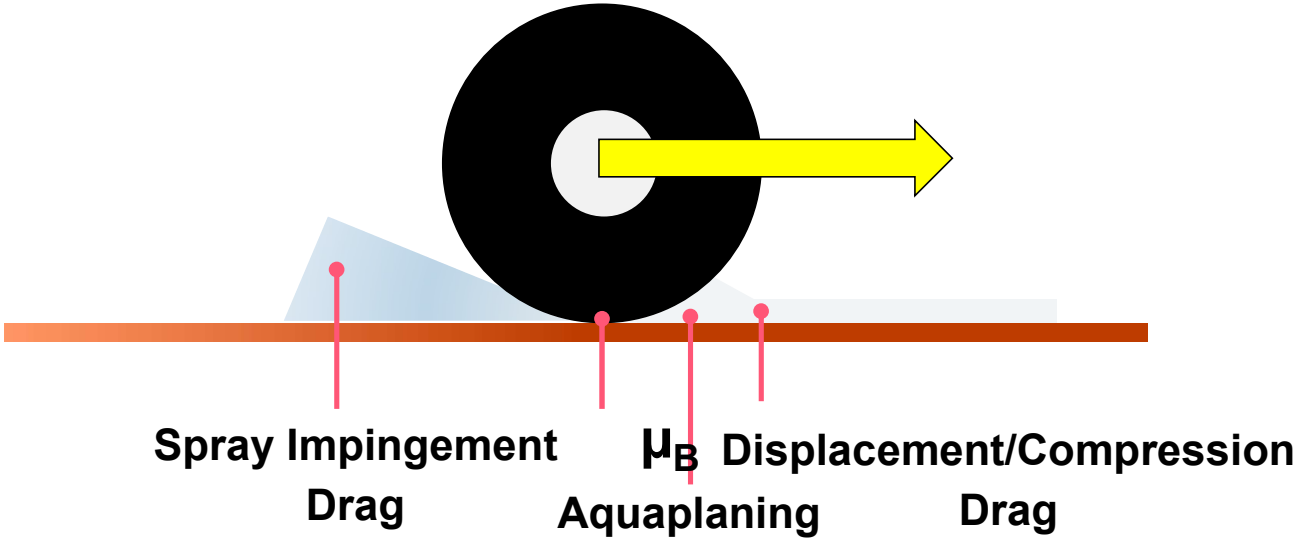
Braking Performance reduced
- Wheel to ground friction
- Aquaplaning

Acceleration reduced
- Contaminant drag





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Performance Relevant Reporting

The Operational Need
- What is on the runway?
- Does it cover a significant portion?
- How deep is it?
- Are in-built qualities of the surface deficient?

The Assessment and Reporting Method
- The essential information
- Updated according relevant criteria
- When there is a significant change

Runway Condition Report (RCR)

- Aircraft Performance Section (mandatory)
  - Airport Designator
  - Assessment Date and Time
  - Lower Runway Designator
  - RWYCC per third
  - Coverage per third
  - Depth of contamination per third
  - Contaminant type per third
  - Width for which assessment of RWYCC applies

- Situational Awareness Section (optional)
  - Reduced Runway length
  - Drifting Snow
  - Loose Sand
  - Chemical Treatment
  - Snowbanks on Runway
  - Snowbanks on Taxiway
  - Snowbanks adjacent to Runway
  - Taxiway Conditions
  - Apron Conditions
  - Measured Friction
  - Free-text Remarks

GG EADBZQZX EADNZQZX EADSZQZX
070645 EADDYNYX
SWEA0151 EADD 02170055
SNOWTAM 0151
EADD 02170055 09L 5/5/5 100/100/100 NR/NR/NR WET/WET/WET
EADD 02170135 09R 5/2/2 100/50/75 NR/06/06 WET/SLUSH/SLUSH
EADD 02170225 09C 2/3/1 75/100/100 06/12/12 SLUSH/WET SNOW/WET SNOW 30
RWY 09L SNOWBANK R20 FM CL. RWY 09C ADJ SNOWBANKS. TWY B POOR. APRON NORTH POOR.

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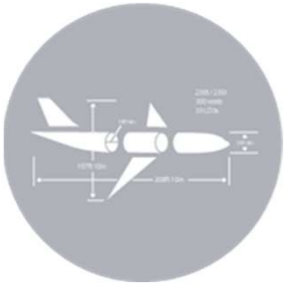
End to End System

Aerodromes



Manufacturers

AIS/ATM

Operators

Common Language

Contaminant Types

Runway Condition Codes

Direct Input to Performance Assessment

Performance Relevance

Depth Thresholds & Temperatures

Significant Changes

Industry Consensus

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RUNWAY CONDITION ASSESSMENT MATRIX (RCAM)			
Assessment criteria		Downgrade assessment criteria	
Runway condition code	Runway surface description	Aeroplane deceleration or directional control observation	Pilot report of runway braking action
6	• DRY	—	—
5	• WET (the runway surface is covered by any visible dampness or water up to and including 3 mm depth)	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD
4		Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM
3	• WET ("slippery wet" runway)	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM
2	***More than 3 mm depth of water:*** • STANDING WATER	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR
1		Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR
0		Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR

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Runway Condition Assessment Matrix (RCAM)

RWYCC

Depth

OAT

Contaminants

Coverage

"Other" Observations

AIREPs

~~Measured Friction~~

Runway condition assessment matrix (RCAM)			
Assessment criteria		Downgrade assessment criteria	
Runway condition code	Runway surface description	Aeroplane deceleration or directional control observation	Pilot report of runway braking action
6	• DRY	---	---
5	• FROST • WET (The runway surface is covered by any visible dampness or water less than 3 mm deep) ***Less than 3 mm depth:*** • SLUSH • DRY SNOW • WET SNOW	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD
4	***-15°C and Lower outside air temperature:*** • COMPACTED SNOW	Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM
3	• WET ("Slippery wet" runway) • DRY SNOW or WET SNOW (Any depth) ON TOP OF COMPACTED SNOW ***3 mm and more depth:*** • DRY SNOW	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is	MEDIUM

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Reportable Contaminants

COMPACTED SNOW
DRY SNOW
DRY SNOW ON TOP OF COMPACTED SNOW
DRY SNOW ON TOP OF ICE
FROST
ICE
SLUSH
STANDING WATER
WATER ON TOP OF COMPACTED SNOW
WET
WET ICE

Layered associated with top contaminant or Less Than Poor

WET SNOW
WET SNOW ON TOP OF COMPACTED SNOW
WET SNOW ON TOP OF ICE
CHEMICALLY TREATED
LOOSE SAND

Situational Awareness

MUD
DUST
SAND
VOLCANIC ASH
OIL
RUBBER

Not in the RCAM

- RCAM covers only conditions with deterministic performance effect
- Other conditions (sanding/chemicals) addressed by down-/upgrade mechanism
  - Driven by Mu / Other observations / AIREPs

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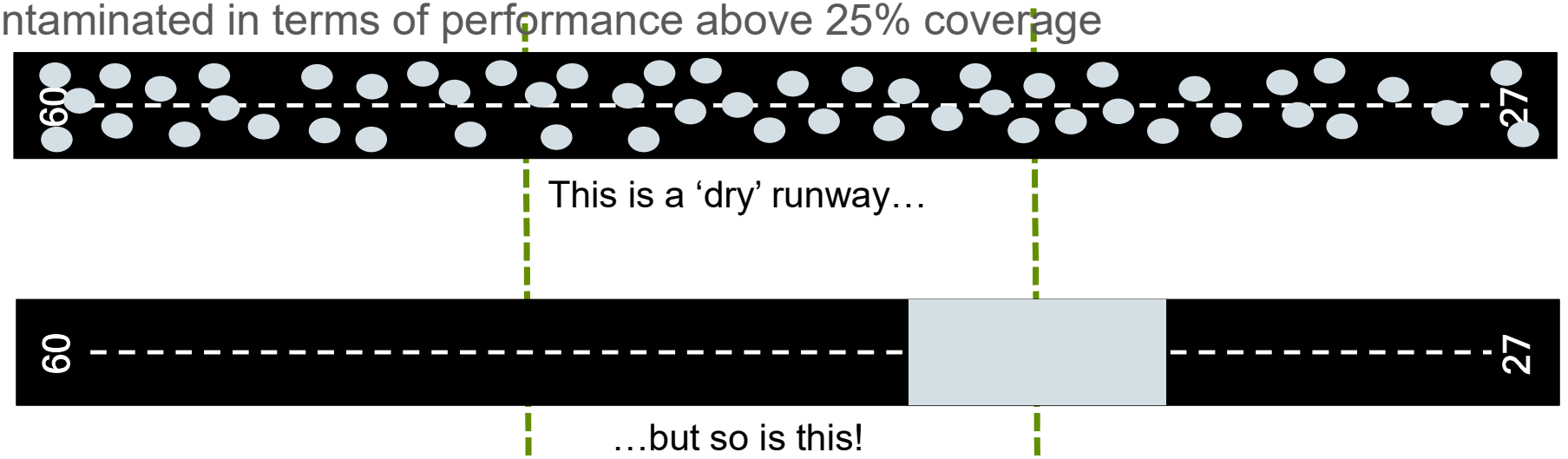
Depth

- Any fluid contaminant below 3mm = WET
  - Well constructed and maintained pavement allows tire to drain fluid from footprint and maintain contact with runway – NO dynamic AQUAPLANING
- Any fluid contaminant above 3mm = CONTAMINATED
  - AQUAPLANING occurs above aquaplaning speed

- Dry Snow and Wet Snow are not fluids
  - Same 3mm depth threshold
  - Below 3mm loose contaminant is compressed into macrotexture allowing contact of tire and runway surface
  - Caution - Some evidence shows that conditions may become slippery even below 3mm

Coverage

- Coverage reported for each third
- Coverage reported as 25% above 10% observed coverage
- Contaminated in terms of performance above 25% coverage

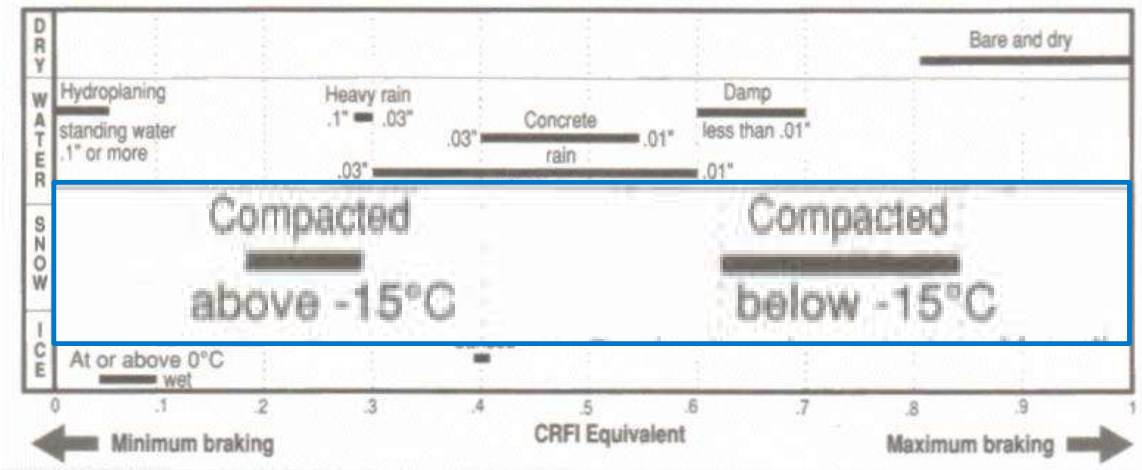


- It has been demonstrated that, if performance calculated for dry condition, regulatory/recommended margins cover concentration of contaminant in worst location

Temperature

Contaminant	Better Braking Action	Worse Braking Action
Compacted Snow	Below -15°C	Above -15°C

- -15°C based historical industry testing
- Probably very conservative



- Braking Action is more closely correlated with surface temperature than with OAT

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Measured Friction

- ICAO provides no friction scale due to poor correlation with aircraft braking action
- CFME used is based on a method approved by the State

Measured coefficient	*Estimated braking action*	*Code*
0.40 and above	Good	5
0.39 to 0.36	Medium to good	4
0.35 to 0.30	Medium	3
0.29 to 0.26	Medium to poor	2
0.25 and below	Poor	1

- Used basically for downgrade
- Upgrade only with significant margins

Differences with Aircraft

Tire Size
Tire Load
Tire Press
Speed
Slip Ratio
Drag

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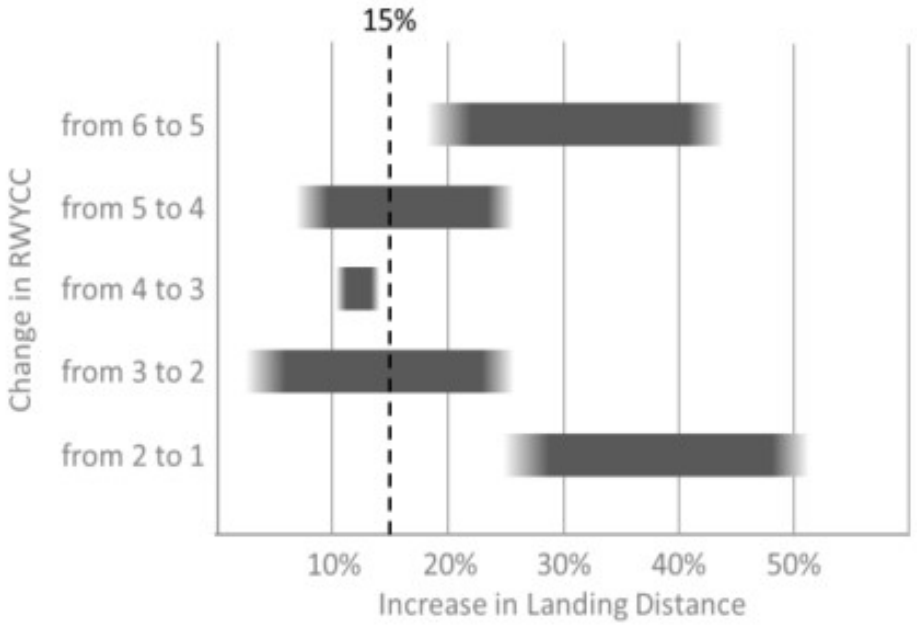
Robustness to Misreported RWYCC

- Pilots are encouraged to apply 15% distance margin to distance assessment at time of arrival
- Computation not systematically robust to optimistic classification by 1 RWYCC

- Particular attention required for transition
  - Dry to Wet (6 to 5)
  - Wet to Standing water (5 to 2)
  - To Poor or Less Than Poor (1 or 0)



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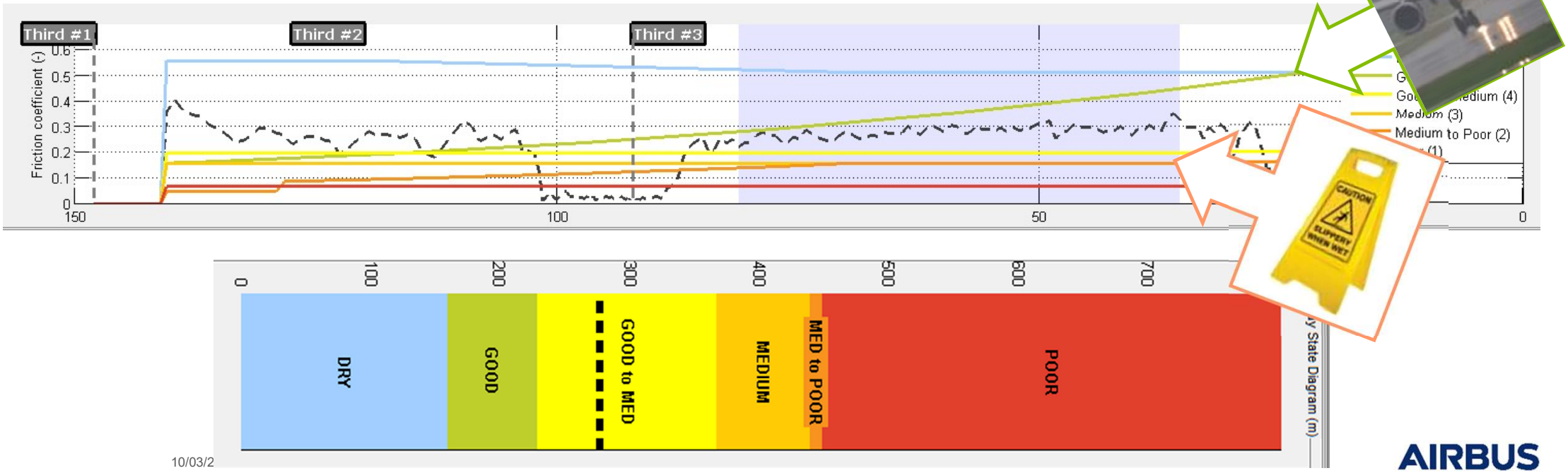
Transition Damp to Wet to Slippery Wet

- Why is “Damp” now “Wet”? An example…
  - Airbus A320 & A350 Flight Tests on runway at commercial airport in France
  - Light to Medium Rain, Runway reported Damp
  - Runway surface fulfills new construction criteria according to CFME
  - Aircraft data identifies substandard surface



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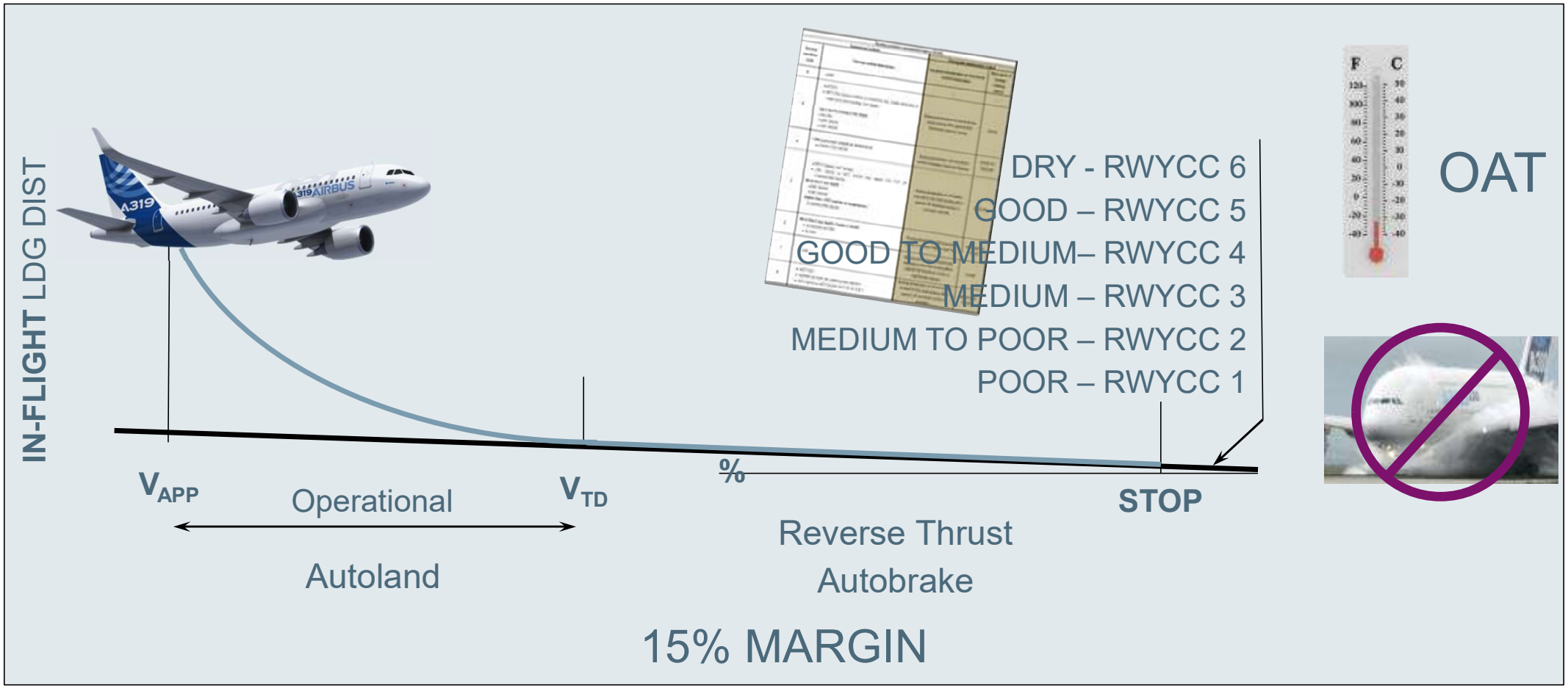
Performance at Time of Landing



Runway Condition Code (RWYCC) – Direct Input to Computation

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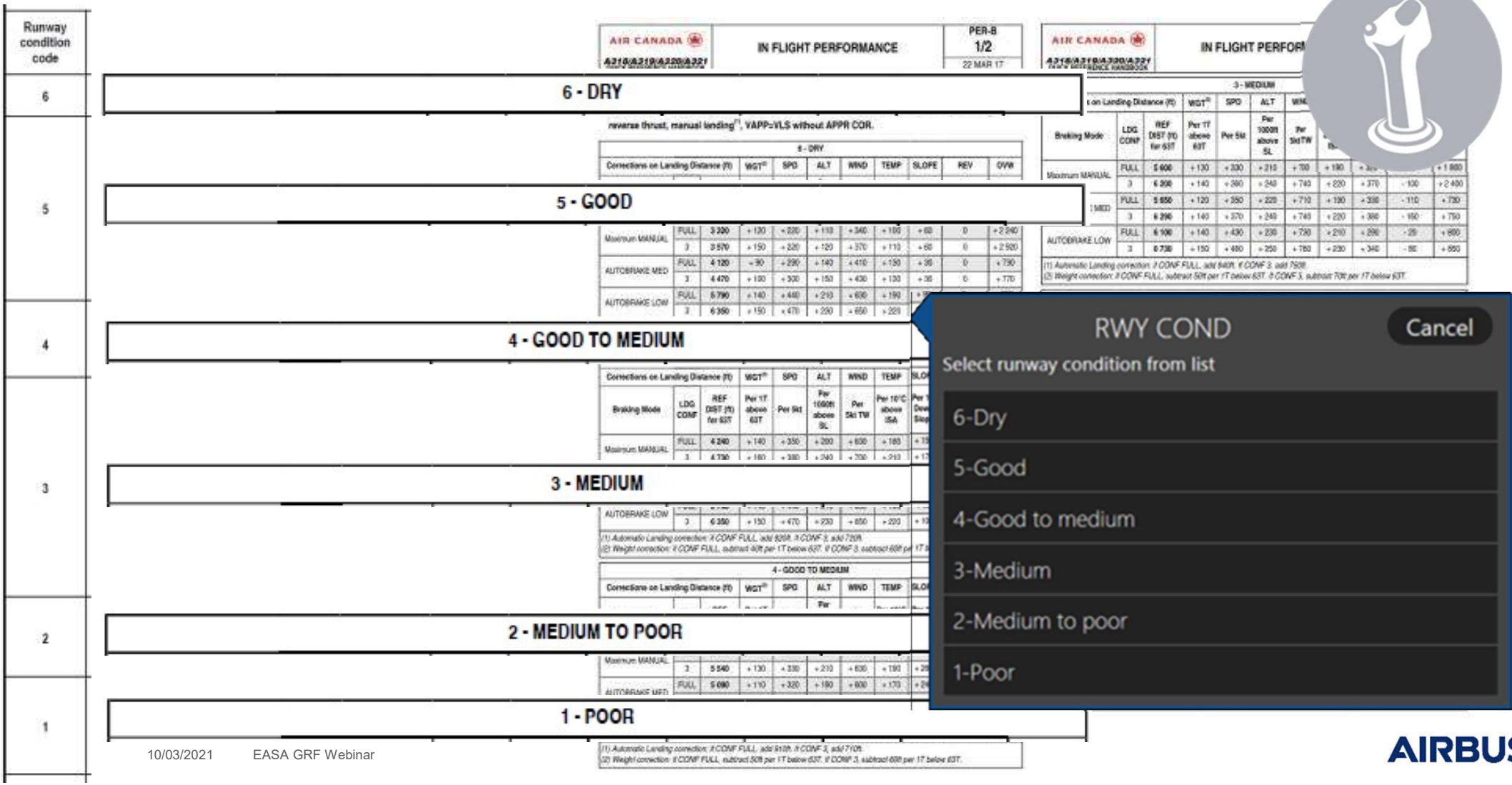

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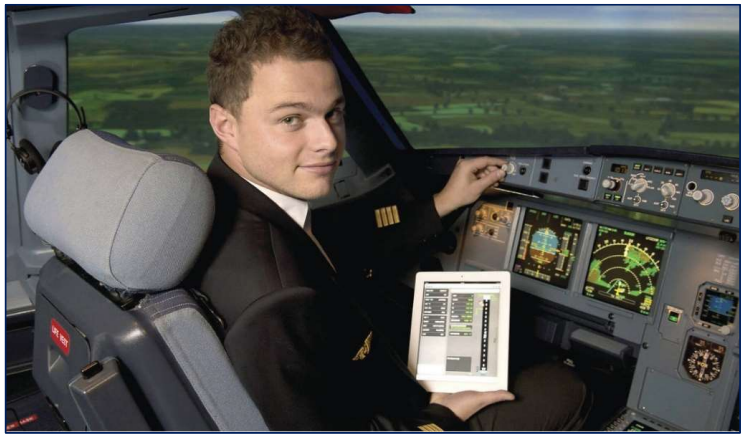
Impact on Dispatch

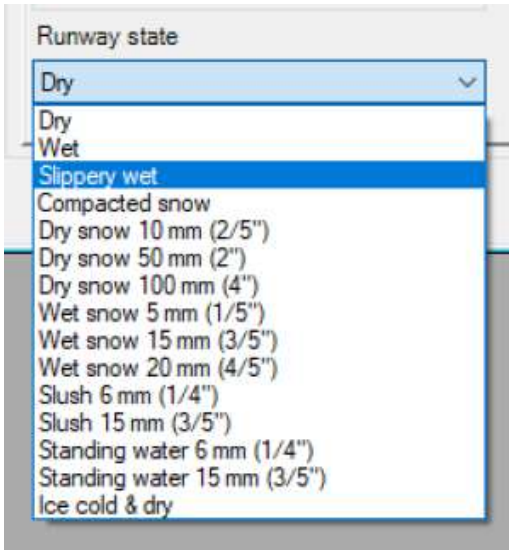
- Nominally, dispatch is unchanged
- Dry runway dispatch distances systematically longer than LDTA
- Wet runway also, if reverse thrust is available
- Contaminated runway dispatch distances by construction shorter than LDTA
- EASA rules give exemptions for Dry and Wet (grooved/PFC)
  - Computation only in case of changes
    - Runway
    - Weather/Surface condition
    - Failures with performance impact
- Systematic approach
  - Crosscheck Dispatch with LDTA before every flight
  - Calculate in-flight only in case of changes



Impact on Takeoff

- Takeoff performance for contaminated surfaces
  - Available in line with EASA AMC 25.1591
  - Some RCAM contaminant types missing
  - Downgraded RWYCC in combination with fluid contaminants problematic

- Industry working on operational solutions
  - Double input of Contaminant Type and Depth + RWYCC
  - Recommendation to provide downgraded performance



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Benefits for Operators

- Harmonized Global Standard
- Easier to understand than current SNOWTAM
- Direct Relation to Operational Procedures and Performance
- Improved Reporting Relevance and Timeliness
- Better situation awareness for Pilots
- Same information on RCR/SNOWTAM, ATIS, ATC
- AIREPs for continuous observation of changes

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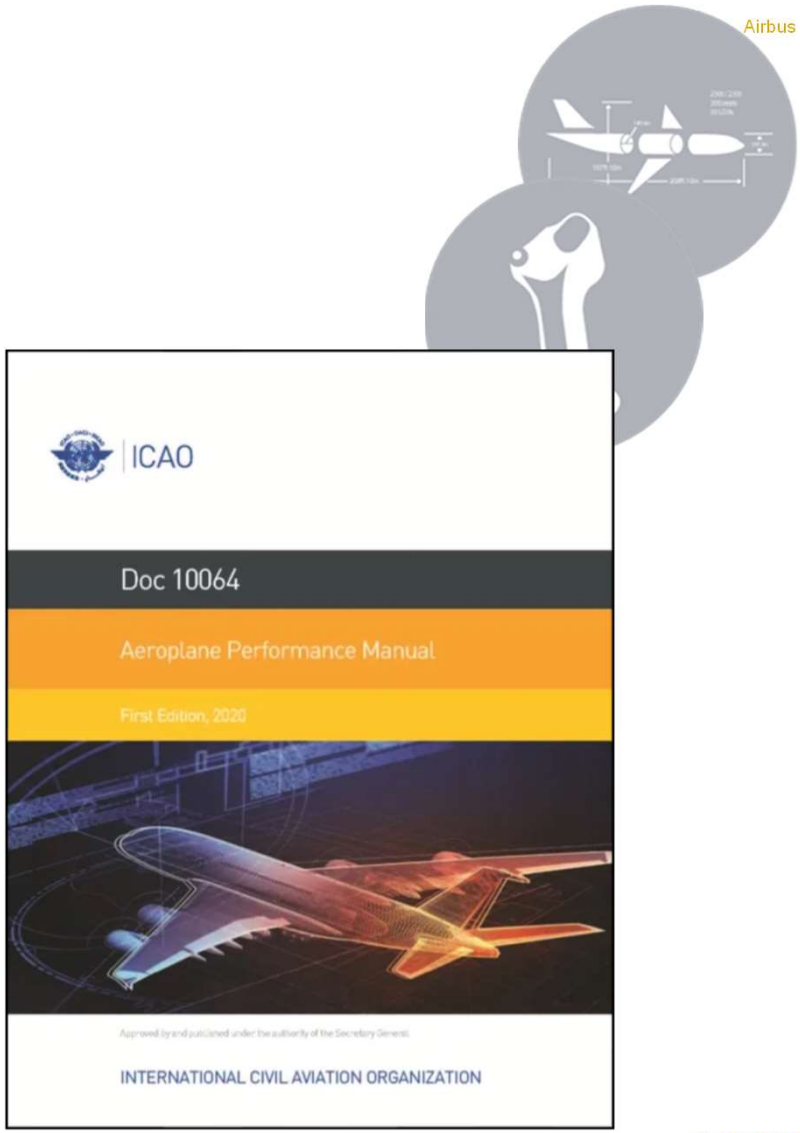
Aeroplane Performance Manual

- Introduction to Operations on Contaminated Runways
- 4 Flight-Phase oriented Chapters
  - Take-off
  - En-Route
  - Landing
  - Missed Approach

- **Clear Focus on GRF**

- Other information considered as non-controversial
- Based on existing national guidance and practices

- Now available on ICAO Store



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Thank you!

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