

# **Runway Friction:** **The Airport Perspective**

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# The Airport Perspective

- Why friction is important.
- Different measurement objectives.
- Limitations of the CFME equipment.
- Regulatory standards.
- Can a wet runway be dry?
- Interoperability with the cockpit.
- What do we need tomorrow?

# What does runway friction mean to the Airport operator?

- Assurance that the pavement surface characteristics provide a friction level that meets the performance requirements for aircraft braking.
- Inadequate friction is a potential key ingredient for runway excursion risk,

**To avoid this...**

**So, it's all about SAFETY.**



# Friction Management Objectives

## ➤ 1. Engineering; or Functional:

- Monitoring and Maintenance of surface characteristics.
- Surface wear and smoothing of aggregates.
- Micro-texture – the Mu value.
- Rubber contamination.

## ➤ 2. Operational:

- Tactical decision making for real time changes.
- Adverse weather – rapidly changing conditions and status.
- Water contamination – heavy rain, thunderstorms.
- Winter contaminants – snow, slush, ice.



# The British Winter!



# The British Winter!

- Wet snow or slush most typical.
- CFME not capable of friction measurement.
- Temperature usually close to 0°C.
- High risk of sudden freezing if not cleared.
- Hence, we tend not to operate with snow contaminated runways.
- Clear and treated with anti-ice agent.

# Limitations

- CFME not permitted for obtaining readings on contaminated runways because drag on measuring wheels and other factors cause readings to be unreliable. (UK CAA)
- = Wet snow, slush and water. Most common form of contamination in UK.
- So, precisely in the conditions that friction readings are most necessary!



# Limitations

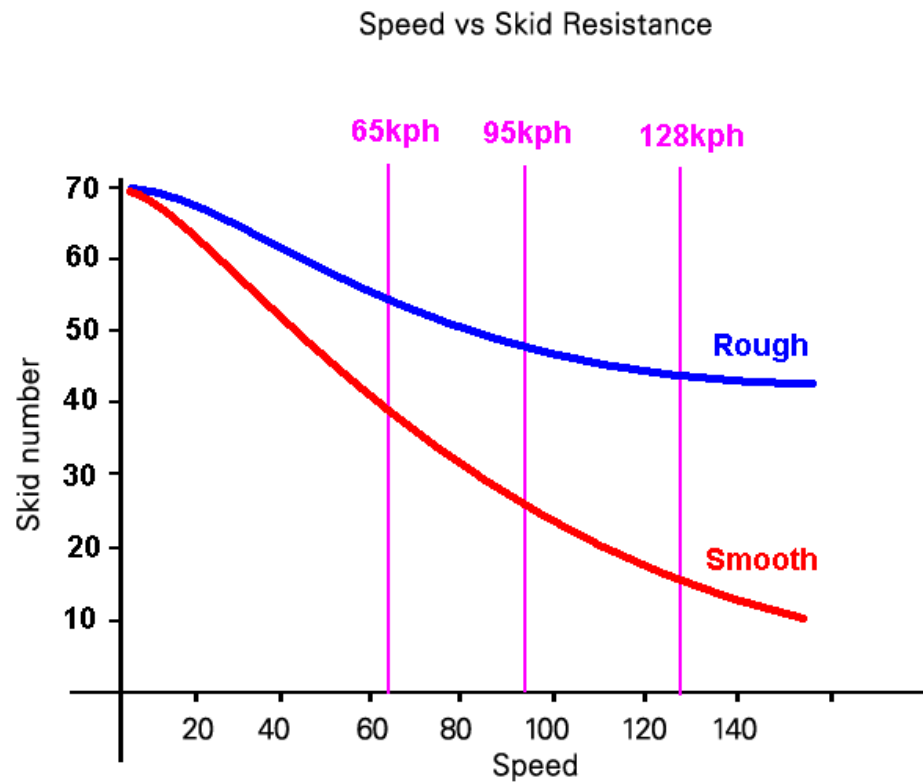
- Friction value readings must not be passed to pilots as there are no means to interpret the readings for the purpose of calculating take-off or landing performance. (UK CAA)
- Again, a big gap in joining up the essential safety information!

# MAN – Grip Tester



- Two different chassis variants but Mu criteria are the same?
- Even the manufacturer is unable to repeat accuracy of measurements with the same item of equipment.
- Concern over accuracy of values produced but OK for monitoring wear.

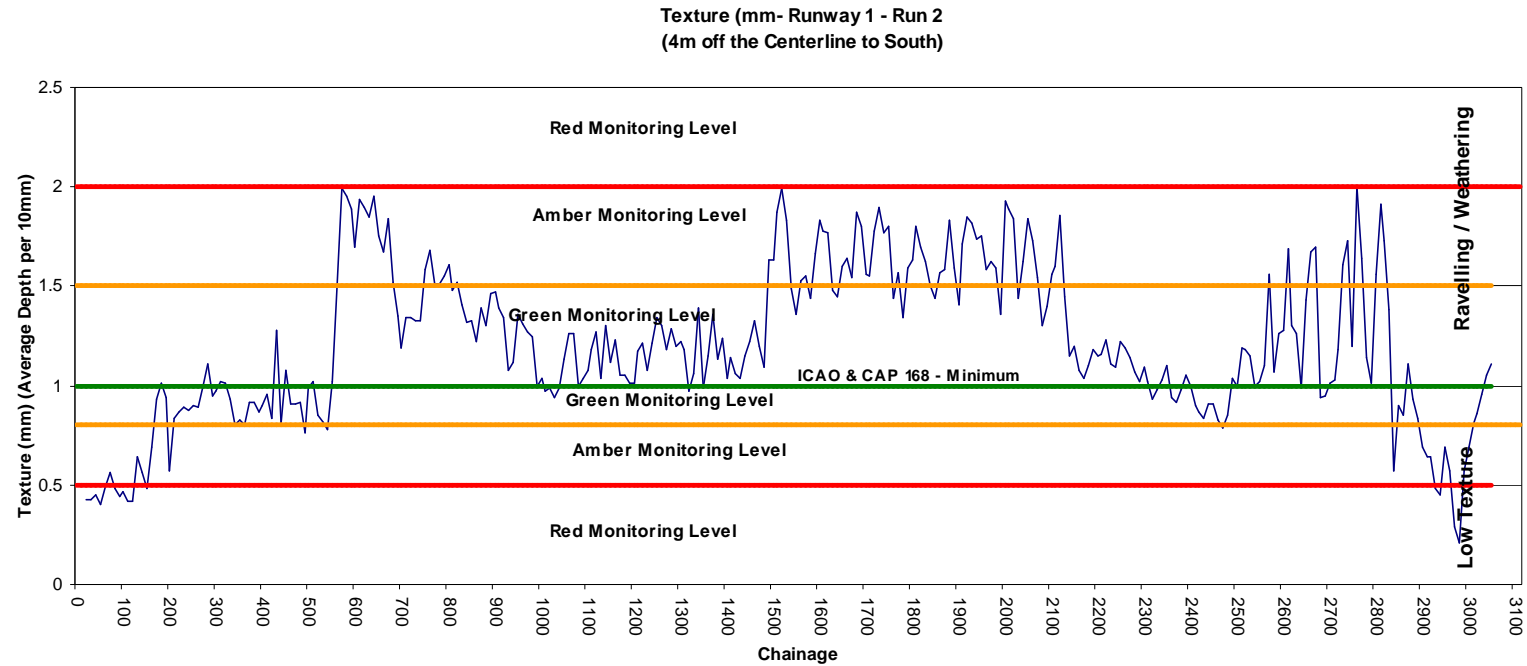
# Many variables – speed...



# Other Technology - Radar?



# Texture Measurement



Looks good, but has no empirical datum (yet?).

# Regulatory Standards - Vary

|                         | Speed | Water<br>Depth | DOL  | MPL  | MFL  |
|-------------------------|-------|----------------|------|------|------|
| Grip Tester<br>CAA (UK) | 65kph | 0.25 mm        | 0.80 | 0.63 | 0.55 |
| Grip Tester<br>ICAO     | 65kph | 1.00 mm        | 0.74 | 0.53 | 0.43 |



# Regulatory Standards - Vary

|                  | Speed | Water<br>Depth | DOL  | MPL  | MFL  |
|------------------|-------|----------------|------|------|------|
| ASFT<br>CAA (UK) | 65kph | 1.00 mm        | 0.74 | 0.47 | 0.34 |
| ASFT<br>ICAO     | 65kph | 1.00 mm        | 0.82 | 0.60 | 0.50 |

# Moisture – Wet or Dry?!

- EU-OPS 1: 'Dry runway' means a runway which is neither wet nor contaminated, and *includes* those paved runways which have been specially prepared with grooves or porous pavement and maintained to retain 'effectively dry' braking action even when moisture is present.

# EU-OPS – EASA Challenge

- Not dry, or wet, or contaminated = damp in ICAO Annex 14 terminology. “Moisture” is not defined in ICAO.
- Methods of “special preparation” do not take into account engineering specification such as defined mean texture depth, PSV etc.
- Need proper definition of criteria for “maintained to retain effectively dry braking action” when “*damp*” (moist)?

# Maintained and Functional....





# Still Functional?



# Airline understanding & interface

- Never approached for data to substantiate “effectively dry” level of maintained surface by airlines. How are they using allowance?
- Assumption that effectively dry criteria are the same as being above Minimum Friction Level? Not defined so Airports don’t know.
- When operating with “Slippery When Wet” conditions, poor understanding from airlines. Confusion with Snow and Ice table...?



# What do Airport Operators want?

- Clear regulatory requirement with defined safety objectives.
- Requirements that are scientifically meaningful to aircraft performance.
- Clear direct relationship between what can be measured and what can be written into the aircraft flight manual.
- Pilots to be properly informed by data given.
- One international standard.

# Thank You