Implementation – Airspace user views

Practical implementation steps before application of the Global Reporting Format

Capt John A. Lande, ICAO GRF2019 March 27th 2019

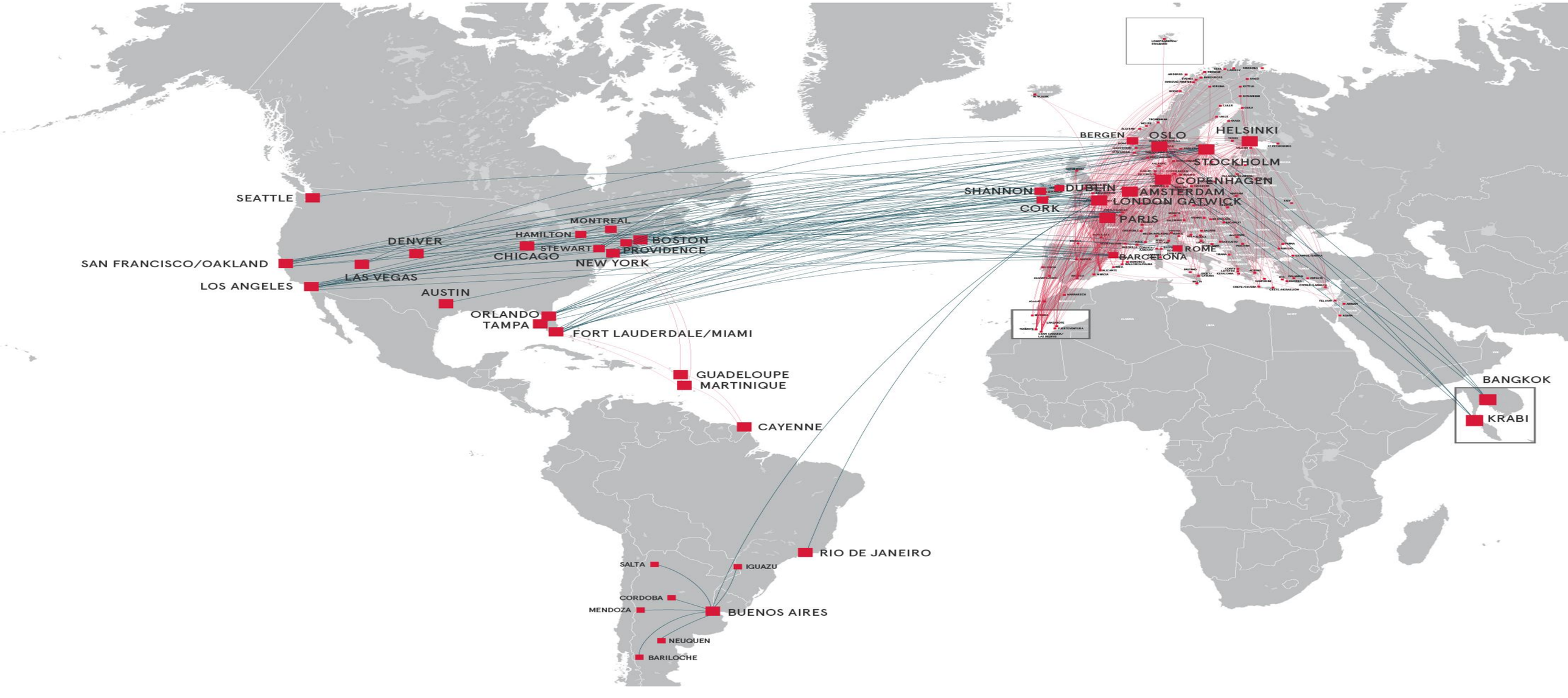
Facts about Norwegian

- →World’s 5th largest low-cost carrier
- →Third largest low-cost carrier in Europe
- →11,000 employees
- →Carried 37 million passengers in 2018
- →One of the world’s fastest growing airlines
- →We believe in affordable fares for all

Our fleet

- One of the youngest and greenest fleets in the world with an average age of 3.8 years
- A fleet of 164 aircraft
  - 25 B787-9
  - 8 B787-8
  - 113 B737-800WSFP1
  - 18 B737- 8 MAX
- Norwegian has around 220 aircraft on order

Our Destinations; 500+ routes to 150+ destinations



Originating from Norway…

- We have extensive experience in operating on contaminated runways.
- Many of our northern destinations have stable winter conditions over a long period of time.
- From 1st Oct 2018 to 14th Mar 2019 our **B737 fleet** made 97794 landings in all, of which **20.6%** where on non-dry & non-wet runway surfaces.
- **93%** of non-dry & non-wet landings where in Scandinavia and Finland.
- **52%** of non-dry & non-wet landings where in Norway alone.
- The numbers are based on pilot reports from the aircraft EFB.
  - Pilots are requested to report experienced braking action and the airport reported braking action in their mandatory landing report.

From an operator’s perspective

→The new GRF will impact our operation!!

→However, we welcome the changes and appreciate the work done by ICAO to standardize the reporting format globally.

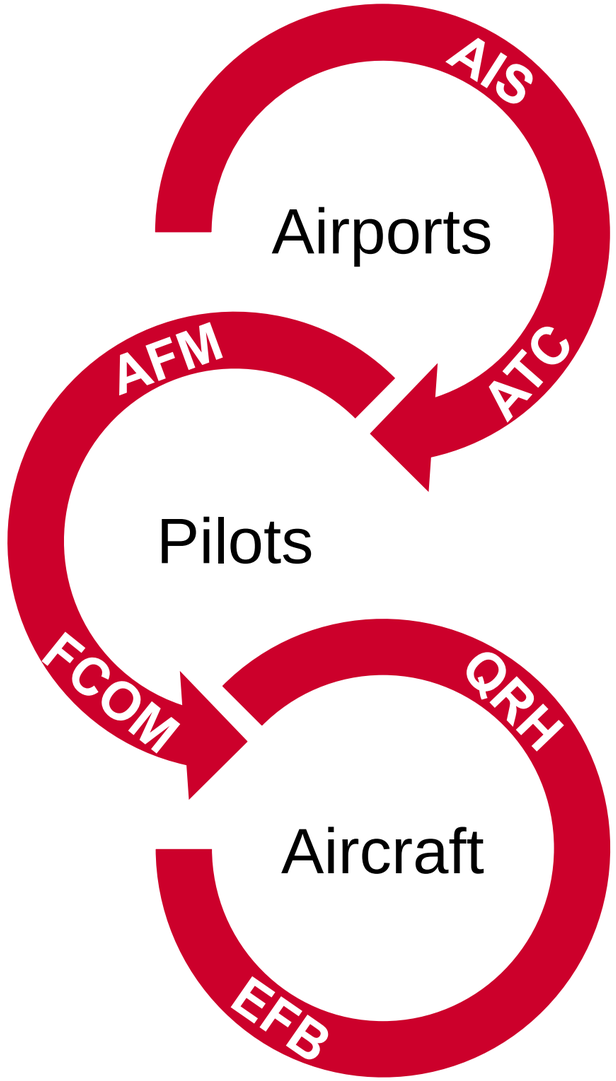
→The key words are standardization and harmonization.

Although I am representing Norwegian Air today…

→…all European airlines face the same challenges.

→The following has been reviewed and agreed with by the following airlines;

Main stakeholders



- **Airport operators** evaluate the runway condition.
- They are the pilots eyes on the ground.
- **The pilots** receive the RWYCC and consult their aircraft manuals.
- The **aircraft manufacturers** provide performance information iaw GRF / TALPA.
- Information chain; **AIS, ATC**.
- Overseen by the **Regulators**.

To make this work, all stakeholders must be on the «same frequency»

- We need to talk the same language and have a common goal;
  - Safe aircraft operation.

- That is the strength of the RCAM, which will be the heart of the GRF.
  - A common starting point.

- The reporters need to know **WHY** they are reporting and **HOW** the reports will be used.
  - Not just to fulfill a requirement, but knowing there are actually recipients that are going to use the information.

- **THIS MEANS TRAINING! …and time is short(!)**

Main changes

- **From an (EASA) Pilot's point of view;**
  - The main change will be the abandon of the Measured Friction Coefficient reports.
  - We are familiar with the ICAO SNOWTAM format, and the SNOWTAM codes.
  - We know that the current SNOWTAM codes are based on Measured Friction Coefficient Values.
  - The SNOWTAM CODES will be re-named RWYCC and will be based on the RCAM.

The challenge…

- The friction “numbers”, with two decimals, have been with us for more than 50 years, and are perceived as scientific values by pilots.
  - Norway stopped giving measured friction values more than 10 years ago, and went through the transition that the rest of you will experience after 2020.

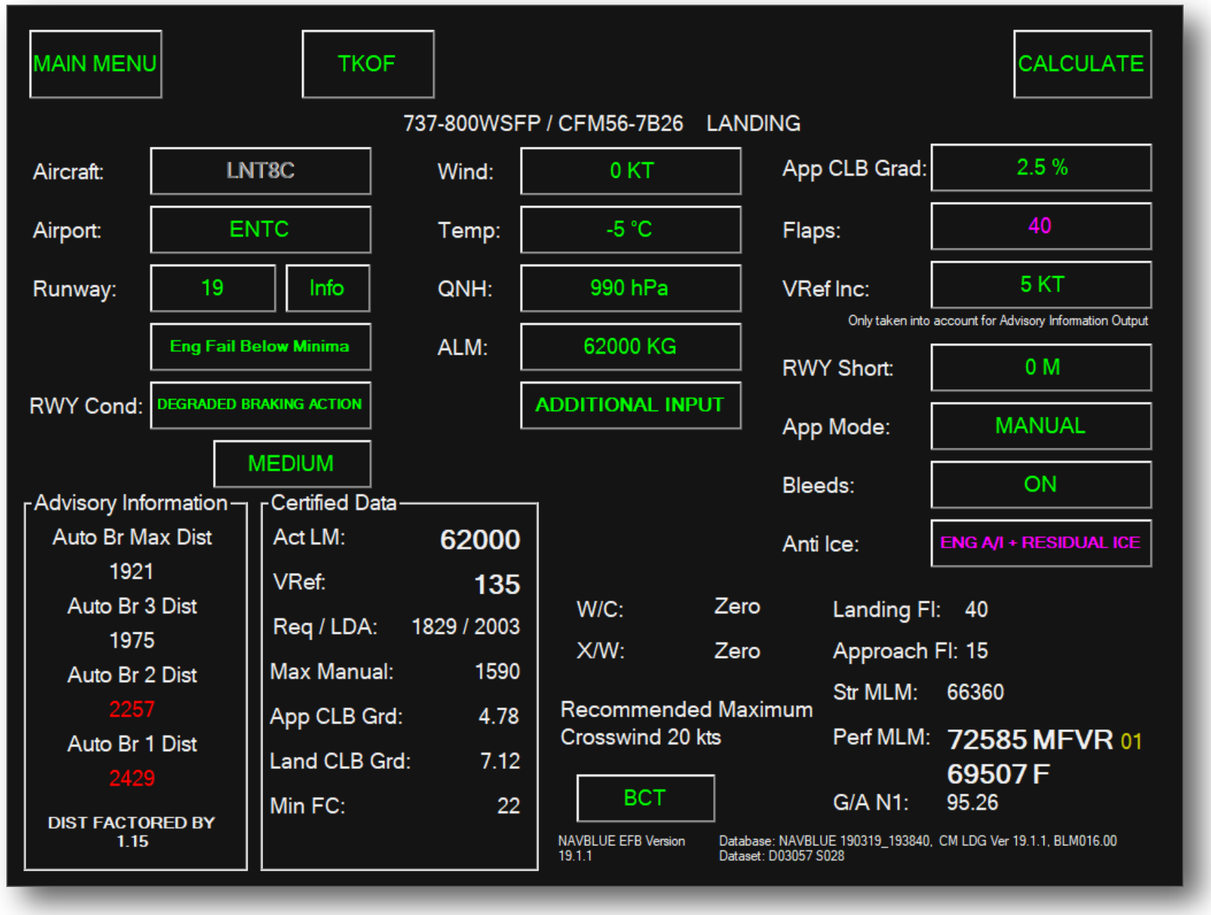
- Pilots will still ask for the “numbers”.

- *“How can I know what friction to expect if I do not get any numbers?”*

- *“Can I have them anyway? I know you have them!”*

Pilots…

- Still have to perform dispatch calculations prior to departure.
- Still have to do “at the time of arrival” assessments.
- EASA operators still need to dispatch to a contaminated runway, not only DRY/WET.
- No change in HOW you do it, but the results might be different.

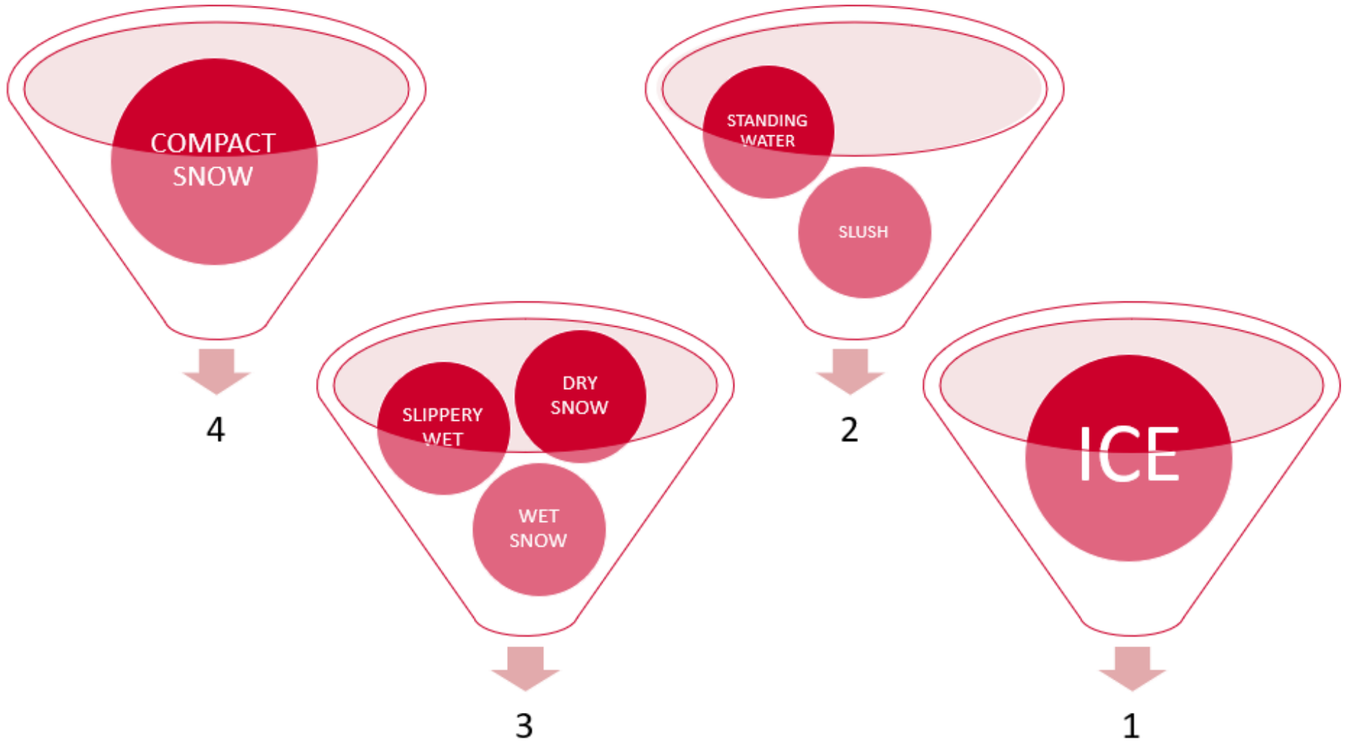


Pilots…

- Need to know that there is a difference in the two calculations, and that the results can differ for the same conditions.

- At the time of departure calculation.
  - No changes visible for pilots.

- At the time of arrival calculation.
  - Revised wheel braking μ
  - Adjusted flare distance
  - Factored calculated distance



Pilots…

- Also need to be familiar with the Runway Condition Assessment Matrix.
- They need to be familiar with the assessment criteria.
- However, the RWYCC may not fit the runway surface description.

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	*-15ºC 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 • WET SNOW *Higher than -15ºC outside air temperature[1]:* • COMPACTED SNOW	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM
2	*3 mm and more depth of water or slush:* • STANDING WATER • SLUSH	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR
1	• ICE [2]	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR
0	• WET ICE [2] • WATER ON TOP OF COMPACTED SNOW [2] • DRY SNOW or WET SNOW ON TOP OF ICE [2]	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR

Pilots…

- The RWYCC may have been subject to upgrade or downgrade.
- The table cannot always be read horizontally.
- This could be reflected in the Situational Awareness section of the GRF.

Runway condition description	Runway condition code (RWYCC)
DRY	**6**
FROST **WET** (The runway surface is covered by any visible dampness or water less than 3 mm deep. **SLUSH** (less than 3 mm depth) **DRY SNOW** (less than 3 mm depth) **WET SNOW** (less than 3 mm depth)	**5**
COMPACTED SNOW (Minus 15°C and lower outside air temperature)	**4**
WET ("Slippery wet" runway) **DRY SNOW** (3 mm and more depth) **WET SNOW** (3 mm and more depth) **DRY SNOW ON TOP OF COMPACTED SNOW** (Any depth) **WET SNOW ON TOP OF COMPACTED SNOW** (Any depth) **COMPACTED SNOW** (Higher than minus 15°C outside air temperature)	**3**
STANDING WATER (Water of depth equal to or greater than 3 mm. **SLUSH** (3 mm and more depth)	**2**
ICE	**1**
WET ICE **WATER ON TOP OF COMPACTED SNOW** **DRY SNOW OR WET SNOW ON TOP OF ICE**	**0**

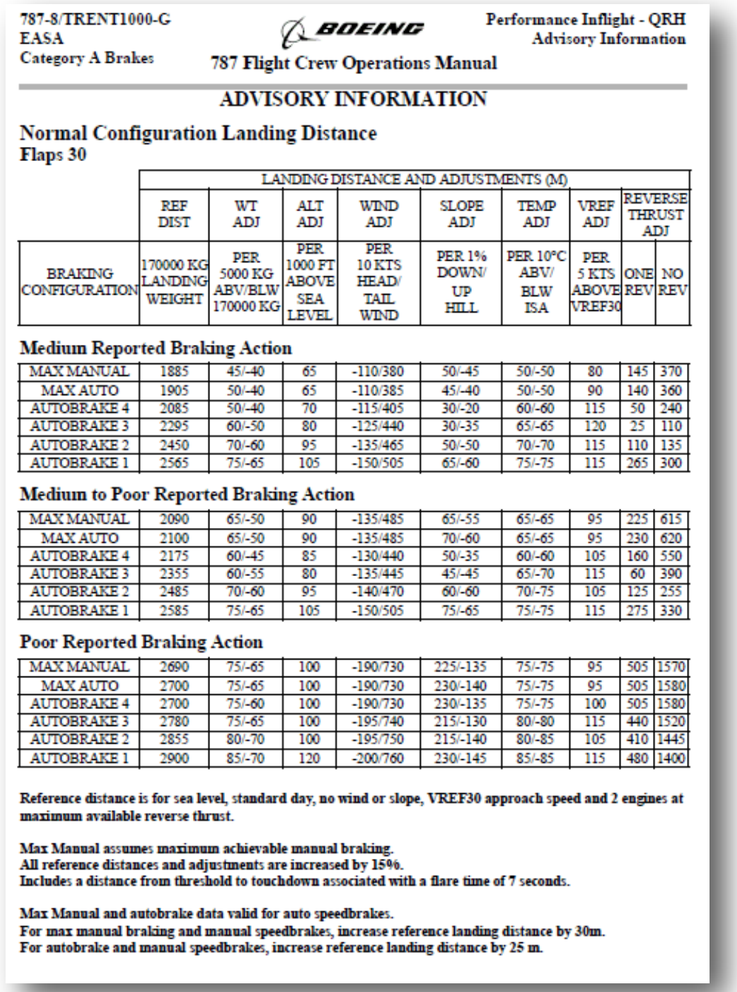
Pilots…

- Be stabilized!!

- Based on the result of the calculations, where on the runway will the aircraft stop?
  - Longer/Shorter?
  - Friction limited?
  - Give feedback!
  - Situational Awareness!

Aircraft manufacturers…

- Need to update their performance information iaw the new GRF.
- When a pilot receives a RWYCC he will translate this into a Braking Action that he is familiar with.
- He will then consult his manuals or electronic support tools (EFBs, Performance tools etc.).



787-8/TRENT1000-G
EASA
Category A Brakes

BOEING

Performance Inflight - QRH
Advisory Information

787 Flight Crew Operations Manual

ADVISORY INFORMATION

Normal Configuration Landing Distance
Flaps 30

	LANDING DISTANCE AND ADJUSTMENTS (M)								
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ	SLOPE ADJ	TEMP ADJ	VREF ADJ	REVERSE THRUST ADJ	
BRAKING CONFIGURATION	170000 KG LANDING WEIGHT	PER 5000 KG ABV/BLW 170000 KG	PER 1000 FT ABOVE SEA LEVEL	PER 10 KTS HEAD/ TAIL WIND	PER 1% DOWN/ UP HILL	PER 10°C ABV/ BLW ISA	PER 5 KTS ABOVE VREF30	ONE REV	NO REV
Medium Reported Braking Action									
MAX MANUAL	1885	45/-40	65	-110/380	50/-45	50/-50	80	145	370
MAX AUTO	1905	50/-40	65	-110/385	45/-40	50/-50	90	140	360
AUTOBRAKE 4	2085	50/-40	70	-115/405	30/-20	60/-60	115	50	240
AUTOBRAKE 3	2295	60/-50	80	-125/440	30/-35	65/-65	120	25	110
AUTOBRAKE 2	2450	70/-60	95	-135/465	50/-50	70/-70	115	110	135
AUTOBRAKE 1	2565	75/-65	105	-150/505	65/-60	75/-75	115	265	300
Medium to Poor Reported Braking Action									
MAX MANUAL	2090	65/-50	90	-135/485	65/-55	65/-65	95	225	615
MAX AUTO	2100	65/-50	90	-135/485	70/-60	65/-65	95	230	620
AUTOBRAKE 4	2175	60/-45	85	-130/440	50/-35	60/-60	105	160	550
AUTOBRAKE 3	2355	60/-55	80	-135/445	45/-45	65/-70	115	60	390
AUTOBRAKE 2	2485	70/-60	95	-140/470	60/-60	70/-75	105	125	255
AUTOBRAKE 1	2585	75/-65	105	-150/505	75/-65	75/-75	115	275	330
Poor Reported Braking Action									
MAX MANUAL	2690	75/-65	100	-190/730	225/-135	75/-75	95	505	1570
MAX AUTO	2700	75/-65	100	-190/730	230/-140	75/-75	95	505	1580
AUTOBRAKE 4	2700	75/-60	100	-190/730	230/-135	75/-75	100	505	1580
AUTOBRAKE 3	2780	75/-65	100	-195/740	215/-130	80/-80	115	440	1520
AUTOBRAKE 2	2855	80/-70	100	-195/750	215/-140	80/-85	105	410	1445
AUTOBRAKE 1	2900	85/-70	120	-200/760	230/-145	85/-85	115	480	1400

Reference distance is for sea level, standard day, no wind or slope, VREF30 approach speed and 2 engines at maximum available reverse thrust.

Max Manual assumes maximum achievable manual braking.
All reference distances and adjustments are increased by 15%.
Includes a distance from threshold to touchdown associated with a flare time of 7 seconds.

Max Manual and autobrake data valid for auto speedbrakes.
For max manual braking and manual speedbrakes, increase reference landing distance by 30m.
For autobrake and manual speedbrakes, increase reference landing distance by 25 m.

Airport operators

- Will be the Pilot’s eyes on the ground.
- Part of the responsibility is shifted from the cockpit to the ground.
- **To achieve this training is vital.**
- Authorization is expensive and it takes time.

Airport operators

- The RCAM will form the basis.
- A proper **trained** and **competent** airport operator must be able to upgrade and downgrade.
- Supporting tools can be different ways of treating the runway, friction measuring equipment or other innovations like airborne or ground based “runway surveillance equipment” .

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DRY	**6**
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Airport operators

- In Norway, the State owned aerodrome operator has developed a self-imposed training program.
- All the personnel performing runway state reporting have been through a comprehensive training program.
- The training program ends with both a written and a practical test.
- The authorization is then valid for 4 years.

Airport operators

- Norway reports estimated friction instead of measured friction.
- The quality of the reports have increased every winter season.
- We definitely see the need of a competent runway condition reporter.
- We also see the need of further development of supporting tools to help the evaluation process.

The new format may cause some challenges

RWYCC Depth Coverage Condition

Aircraft Performance →
Situational Awareness →

ENAT 03010650 11 **3/3/3** 25/25/25 // ICE/ICE/ICE
RWY 11 ADJACENT SNOWBANKS. FROZEN SAND APPLIED.

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>>> ENAT (ALTA RWY 11/29) <<<

METAR 010650Z 19006KT CAVOK M07/M12 Q1013 RMK WIND 700FT 17011KT

TAF 010500Z 0106/0115 19008KT 9999 FEW080


SWEN0287 ENAT 03010709
(SNOWTAM 0287
A) ENAT
B) 03010709 C) 11
F) 7/7/7 G) XX/XX/XX H) 5/5/5
N) B/789  ALL REMAINING TWYS/79
R) APRON CENTER APRON EAST APRON GA EAST APRON GA
WEST APRON WEST/789  ALL REMAINING APRONS/79
T) CONTAMINATION/10/25/25/PERCENT.
FROZEN SAND APPLIED.
SLIPPERY PORTIONS ON TAXIWAYS. SLIPPERY PORTIONS
ON APRONS.
)


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FROZEN SAND

- Norway has used a method of applying warm sand (frozen sand) on the runway.
- Heated pre-wetted sand is spread on an icy surface when runway temperature is sub-zero.
- The sand will be fixed to the runway and creates a sandpaper like surface.
- This has proved to be very effective.

From an operator’s perspective

- When converting to the new Runway Condition Report, it is not acceptable to lower the quality of the service given.

- The regulations must account for future innovations/methods that can assure an equivalent level of safety .

Thank you for your attention!