MARWIS "Efficient TALPA Workflow With Mobile Runway Weather Sensors" Held by Eric Cottone





Short Company Introduction – G.Lufft GmbH

Innovative Sensor Manufacturer with Experience of more than 135 years!

- Founded 1881 from Gotthilf Lufft
- Long History in environmental and climatological measurement equipment
- Today innovative sensor manufacturer in the fields of meteorology and weather critical operations (WCO)





"Efficient TALPA Reporting"





A Threat to Aviation Safety

Excursions due to contaminated runways are among the most reported accidents!





2008 - TALPA ARC was formed to develop a way to standardize runway condition reporting by changing from subjective judgements to objective assessment of conditions.



10/1/2016- TALPA Initiative went live for FAA regulated airports

Standardizes runway condition reporting using the "RCAM" and "RwyCCs"

Restricts the use of Mu values

Designed to remove subjectivity from condition reporting and aligns runway condition expectations with expected braking of aircraft



ICAO partner airports are well underway in implementing TALPA reporting.

Canadian, Japanese, Scandinavian, British, Italian airports



Runway Condition Assessment Matrix (RCAM)

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TABLE 1-1, OPERATIONAL RUNWAY CONDITION ASSESSMENT MATRIX

	(RCAM) BRAKING ACTION CODES AND DEFINITIONS					
Generating RwyCCs requires	Assessment Criteria	Control/Braking Assessment Criteria				
contaminants on the runway for	Runway Condition Description	RwyCC	Deceleration or Directional Control Observation	Pilot Reported Braking Action		
each third	• Dry	6				
	Frost Wet (Includes damp and 1/8 inch depth or less of water) 1/8 inch (3mm) depth or less of: Slush Dry Snow Wet Snow	5	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	Good		
What you need to know	-15°C and Colder outside air temperature: • Compacted Snow	4	Braking deceleration OR directional control is between Good and Medium.	Good to Medium		
 Contaminant type Contaminant depth to 3mm Air temperature 	Slippery When Wet (wet runway) Dry Snow or Wet Snow (any depth) over Compacted Snow Greater than 1/8 inch (3 mm) depth of: Dry Snow Wet Snow Warmer than -15°C outside air temperature: Compacted Snow	3	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	Medium		
Reported to the pilot through	Greater than 1/8 inch(3 mm) depth of: • Water • Slush	2	Braking deceleration OR directional control is between Medium and Poor.	Medium to Poor		
NOTAM Manager via a FICON	• loe	1	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	Poor		
	Wet loe Slush over loe Water over Compacted Snow Dry Snow or Wet Snow over loe	0	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	Nil		

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FICON

FICON before 10/1/2016 "FICON 2IN DRY SN OBSERVED AT 1601010139. 1601010151-1601020145" along with Mu values as "TAP MU 29/27/29 OBSERVED AT 1601010139. 1601010151-1601020145

FICON after 10/1/2016 DEN RWY 17R FICON (5/5/3) 25 PRCT 1/8 IN DRY SN, 25 PRCT 1/8 IN DRY SN, 50 PRCT 2 IN DRY SN OBSERVED AT 1601010139. 1601010151-1601020145

How can we objectively measure contaminants?



MARWIS: Mobile Runway Weather Sensor





MARWIS: Measurement Parameters

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AMBIENT TEMPERATURE

- Measurement range: -40°C...60°C
- Resolution: 0.1°C



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ROAD CONDITION

· Dry, damp, wet, ice, snow/ice, critically /chemically wet

ROAD SURFACE TEMPERATURE

- · Principle: Pyrometer
- Measurement range: -40°C...70°C
- Accuracy: +/- 0.8°C@0°C
- Resolution: 0.1°C
- · Sampling rate: 10Hz

WATER FILM HEIGHT

- Measurement range: 0...6000 µm
- Resolution: 0,1 µm
- · Sampling rate: 100Hz







MARWIS: Measurement Parameters



DEW POINT TEMPERATURE

- Measurement range: -50°C...60°C
- Accuracy: +/- 1.5°C (0...35°C)



FRICTION

- Measurement range: 0 ... 1 (smooth ... dry)
- Sampling rate: 100Hz

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RELATIVE HUMIDITY

- Measurement range: 0...100%
- Sampling rate: 10Hz

ICE PERCENTAGE

- Measurement range: 0...100%
- Sampling rate: 100Hz







Setups for MARWIS on Patrol Car

MARWIS as Decision Support on Patrol & Runway Cars





Setups for MARWIS on Patrol Car (I)





Setups for MARWIS on Patrol Car (II)

 \rightarrow Without display in vehicle





Examples for (Central Server) Monitoring Solutions



Mobile display on iOS/Android device (Tablet / Smartphone)





Monitoring Solution ViewMondo for central server / user interface





Monitoring Solution ViewMondo for central server / user interface





Performing a Measurement Drive

Runways are defined in ViewMondo during a one time setup





TALPA Workflow in ViewMondo

The TALPA workflow module simplifies data collection and reporting for TALPA



A				В			С			
		worst	avg/modal	best	worst	avg/modal	best	worst	avg/modal	best
Ambient Temperature	°C									
Humidity on Road Surface	%	83.55	90.44	96.16	82.87	90.33	96.23	82.44	90.13	97.33
Dew Point	°C	-2.98	-2.19	-1.79	-3.17	-2.27	-1.81	-3.24	-2.36	-1.68
Surface Temperature	°C	-1.89	-0.82	-0.23	-1.45	-0.87	-0.35	-1.48	-0.94	-0.39
Road Condition Lufft	logic	ice (3)	chem. wet (5)	dry (0)	ice (3)	chem. wet (5)	dry (0)	ice (3)	ice (3)	dry (0)
Ice Percent	%	Ice (100.00)	Snow (36.11)	no ice (0.00)	Ice (100.00)	Snow (34.65)	no ice (0.00)	Ice (100.00)	Snow (49.26)	no ice (0.00)
Water Film Height	μm	212.94	22.01	0.00	60.35	11.30	0.00	236.88	12.53	0.00
Friction		0.65	0.81	0.82	0.78	0.82	0.82	0.65	0.82	0.82

Used Measure Values	-		A	В	C
Road Condition Lufft	logic	Modal	chem. wet (5)	chem. wet (5)	ice (3)
Surface Temperature	°C	Avg	-0.82	-0.87	-0.94
Dew Point	°C	Avg	-2.19	-2.27	-2.36
Ice Percent	%	Avg	Snow (36.11)	Snow (34.65)	Snow (49.26)
Friction		Min	0.65	0.78	0.65
Water Film Height	μm	Avg	22.01	11.30	12.53

ltem			A	В	С
F)	Deposits over Rwy	enum	wet 🔻	wet 🔻	slush 🔻
G)	Water Depth	mm	0.022	0.011	0.013
	surface status	enum	damp or wet <= 3mm ▼	damp or wet <= 3mm ▼	slush <= 3mm ▼
H)	Grip Coefficient Mµ		36	42.8	36
	RCC from Surface Status		5	5	5
	RCC from Mµ		4	5	4
	RCC from Pilot Report				
	Segment RCC		4	5	4

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TALPA Report in ViewMondo

TALPA reports are generated after a measurement drive is completed

- Reports are saved for later viewing
- Email automation of reports makes communications with all stakeholders easy

Report Data Date/Time from 7/9/2017 9:24:35 PM to 7/9/2017 9:26:10 PM

ltem			А	В	С
F)	Deposits over Rwy	enum	wet 🔻	wet 🔻	damp 🔻
G)	Water Depth	mm	0.696	0.146	0.026
	surface status	enum	damp or wet <= 3mm ▼	damp or wet <= 3mm ▼	damp or wet <= 3mm ▼
H)	Grip Coefficient Mµ		37.4	43.1	44.3
	RCC from Surface Status		5	5	5
	RCC from Mµ		4	5	5
	RCC from Pilot Report				
	Segment RCC		4	5	5

print

measurement drives



MARWIS - Not just for Runways

- Ramps
- Taxiways
- Landside Roadways





MARWIS beyond TALPA

Maintenance can **save money** by evaluating conditions on entire runways, taxiways, ramps, and landside applications and **treating only when necessary.**



Extract of satisfied Customers:





Additional Resources

FAA

TALPA Initiatives	https://www.faa.gov/about/initiatives/talpa/
Airport Circular	https://www.faa.gov/airports/resources/advisory_circulars/ind ex.cfm/go/document.current/documentNumber/150_5200-30

Standards

SAE ARP 5623,http://standards.sae.org/arp5623/Mobile DigitalInfrared PavementSensors	
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Lufft

MARWIS WebPage	https://www.lufft.com/marwis
TALPA Whitepaper	https://www.lufft.com/aviation-weather-reduce-risk-in-takeoff- landing-assessment-talpa/





Further information www.Lufft-Marwis.com

