

Runway weather contaminants information systems study

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Challenges for airports



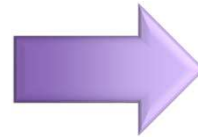
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Runway Surface Assessment to improve safety and capacity

Assess the **runway contamination** via a measure **reliable** and regularly **updated**



Enabling the airport operator to take **accurate decisions**

Enabling the airport operator and ATC to give **accurate info to pilots**



Runway Condition Assessment Process

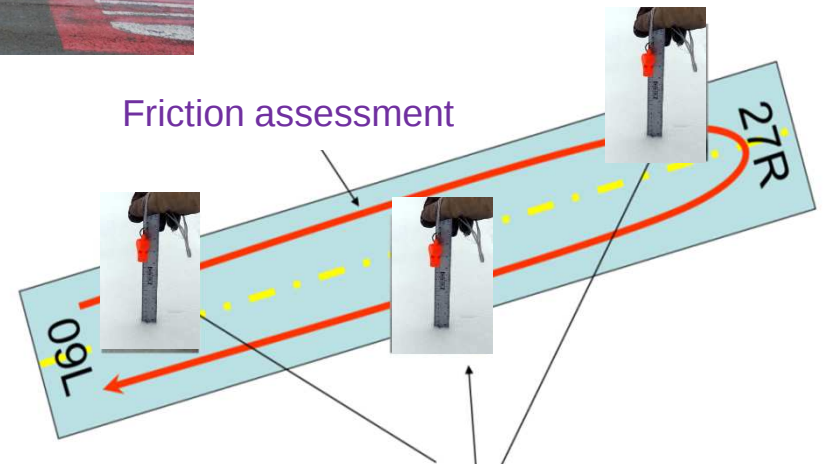


Drawbacks

Runway occupancy

Accuracy / Data updating

Subjectivity



3 manual measures of contamination depth with a rule and type (3 locations predefined in every third)



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RUNWAY CONDITION CODE determination



Runway Condition Code	
5	<ul style="list-style-type: none">• FROST• WET (The runway surface is covered by any visible dampness or water less than 3 mm deep) <p>Less than 3 mm depth:</p> <ul style="list-style-type: none">• SLUSH• DRY SNOW• WET SNOW



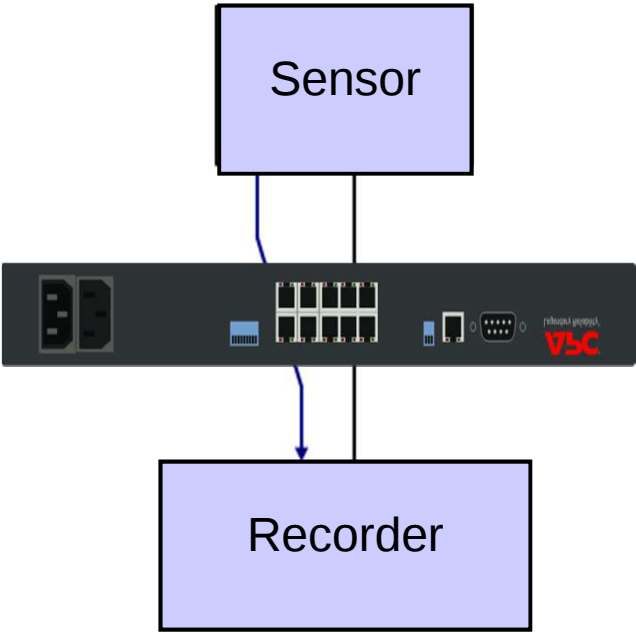
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Drawbacks reduction or removal

Which systems ?

What performance ?



Theoretical performance of the systems



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Sales offer

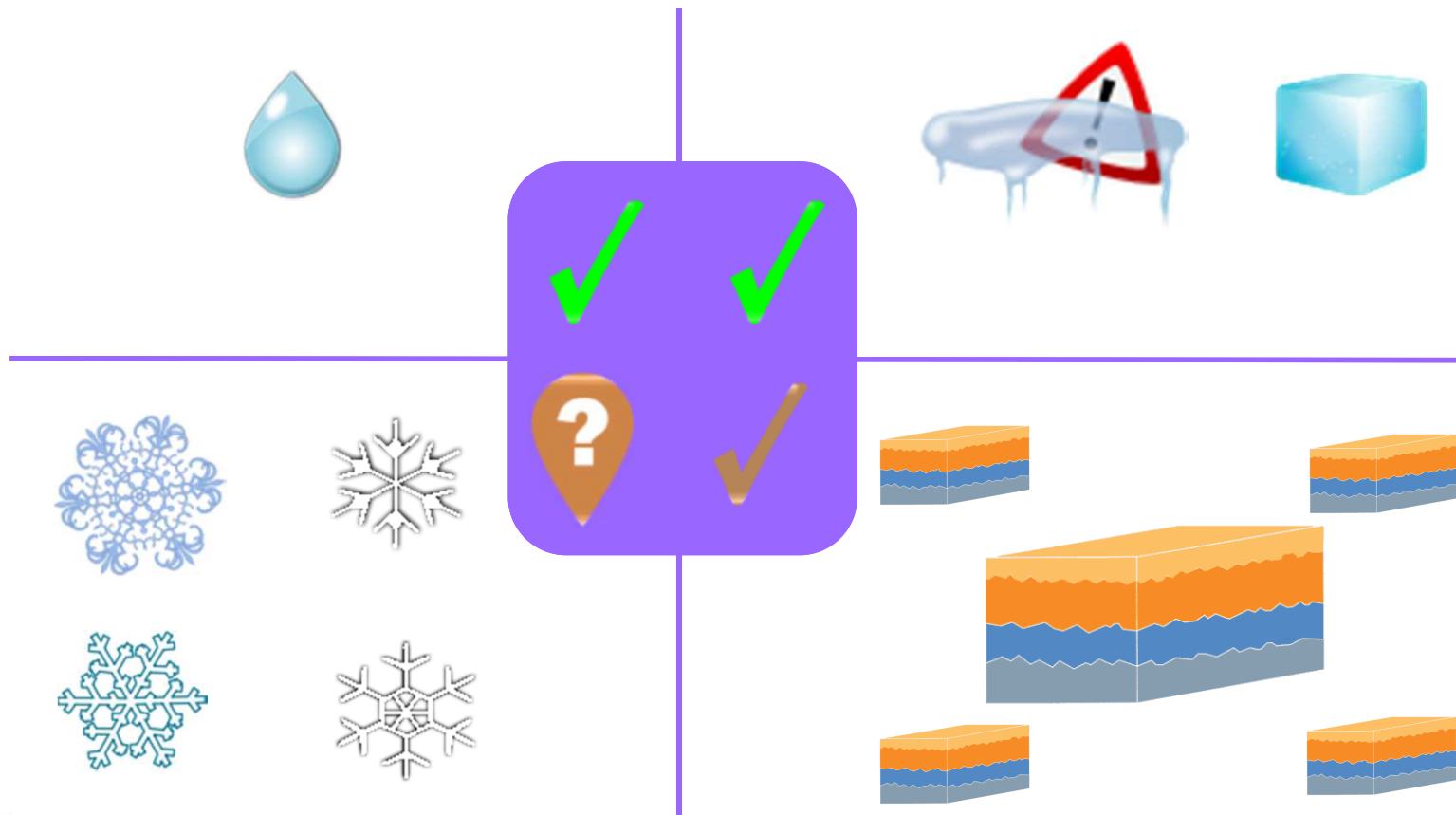
Embedded systems



Mobile systems



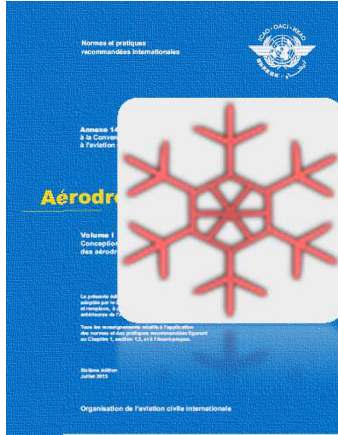
Theoretical performance : nature



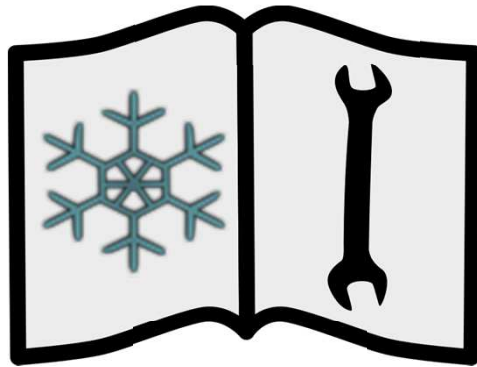
Theoretical performance : thickness



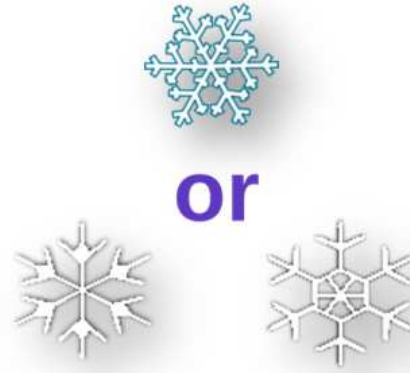
Limits



=



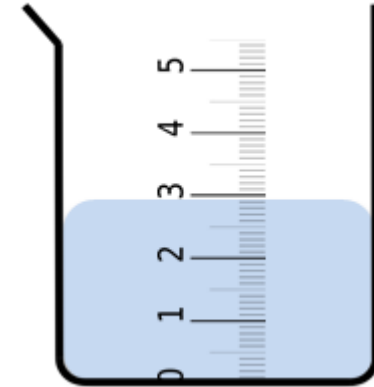
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Real performance of the systems



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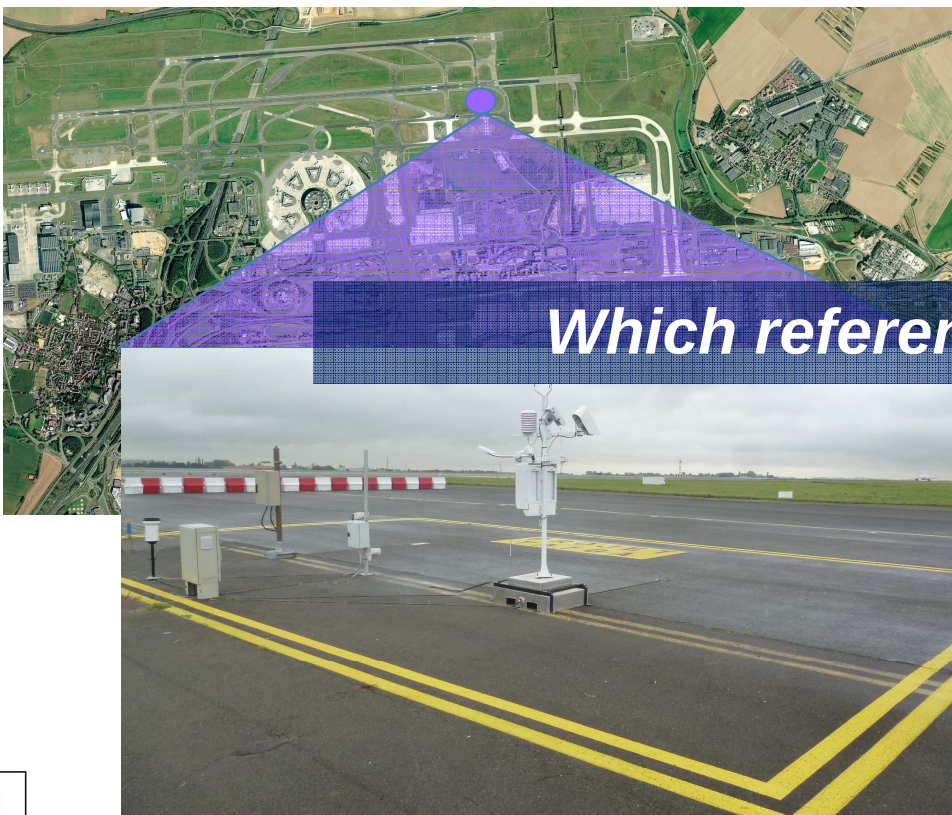
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Operating conditions tests

Embedded systems

(Experimental test zone TAIGA)



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Thickness:
Reference ruler on site



Nature:
Sampling protocol
depending
contaminant





Operating conditions tests

Embedded sensors tests

Winter 2015 / 2016 @ CDG

Designation	Sensor 1	Ref.	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6
Epaisseur Film Eau (mm)	0	-	-	0	0.163275	0	-
Etat de Précipitation	-	-	-	Pas de Précipitations	-	-	-
Etat de Surface	DRY	-	0	Sec	Sec	Sec	-
Hauteur Contaminant (mm)	-	-	0	-	2.2	-	1
Hauteur Precipt° (mm)	-	0	-	-	-	-	-
Mesure Reglet (mm)	-	0	-	-	-	-	-
Température Air (°C)	-	-	0	9.1	-	11	-
Température Freezing (°C)	-	-	-	-	0	-	-
Température Surface (°C)	-	-	-	13.7	7.8	-	-

Température Air 9.3°C

Etat de Précipitat° NC

Epaisseur Film Eau 0mm

Température Surface 13.7°C

Etat de Surface Sec



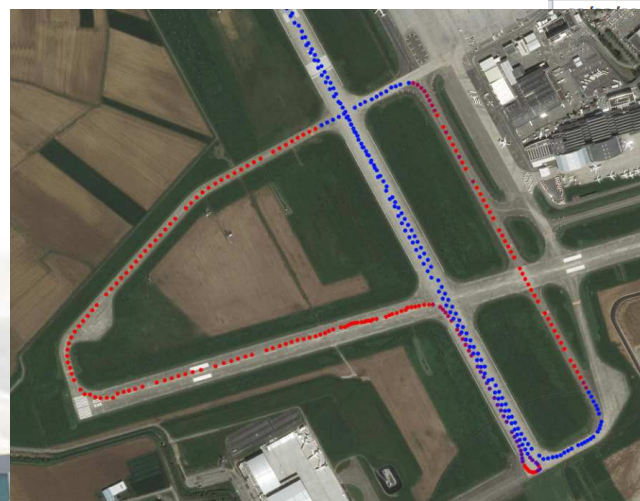
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Operating conditions tests

Mobile sensors tests

Winter 2015 / 2016 @ EuroAirport Basel Mulhouse

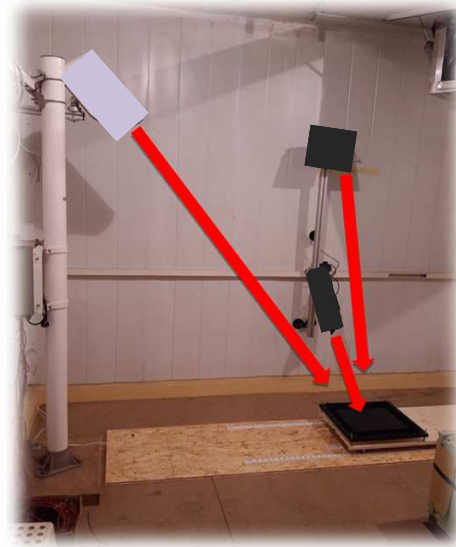
Time	Longitude	Latitude	State	Water [mm]	Snow [mm]	Ice [mm]
03/02/2016 15:55:26	7,52091	47,60736	3	0,1	0	0
03/02/2016 15:55:29	7,52091	47,60736	3	0,1	0	0
03/02/2016 15:55:32	7,52084	47,60733	3	0,1	0	0
03/02/2016 15:55:35	7,52079	47,6073	3	0,1	0	0
03/02/2016 15:55:38	7,52074	47,60728	3	0,1	0	0
03/02/2016 15:55:41	7,52073	47,60728	3	0,3	0	0
03/02/2016 15:55:44	7,52074	47,60729	3	0,1	0	0
03/02/2016 15:55:47	7,52075	47,60729	3	0	0	0
6 15:55:50	7,52075	47,60729	3	0	0	0
6 15:55:53	7,52075	47,60729	3	0,1	0	0
6 15:55:56	7,52074	47,60728	3	0,1	0	0
6 15:55:59	7,5207	47,60727	3	0,1	0	0
6 15:56:02	7,52057	47,60723	3	0	0	0
6 15:56:05	7,52042	47,60718	3	0,1	0	0



Laboratory tests

Mobile sensors – Winter 2015

Climatic chamber



Protocol

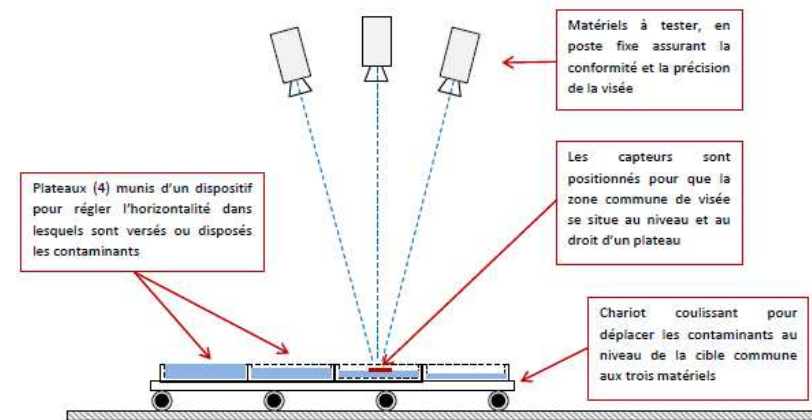


Fig 1. Dispositif expérimental pour les essais statiques et pseudo-dynamiques

Laboratory tests

State of progress

OCCO

X



X



Laboratory tests

Embedded sensors – Spring 2016



Laboratory tests

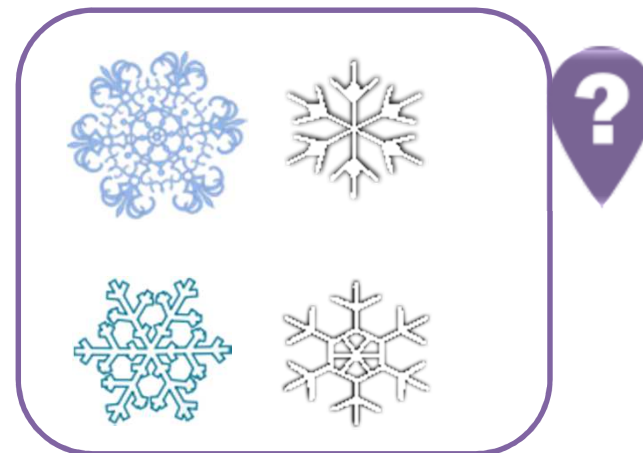
Mobile sensors

Laboratory complementary tests

Climatic chamber

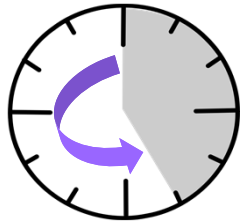


Remaining to do

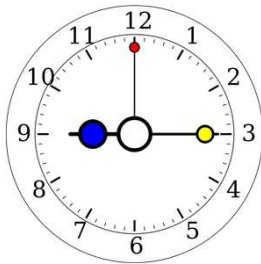


Synthesis

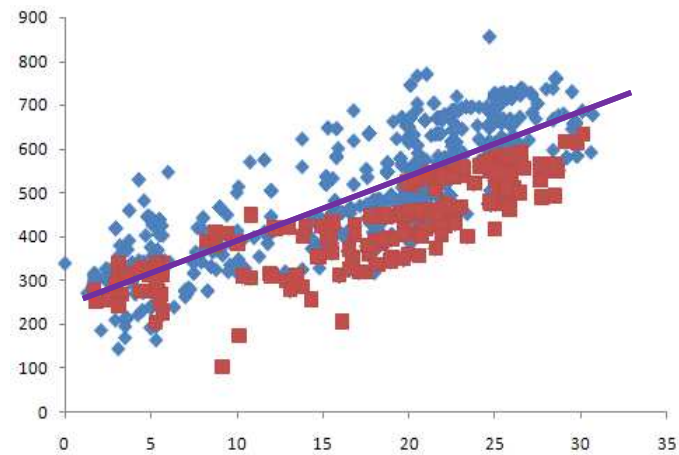
Advantages



Runway
occupancy



Data updating



Objectivity

Limits



Differentiation

Complementary actions



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Complementary actions

Feedbacks for mobile and embedded sensors



Milano Malpensa



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Complementary actions

Technico-economic analysis



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Complementary actions

In-depth exchanges with the suppliers



Final stage

European specifications



Minimal performance



European standard

Contacts



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Thank you for your attention



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