

GRF Issues

AENA's Spanish Network

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Agenda

- AENA's airport network characteristics.
- Airport challenges regarding GRF
- Technology currently under analysis

1. Airport network characteristics

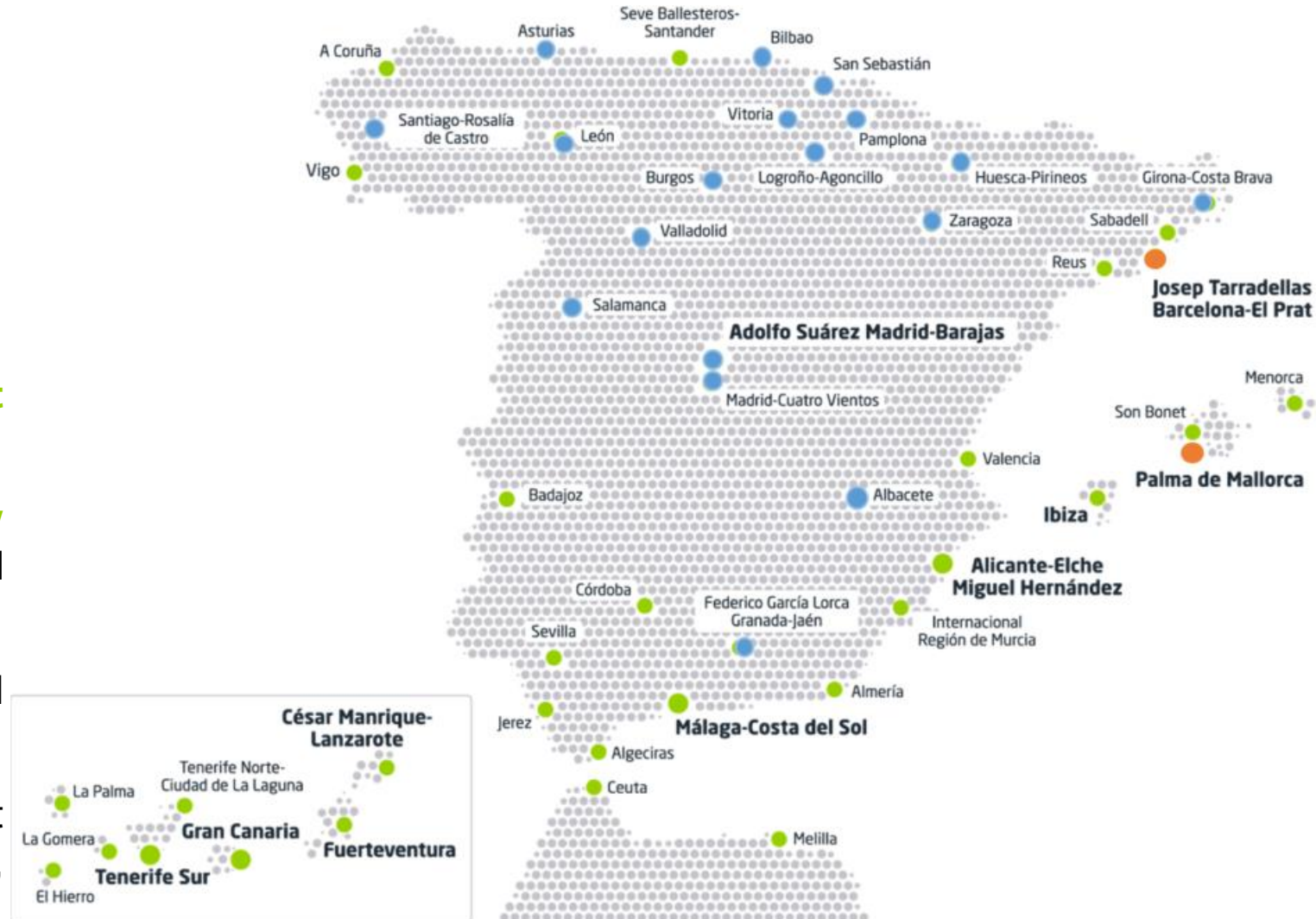
AENA's Spanish network:

- 46 airports
- 2 heliports

Meteorological characteristics:

- Climate in Spain, **soft winters** and **hot summers**.
- In fact, only **20 aerodromes have a Snow Plan** and just a few of them are really used to handle snow and ice.
- **Rain** is the most common meteorological condition at airports here.

Cantabrian and Atlantic Coasts where it rains the most. Mediterranean Coast, heavy rain are common during autumn.



1. Airport network characteristics

Rain is the main issue in Spain when talking about Global Reporting Format (GRF) procedure.

The consequences of rain, which imply **wet or standing water** contaminant on runway, are also the most difficult to determine because the **difference** between them is just **1 mm depth** of water:

RWYCC	CONTAMINANT	DEPTH
5	WET	$\leq 3\text{mm}$
2	STANDING WATER	$> 3\text{mm}$



2. Airports challenges regarding GRF

There are several challenges the airports are facing regarding **GRF day by day activities**.

1. Runway assessments affect **runway capacity**. This is also aggravated by the fact that every runway assessment needs to take into account plenty of information.
2. Detection of **significant changes** is not an easy thing to do without having permanent equipment on the runway assessing the depth of the contaminants.
3. Runway **inspections** under **adverse weather conditions** are not easy for the inspectors in terms of risks, visibility, workload, etc.
4. A precision of **1 mm water/snow film depth affects** in a very critical way the **RWYCC**. Manual and visual assessments don't have that kind of **precision**. A special equipment would be necessary to make that distinctions correctly.



2. Airports challenges regarding GRF

5. Some adverse weather situations can **change very quickly** (even in a matter of minutes) which can cause issues with real-time reports.
6. For a **regular rain case**, runway assessment takes too long even if you have to publish the most simple message (RWYCC 5/5/5, coverage 100/100/100 and contaminant WET/WET/WET). If the airport's runway comply with the regulations in terms of drainage and maintenance, having the possibility of notifying the information without entering the runway would be an improvement in the procedure.
7. It is also important to take into account that **non of the equipment** currently developed by the industry that can help you with these issues **is certified by the Authority**. Also, when talking about snow or ice contamination, the different solutions that the industry has developed are not precise in the detection of the different RCAM contaminants.



3. Technology currently under analysis at AENA

Mobile sensors that measure the depth of the contaminants

- These mobile sensors are placed in the back of the runway inspector's vehicle.
- They usually measure:
 - ✓ Depth of water or ice
 - ✓ Coverage
 - ✓ Pavement temperature
 - ✓ Humidity
 - ✓ Friction

ADVANTAGES	DISADVANTAGES
Easy to install	The sensor has to be plug inside the car for power supplying (so a window have to be partially open)
Easy to use	This sensor do not distinguish all of the RCAM contaminants
Quicker than manual/visual assessments	You are still affecting runway capacity
Much more precise in certain parameters than manual assessment	In case of snow, you still need to manually assess other RCR parameters
They provide plenty of information of the runway because of the high number of measures that they can take	Every time you remove it and put it on the vehicle it has to be calibrated

3. Technology currently under analysis at AENA

Permanent sensors embedded in the pavement of the runway

- These permanent sensors are placed embedded in the pavement of the runway. In terms of characteristics, they are similar to the mobile ones.
- They usually measure:
 - ✓ Depth of water
 - ✓ Depth of ice / snow (sometimes)
 - ✓ Pavement temperature

ADVANTAGES	DISADVANTAGES
Easy to use	Difficult to install
You can monitor certain parameters in real-time without interrupting runway operations	This sensor do not distinguish all of the RCAM contaminants
	The measures they provide are limited to their location at the runway
	Due to the limitations that these sensors have, you can't use them on their own.

3. Technology currently under analysis at AENA

RCR-Tool that involves rain gauges and a software to assess the runway

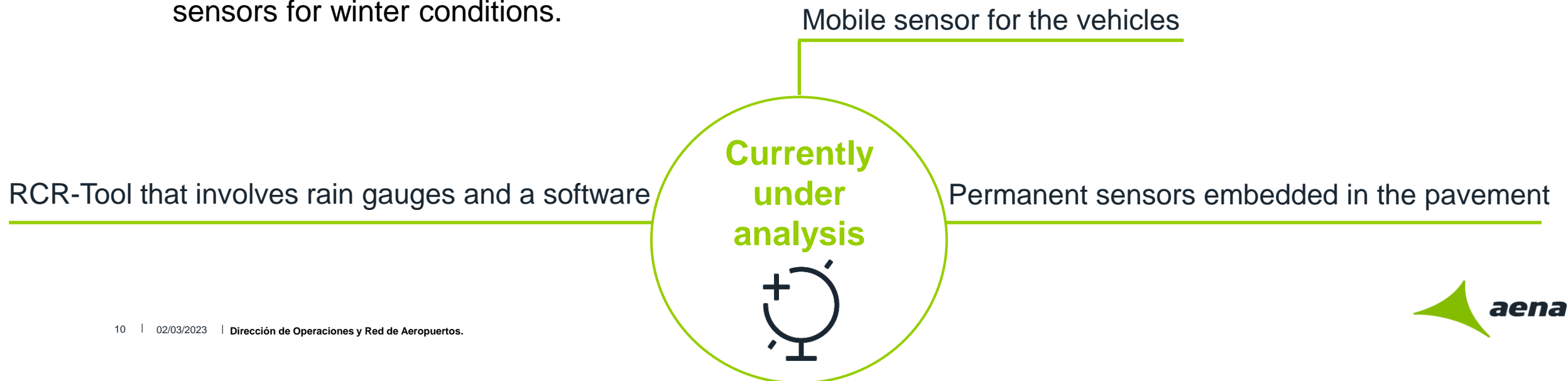
- This solution consist on the installation of three rain gauges along the runway (outside of the runway strip) that collect rainfall data and a software that takes into account these measurements and the physical characteristics of the runway to produce the RCR message.
- It allows the production of real-time reports but just under rainfall conditions.

ADVANTAGES	DISADVANTAGES
Easy to use	Limited to rainfall conditions
Real-time reports	It is the most expensive solution
No visual inspections of the runway are needed except during winter conditions	

3. Technology currently under analysis at AENA

Some preliminary conclusions are:

- There is **no technology** that can provide a **complete GRF assessment**. Also **none of them are certified**. It would be of high interest if some of these tool guarantee they are compliance with aerodromes regulations.
- Depending on the **traffic characteristics of an airport**, the best solution may vary from one to another:
 - Airports where occasional interruptions of the operations are not a big issue may opt for mobile sensors ideally combined with some embedded ones too.
 - Big airports where runway capacity is a big issue may opt for the RCR-Tool and some kind of mobile sensors for winter conditions.



Thank you

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