Operations on PFC/grooved runways
Improved Stopping Distances on specifically prepared runways

Presented by
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Introduction

- Some runways have specific surface treatment
  - Better water drainage when raining
  - Restore of braking friction coefficient close to dry runway when runway is wet

- Two main types of runway surface treatment
  - Porous Friction Course
  - Grooves
Introduction

Santos Dumont, Brazil

Luton, England

Gibraltar, England

Florence, Italy
Airworthiness Authorities Requirements

- Possibility to use grooved or porous friction course data (credit of performance)

- To take benefit of grooved or porous friction course, the runway have to be designed, constructed and maintained in a manner acceptable to the Authority

- Acceptable guidance for design, construction and maintenance of grooved or PFC runway
  - FAA AC 1505320-12C or CAA CAP 683 or equivalent

- Operational approval should be obtained by the operator from their operational authorities
Airworthiness Authorities Requirements

- Method of demonstrating stopping distance on wet runway depends upon the Airworthiness Authorities

  - FAA
    - Braking distance based on results of testing on wet runway (grooved or porous friction course)

  - EASA
    - Analytical method

- Both methods permit a factor of AFM Landing Distance to be less than 1.92 (wet smooth) but not less than 1.67 (dry)
Airworthiness Authorities Requirements

- **Farnborough campaign (certification FT)**
  - Goal: Improved landing performance on wet runway
    - Brazilian certif. for Santos Dumont Airport for A319 and A320.
  - Porous Friction Course
  - Flight Tests dated 1999

- **Gibraltar campaign (development FT)**
  - Goal: Improved landing performance on wet runway
  - Grooved Runway
  - Flight Tests dated 2001
Certified Aircraft Performance

- Aircraft models and runways currently certified with credit of performance

<table>
<thead>
<tr>
<th>Aircraft Models</th>
<th>Runway Type</th>
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<tbody>
<tr>
<td>A320-232/-233</td>
<td>SANTOS-DUMONT</td>
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<tr>
<td>A319-131/-132/-133</td>
<td>SANTOS-DUMONT</td>
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<tr>
<td>A319-111/-112/-115</td>
<td>FLORENCE</td>
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<td>A319-111</td>
<td>LUTON</td>
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<tr>
<td>A320-211/-212/-214</td>
<td>GIBRALTAR</td>
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<td>A320-232/-233</td>
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</tbody>
</table>

- Airbus now offers credit of performance for generic grooved or porous friction course runways
Certified Aircraft Performance

- Impact on **takeoff** performance

![Graph showing impact on takeoff performance with different runway lengths and MTOWs.](Image)

- **MTOW (kg)**
  - DRY
  - WET
  - WET GVD/PFC

- **Runway length (m)**
  - 1500
  - 1700
  - 1900
  - 2100
  - 2300
  - 2500
  - 2700
  - 2900

IAE 22000lb
OPT CONF
CWY=200m
OAT=10°C
Certified Aircraft Performance

- Impact on **takeoff** performance

![Graph showing takeoff performance impact](image)

IAE 22000lb
OPT CONF
CWY=200m
OAT=10°C

- DRY
- WET GVD/PFC
- WET

Certified Aircraft Performance Data:
- Wt = 70100kg
- Wt = 69700kg
- Runway length = 2000m
Certified Aircraft Performance

- Impact on **landing** performance

![Graph showing RLD (ft) vs Weight (1000kg)]

- DRY
- WET
- WET GVD/PFC

IAE 27000lb VLS CONF FULL Zp = 0ft
Certified Aircraft Performance

- Impact on **landing** performance

### Graph

- **IAE 27000lb**
- VLS
- CONF FULL
- Zp = 0ft

<table>
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<tr>
<th>Weight (1000kg)</th>
<th>46</th>
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**Legend**
- Red line: WET
- Pink line: WET GVD/PFC
- Blue line: DRY
Documentation and Software

- Operational Documentation
  - FM impact
    - Takeoff: new certified software
    - Landing: paper data only
  - FCOM impact
    - RLD published in 2.03.10 chapter

- Software (PEP / LPC)
  - Takeoff already implemented
  - Landing planned for 4th Quarter 2006
Conclusion

- Improved stopping distances when runway surface specially prepared

- Generic Certified Airbus Aircraft performance is now available
  - Usual channel: RFC (Request For Change)

- Upon request to local Authorities, this certified set of performance can be used if runway has relevant characteristics