EUROPEAN AVIATION SAFETY AGENCY
AGENCE EUROPÉENNE DE LA SÉCURITÉ AÉRIENNE
EUROPÄISCHE AGENTUR FÜR FLUGSICHERHEIT

Continuous Friction Measuring Equipment
Use on Contaminated Runways

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Background

- In 2011 AIB Norway issued a report of a theme investigation focused on the general framework for operations on contaminated and slippery runways

- The report is based on 30 reports of accidents and incidents related to operations on contaminated and slippery runways over a 10-year period

- AIB found that aircraft braking coefficient was not in accordance with the measured/ estimated runway friction coefficient

Background

- AIB Norway Safety Recommendation 2011/08T:

  "…The AIB Norway recommends that ICAO, FAA, EASA and CAA Norway review and validate the permitted measuring (validity) ranges for approved friction measuring devices"

- EASA accepted the recommendation and in 2012 initiated a study through a public tender process

- Study concluded in 2013 and the final report has been presented at the beginning of October 2013

ICAO Provisions

- Current friction measurement equipment is not considered appropriate to provide friction values on runways contaminated by slush, wet snow or wet ice

- ICAO Annex 14, Amendment 11 *(effective Nov 13)*

  - *"2.9.7A Recommendation: Runway surface friction measurements made on a runway that is contaminated by slush, wet snow or wet ice should not be reported unless the reliability of the measurement relevant to its operational use can be assured."*

EASA Study

- Study has been divided into three parts:
  - Part 1 - Mathematical model of the motion of tyres on dry and contaminated surfaces and the means by which the decelerating forces acting on the tyres are determined
  - Part 2 – Design philosophy of a CFME to provide the data required to enable an appropriate relationship to be established between a friction device and aircraft braking action
  - Part 3 – Proposal for regulation of the operational use of CFME

EASA Study – Part 1

- Semi-empirical model substantiated by test data
- Calculation of decelerating forces acting on aircraft tyres when rolling or braking on dry or contaminated runway surface
- The force is taken to be the sum of the following:
  - Rolling resistance, since the tyre carcase absorbs energy
  - Movement of the tyre through or compressing a contaminant
  - Friction interaction between the tyre compound and the runway surface

EASA Study – Part 1

- The model depends upon knowledge of the following independent variables:
  - Surface texture depth
  - Depth of contaminant
  - Density of the contaminant
  - Tyre inflation pressure
  - Nominal tyre width
  - Nominal tyre diameter
  - Vertical loading on the tyre
  - Ground speed of aircraft

EASA Study – Part 1

- The first three variables are related to the runway and its conditions

- All the other variables are part of conventional performance calculations

- The variables together with a knowledge of aircraft braking system provides sufficient knowledge to determine decelerating forces

- The model can also be used to link the performance of aircraft and ground vehicles

EASA Study – Part 2

- The report assesses a pre-production device, both from laboratory tests and some field trials
- The device is shown to be capable of providing information on runways contaminated with substantial depths of water, slush or snow
- Apart from the conventional output, measurements enable the deduction of:
  - Depth of contaminating water
  - Equivalent water depth of contaminating slush, or
  - Depth and relevant mechanical properties of snow
- The device can be operated satisfactorily and safely in depths of water in excess of 20 mm at speeds up to 13.5 m/sec

EASA Study – Part 3

- The Regulatory approach covers the following:
  - Outline description of the various types of CFME
  - Regulatory objectives and regulatory framework when using CFME
  - Discusses the contents of an aircraft flight manual in relation to the use of CFME
- An appendix describes in broad terms the following
  - CFME regulation
  - Design specifications and applicability
  - Certification, design objectives and approval together with operational and runway maintenance use
  - Regulatory impact assessment and cost-benefit analysis

Way forward

- The Agency will evaluate the report and hold internal discussions
- Extensive field trials are required in order to validate the model
- Coordination with ICAO Friction Task Force
- Presentation and consultation with the Member States and Industry Stakeholders

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Thank you very much for your attention

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