Presented to: IX ALACPA Seminar on Airport Pavements  
Ciudad de Panamá, Panamá

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Date: September 13, 2012
FAARFIELD – What’s Coming?

- External aircraft library upgrades.
- New flexible pavement failure model.
- New aggregate modulus model.
- Automated, design based compaction criteria.
- Revised 3D-FEM mesh.
- New energy-based HMA fatigue failure criterion.
External Aircraft Library Upgrades

• New feature allows users to specify arbitrary gear geometries in external library.
• Uses rewritten internal pass/coverage computation routine.
• Externally defined airplane such as the A380 gives the identical result as the internally stored airplane.
• New user guidance for the external library.
New Flexible Failure Model

• Developed from analysis of CC3 full-scale failure data.
• Bleasdale model found to give best match to backcalculated failure curves.
• Incorporates new alpha factors for 4- and 6-wheel gears.
• Better correspondence with PCN procedure (COMFAA 3.0).
• Reduces conservatism of existing FAARFIELD model, particularly at higher coverage levels.
New Aggregate Modulus Model

- Implemented & tested a new sublayering and modulus computation procedure for P-154 aggregate subbase.
- Why?
  - Existing procedure (WES Modulus subroutine) has gaps that can cause illogical results under some circumstances.
  - New model provides a continuous function of modulus with changes in P-154 thickness.
  - Better overall agreement with the P-209/P-154 equivalency factor used in PCN computations.
Automated Design-Based Compaction Criteria

- New procedure computes the compaction index CI at any depth from the vertical stress:
  \[ CI = \sigma_v \times \pi / \beta \]
- In the equation above, stress cannot be used directly from LEAF, but must be adjusted to be consistent with the CBR eqn. (see Barker & Gonzalez, 2008).
- For a given percent compaction, get the corresponding CI from the appropriate curve (cohesive or non-cohesive). Then find the depth giving that CI recursively.
- Procedure has been implemented in FAARFIELD. Now in testing.
Revised 3D-FEM Mesh

- Incorporates improvements from FEAFIAA 2.0.
  - Implemented new mathematical formulation for 3D infinite elements.
  - Added new decay function to improve accuracy for coupled finite and infinite elements.
  - Improved interface model corrects penalty stiffness factor depending on the current state of contact.
  - Nonconforming elements are now used only where needed.

- Calibration factor can be eliminated from rigid failure model.
Questions?
¿Preguntas?

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