International Coordinating Council of Aerospace Industries Associations

ICCAIA - Industry Cabin Safety Group

Airbus – Boeing – Bombardier - Embraer

Industry Burnthrough Development
& Implementation

July 11, 2006

Agenda:

- ICCAIA Background
- ICCAIA Cabin Safety Group Formation
- New Burner Development Plan
- Steps Beyond Burner Development
- Summary

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ICCAIA (created in 1993): international organisation of aerospace industry associations (design, development, manufacture and in-service support of aeronautical and space products and technologies, including related ground-based systems)

Membership: any association with relevant membership may apply for membership, if not controlled by a government entity (an association organisation can be regional, a country can only be represented by one association organisation)

Current Membership: AIA (USA), AIAB (Brazil), AIAC (Canada), ASD (Europe), SJAC (Japan)

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ICCAIA Purpose and Objectives:

•Promotion of technical advances to achieve safe and economical air transport

•Representation of industry vis-à-vis national and international (ICAO) bodies, to achieve aviation policies that promote a sustainable global economy,

•Maintain industry's commitment to high standards of professional performance, integrity, fairness and reliability.

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Industry Cabin Safety Group Formation:

- Recommended by FAA Transport Airplane Directorate Management in November 2005
- Team Charter defined from December 2005 to June 2006
- Team's focus is cabin safety, including flammability
- Sponsorship by ICCAIA in June 2006:

  Claude Schmitt, Chairman
  ICCAIA Airworthiness Committee Senior Director
  Strategies & Policies Airbus, Engineering-Product Integrity

Member Focals:

Airbus - Jean-Francois Petit/Marie-Laure Wawrzyniec,
Boeing - Timothy Holey/Jonas Hinton/Kendall Krieg,
Bombardier - Anninos Chouliotis/Antonio Chiesa,
Embraer - Francisco Landroni/Lauro Yuzo Miura,
… and others as applicable to specific subject matter.

SITUATION:

The definition of test equipment in 14 CFR Part 25, Appendix F, Part VII has been found to allow variations in test results that are too large for industry to be able to develop compliant solutions to the requirements introduced in §25.856(b).

Industry and FAA need to develop a detailed plan and schedule to show that the new Burnthrough requirements are production ready and allow adequate time for industry to evaluate and certify Burnthrough compliant designs and materials.

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Industry NPRM Extension Comments:

AIA

"While AIA supports an extension of the compliance date, it is of great concern that the problems and issues involving test equipment that led to this NPRM cannot be resolved by the proposed new compliance date. We believe the FAA should develop the new test procedures and demonstrate they are repeatable in different test facilities before it decides how long to extend the compliance time for this rule. Serious problems still exist with the test equipment and the FAA is continuing to pursue R&D efforts on the test equipment. Industry has initiated a parallel program to investigate alternative test equipment whose findings will be offered to the FAA." …"the AIA believes that at least 24 months, and probably longer, will be required to complete the work necessary."

Airbus

"Major comments on NPRM 06-05 "Improved flammability standards for Thermal/Acoustic insulation materials used in transport category airplanes" are the following:

-The test equipment and the test methodologies are not mature for certification tests.

-Airbus requests 24-month postponement instead of the 12 months proposed by the FAA."

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Industry NPRM Extension Comments:

Boeing

"However, we (Boeing) request that the FAA reconsider establishing a specific compliance date until the continuing problems concerning the unavailability of adequate test equipment, repeatable test procedures, and compliant materials that led to this NPRM are resolved." … "The extension is currently estimated to be no less than 24 months …"

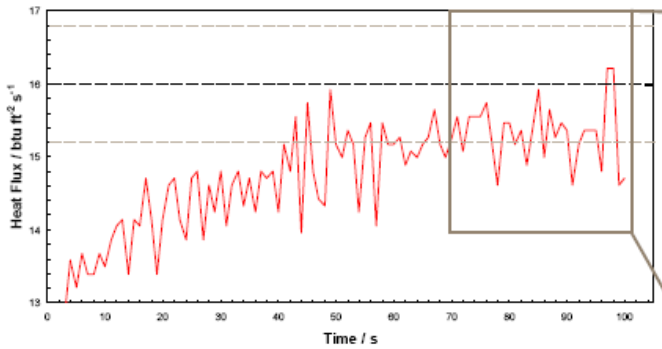
Bombardier

"There are a limited number of materials that are presently available to the aerospace community as burn through fire barriers. These materials tend to be relatively costly with little or no long-term in-service data available. Efforts are still underway by material suppliers to minimize the cost and weight impact. These efforts should be allowed more time in order to optimize the design."… "Bombardier Aerospace concur with the FAA proposal to extend, by 12 months … to evaluate different solutions to better address to the following concerns"

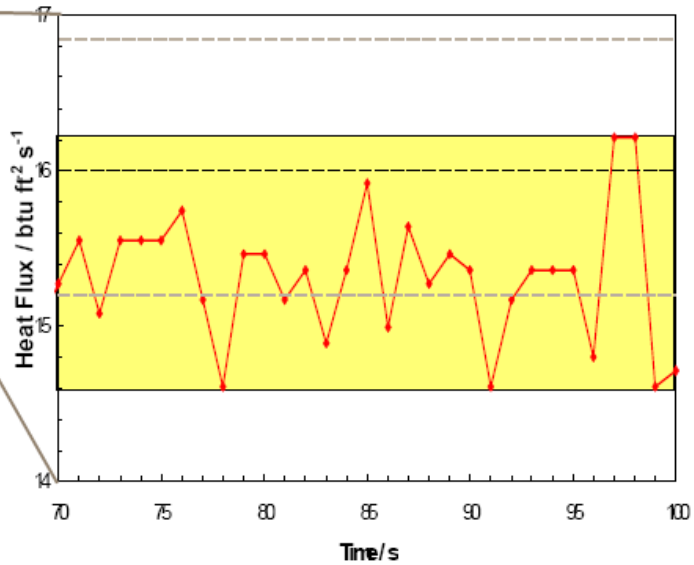
Clearly there are unresolved aspects with equipment, materials, and procedures required to be in place for effective implementation and certification… Industry is working to provide solutions.

Heat Flux Fluctuations

typical heat flux distribution



heat flux averaging window



- great fluctuations in the heat flux
- minimum and maximum values normally differ about two standard deviations from the average value
- fluctuations can falsify the calibration in positive or negative manner

For shown example:

Average Heat Flux:	15,3 btu ft^{-2} s^{-1}
Standard Deviation:	0,4 btu ft^{-2} s^{-1}
Minimum Heat Flux:	14,6 btu ft^{-2} s^{-1}
Maximum Heat Flux:	16,2 btu ft^{-2} s^{-1}

Park Burner is inadequately sized for BTU performance

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TEAM GOAL:

Find a solution that is economically viable, reliable, repeatable and available, and equipment and process definition that can be accepted by the Aircraft Certification Offices.

Identify a commercially available industrial burner that…
- is readily available to all participants
- is economical
- is designed for the amount of expected flame output
- is developed by specialists in burner technologies
- has repeatable performance based on SQC tools (3 sigma)

By taking the necessary time required for successful R&D.

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Ingredients for Successful Burner Development:

- Commercially (worldwide) available equipment with performance based on process and not specific equipment type or manufacturer
- Utilization of industry experts on burners/ignition
- Means to transfer FAA burner performance into new burner solutions (i.e. controlled calibration material)
- Validated (Statistical Quality Control (SQC) methodologies) process for burner performance within +/- 5 percent (e.g.. Heat Flux within +/- 0.8 BTU/ft^2-sec requirement) to 3 standard deviations
- Round robin results on common material. Round robin testing also validated to SQC methodologies
- Documentation of equipment and procedures for consistent FAA ACO, EASA and/or other regulatory authority acceptance

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Burner Equipment Approach:

• Obtain several makes of commercially readily available (North/South America, Asia, Europe, etc.) industrial sized oil burners with consistently repeatable performance. Burners should be compatible with test facility and not require alteration for frequency, power, etc. to be used.
• The new oil burners will be researched, tested, and defined with reliable procedures and processes that are expected to provide consistent results regardless of test facility location.
• The equipment and procedures will be acceptable to regulatory authorities (FAA ACO's, EASA, etc.) in meeting the performance intent of FAR 25.856 (b) for evaluating burn-through resistant insulation materials.
• An improved calibration felt material will be used to ensure translation to the FAA original burner performance and as an assurance of consistently comparable results.
• The burners will be equipped with adequately defined associated hardware and controls.
• The test set-up and methodologies will be as simple and practical as possible.
• The team will engage recognized industry experts in calibration, oil-burner technology, and set-up calibration as appropriate to validate equipment.
• The recommendation will be based upon successful testing using statistical analysis (Statistical Quality Control (SQC) methodologies) showing repeatable and in-control performance results within +/- 5 percent (e.g.. Heat Flux within +/- 0.8 BTU/ft^2-sec requirement) to 3 standard deviations.
• The solution recommendation to move forward must be high quality and ready for aerospace production purposes, capable of reliably satisfying 'type certificate' process requirements.

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Current Status:

Industry is working rapidly toward translating the current burner performance to a proposed new one to match FAA TC burner requirement.

Once reliable test equipment is defined, Industry will go through the steps of round robin testing using statistical process tools and industry experts for burners, heat flux, etc.

Steps Beyond Burner Development (Part 1)

MATERIALS

- Materials R&D completion;
  - Target weight, durability and cost to be equivalent to existing materials (films and/or batting)
  - Candidate materials have been proposed, however cost, and weight do not come close to FAA expected rule economics

  "Only a few materials, mostly ceramic based films, are available that satisfy the burner penetration test requirement. These materials add significantly more weight – from 25 pounds for a regional aircraft to 350 pounds to a large twin aisle aircraft – than originally projected. The economic impact for this weight gain due to additional fuel burn exceeds $400 million, whereas the economic impact originally projected was $2 million dollars. Material suppliers need time to develop more suitable materials." - AIA

- Production Material Validation (including ability to repair), Supplier Qualification, and Specification Release

Steps Beyond Burner Development (Part 2)

DESIGN AND MANUFACTURING

- Design Definition and Validation (Certification)
  - Installation optimization
- Manufacturing/Installation Validation
- Serviceability Validation
- Production Design Validation:
  - Production Design Release
  - Manufacturing Implementation
  - Installation Implementation

After a standardized burner is available (estimate 6 months), an additional 18 – 24 months are required to complete the material, design and manufacturing activities.

SUMMARY

• Translate the current burner performance to a proposed new test equipment that is consistent in meeting the same FAA TC burner output requirements.

  • Means to transfer FAA burner performance into new burner solutions (i.e. controlled calibration material)

• Document test equipment and perform round-robin testing that establishes a means to develop and certify Burnthrough compliant designs and materials.

• Need a collective common approach and support to adequately provide a timely and quality solution that meets overall industry needs and is acceptable to regulatory authorities.