INTERNATIONAL AIRCRAFT MATERIALS FIRE TEST WORKING GROUP MEETING

December 6-7, 2006

Hosted by Airbus Industries, Bremen, Germany

WEDNESDAY, DECEMBER 6, 2006

Welcome from Airbus – Mr. Frank Dohrmann

Testing of Pre-ox PAN Calibration Materials – R. Ochs (for Tim Marker)

Review of purpose as presented during the July 2006 Materials WG meeting. Materials produced by TexTech. Review of interim findings as of July 2006 meeting.

Outcome and Planned Activities from July 2006 Meeting:

TexTech Felt Style 8579 showed most consistent results.

October 2006 Trials were conducted at FAATC.

Original FAA Burner:Calibration and heat flux data presented. Results of 20 tests conducted on 8579 and 8579R were presented. Results of TexTech 8611R were presented.

Relationship of Blanket Density and Failure Time:

Do longer burnthrough failure times correlate to an increased blanket density?

Summary of October 2006 Trials:

8579R was equally consistent when tested on FAATC original burner. 8611 R indicated comparable consistency to 8579R.

Burnthrough Test Method for Thermal/Acoustic Insulation: Alternative Burner Apparatus – R. Ochs

Review of motivation for design of an alternative burner and proof of concept.

Velocity mapping of Original FAA Burner and New Burner.

FAA prototype burner results were in agreement with Original FAA Burner.

Phase II: Construction and calibration of multiple (10) burners at labs around the world. Burners will be distributed to participating labs. Photo of new concept burner supplied and parts list.

Compressed air supply required at lab to operate new concept burner:

Constant pressure line of at least 60 psig
Regulator has 1" NPT female connection. A flexible air line will make connections easier.

Information on design and parts for the Pressurized Fuel System.

Controls used at FAATC.

Measured Burner Operating Conditions During Calibration: 3-minute span.

30-Second Sample of Heat Flux Measurements comparison of New Concept Burner, FAATC Original Burner, and Boeing Wayne Burner.

Material 13408A-8579R, 13406B-8611R, 15947A-8579R (new roll), and 15948A-8611R Burnthrough Times – graph of results of tests conducted using FAA Original Burner and New Concept Burner presented and explained. Materials 8579R and 8611R Batch to Batch Comparison: Avg. =234.6s, Std. Dev. = 15.5 s, % Std. Dev. 6.6%

Current Status:

To date, 4 burners have been tested and are ready for use.

One burner has been shipped to Boeing initial set-up and tests conducted during Tech Center personnel visit.

One burner has been shipped to Airbus and will be set-up on December 8, 2006, during Tech Center personnel visit.

Future work:

Design and "mapping" of stators.

Design a totally independent burner capable of simulating the performance of the FAA standard that closely replicates the behavior of a post-crash pool fire and its effects on an aircraft fuselage that is independent of the previous designs and parts that are discontinued or hard to obtain and that is capable of a higher level of precision, as well as tighter tolerances for repeatability and reproducibility.

Dick: The new burner is designed to be equivalent of the burner specified in the FAR. It is the same as operating the OSU per the Aircraft Materials Fire Test Handbook not per the FAR. The burnthrough FAR states "or equivalent" burner.

Acceptable Practices for Installation of Burnthrough Barrier – R. Hill

This information is available on the FAA Fire Safety Website (www.fire.tc.faa.gov). This continually updated section provides acceptable installation means of burnthrough barrier materials if proposed to the FAA that would be allowed (non-proprietary) by the FAA ACOs.

Airbus requested that there be some reference included in PDF file that indicates where this information came from (ie: FAATC Fire Safety website). ***ACTION***: The FAATC Fire Safety Branch will follow up on this request.

Discussion on the Use of Magnesium in Aircraft Cabins – R. Hill

The FAA Transport Airplane Directorate has requested that the FAATC establish a Task Group to discuss/investigate the use of magnesium in aircraft cabins. Several companies have approached the FAA regarding the use of magnesium seat frames that would reduce the weight of aircraft seats significantly. The initial meeting of this Task Group will occur today. The FAA would like representatives from the major aircraft manufacturers to participate in this Task Group.

Industry Burnthrough Development and Implementation – K. Kreig and P. Busch

A copy of this presentation is available at www.fire.tc.faa.gov from the Materials Group page.

Currently in R&D phase.

Peter reviewed the functional requirements of the burner under development. Photo of control panel. Airbus has built Airbus-Kuppersbusch burner.

Kendall explained the objectives: find a solution that is economically viable, reliable, repeatable and available, and equipment and process definition.

Sierra Hot Wire Anemometer precisely measures airflow to adjust for repeatable burner results.

Summary of Results

Similar Burnthrough Times achieved

The purpose of the experiment was to determine which variables have a large influence on the Burnthrough time consistency. Boeing DOE results were described (both major and minor influences).

Design of experiment isolates high influence test equipment, methods and process variables.

The group is still awaiting completion of R&D tasks: calibration method (biggest challenge at this time, documentation of sonic burner test equipment setup, validation, maintenance, and required alterations. Fuel nozzle issues must also be resolved.

Seat Round Robin – R. Hill (for Pat Cahill)

Testing is complete in the U.S., and the FAATC has coordinated with foreign aviation authorities for testing at international labs. We are still discussing if someone from the foreign aviation authority will witness the tests at international labs or how this will be handled. EASA does not have plans to witness these tests. Eight labs in the U.S. participated in this round robin.

There is no correlation in the pass/fail data among those labs that run according to the Rule or Handbook.

All of the failures reported by all of the labs were due to weight loss. There were no failures due to burn length.

The majority of labs recorded greater horizontal bottom burn lengths than horizontal top burn lengths.

The use of tabs or static disk may influence test results.

The thermocouple type used for calibration purposes appears to be the wrong type for this test.

The air velocity through the burner may be one of the reasons that cause the rapid breaching of the hook and loop closures and blocking layer into the polyurethane foam.

Radiant Heat Panel Discussion – R. Hill (for Pat Cahill)

Composite Sample Ventilation: ventilation slits 2-inch vs. 4-inch slits.

Hook and Loop testing of two different sample sizes.

Points of Discussion for Radiant Panel Task Group (per Pat Cahill):

Use of flat frame
Flame Exposure Time (longer than 15 seconds)
Temperature inside the chamber at calibration

Proposed Radiant Heat Panel Test for the Evaluation of Aircraft Ducting Materials – Status Report – J. Reinhardt

John reviewed the analysis between the Intermediate Scale Test and the Radiant Heat Panel test.

Results (1 BTU/ft^2 Test Protocol) for 12 samples.

What's Next?

Conduct additional tests as needed
Prepare final report and submit to internal sponsor

Task Group Meetings

THURSDAY, DECEMBER 7, 2006

OSU and NBS Round Robin – Preliminary Results – R. Hill (for Dick Johnson)

Most of the labs included photos of the test results, and some labs sent video of the test series. There are 25 participating labs. The round robin materials tested were 3 samples of 3 materials tested by each lab. Labs with both an OSU and an NBS chamber conducted both tests. Dick presented preliminary data as the Percent Deviation from the overall average of:

total heat release
peak heat release
time to peak heat release rate

The data was presented in this format, because all participating labs have not submitted their test results as of this meeting. Dick Johnson will prepare the final round robin results once he has received the results from all the participating labs. To date, 23 of the participating labs have sent in their data. Some labs have only reported data for observed Smoke Ds at 4 minutes. Reported data contains some ambiguity with regard to observed Smoke Ds at 4 minutes and the Maximum Smoke Ds observed during the 4 minutes. Labs will be contacted via e-mail over the next few weeks to collect missing data and clarify reported data. Data analysis should be completed by spring 2007.

Contamination – D. Slaton

Flammability of Cleaners and Corrosion Inhibiting Compounds on Insulation Blankets:

Cleaning Agents – A small amount of cleaning agents was sprayed onto the insulation blankets. The Q-tip and radiant panel test were conducted on these sprayed insulation blankets.
Corrosion Inhibiting Compounds – This work is currently in-process.

Flammability Testing Results:

Recommend cleaning of blankets using Naphtha or IPA. Get concurrence from film manufacturers. WG Members expressed some questions/concerns regarding airlines using these products as cleaning agents. Marco Neiderkleine and Jim Davis indicated that soap and water are more commonly used in cleaning aircraft cabins.
Complete CIC testing.
The Contamination Task Group will develop a test matrix for other contaminates such as hydraulic fluids, etc.

Maintenance Review Board Report

Document Purpose:

The MRB Report is model specific:
1)defines the initial minimum scheduled maintenance/inspection requirements to be used in the development of an approved continuous airworthiness maintenance program
2)basis from which each operator may develop their own continuous airworthiness maintenance program
3) forms part of the instructions considered essential for proper maintenance as required by FAR 25.1529 and FAR 25 Appendix H (Instructions for Continued Airworthiness)

Dan reviewed the inspection intervals and systems requirements of the MRB Report.

Thermal Acoustic Insulation Contamination – Route Map – R. Cherry

Purpose: Development of a methodology to provide whatever mitigation is required to reduce the risk of hidden fires involving contaminated thermal acoustic insulation.

One major cause of hidden fires is electrical arcing. This is not the only cause. Design of the electrical arc fault test rig is completed. A company in the United Kingdom will be providing advice on reproducing electrical arc faults in this test rig. Sample size will be approximately 8x10 inches. They are looking to this Working Group for some guidance for calibration, etc., for this test. They will also need some input from airframe manufacturers and manufacturers of arc fault interrupters. Ray provided details of the Route Map Plan.

Composite Materials – R. Hill

We will be developing tests for composite materials used in aircraft that will replace metallic materials that currently do not require flammability tests over the next few years.

Next Meeting

The next meeting will be hosted by Schneller, Inc., in Kent, Ohio, March 6-7, 2007.

The summer meeting will be hosted by Jehier-Hutchinson in Paris, France, June 26-27, 2007. Hotel information will be posted to the Fire Safety website in January 2007, so that Working Group members can make their hotel reservations early, since June is tourist season in Paris.

Burnthrough Task Group Report – R. Ochs

Full burner distribution list – up to 10.
FAATC will assemble and test them a couple at a time and then send them out to the labs.

Consistency of TexTech calibration materials – still some concerns.

Some belief we should focus more on mapping, exit velocity, etc., instead of calibration of materials.
Nozzles: strong influence from nozzles, and inconsistency from nozzle to nozzle.
Cone geometry – circular instead of elliptical cone may provide a more uniform flame.
Test frame and construction of it – warpage of it. A Task Group member will investigate this and report back to the group.

Ducting Task Group – J. Reinhardt

MINUTES FROM THE AIRCRAFT DUCTING TASK GROUP

On 7 December 2006, the task group met in order to discuss any concerns, questions, etc. that the members had with relation to the new radiant heat panel test protocol to be recommended for the testing of aircraft ducting. The following bullets addresses the main questions:

- **Flame Propagation** - As indicated during the oral presentation, the performance of the material will be evaluated starting at the moment the pilot flame is no longer impinged on the material (right after the 15 seconds pilot impingement). The reason for this decision is based on the fact that the temperature of the pilot flame exceeds the ignition temperature of most of the ducting materials. Sometimes during the application of the pilot flame, flame propagates beyond the 2-inch acceptance criteria mark because of the sample configuration (ribs on the upper surface running perpendicular to the pilot flame). But, once the pilot flame is removed the flames on the sample moves back to the acceptable area. This phenomenon will be accepted only if the degradation and ignition temperature of the material tested exceeds 256 degrees Celsius; this is the temperature at the location where the 2-inch mark (acceptance criteria) is located on the tray where the material sample is placed. The person testing the sample must report the propagation length of the flame that remained after the pilot flame is removed from the sample.

- **Fire Protection Jacket** – The statement expressed by the task group lead during the group meeting has been changed by the FAA management. The FAA management indicated that the Fire Protection Jacket must first meet FAR 25.856 and then the “new FAR 25.853” (the proposed radiant heat panel test for ducts) if it is going to be used as a protective jacket. The structural integrity of the Fire Protection Jacket must be maintained in order to prevent the “non-fireworthy” duct from been exposed to an external fire.

- **Material Names** – A consensus agreement was not reached, amongst the manufacturers that provided samples to the FAA, to reveal the names and details of the materials tested. In the final report, the FAA will only report the material letter assigned to the tested materials along with a photo.