International Aircraft Materials Fire Test Working Group Meeting Minutes

Hosted by Airbus, Toulouse, France

June 11-12, 2002

TUESDAY, JUNE 11, 2002

Burnthrough Presentation and Discussion – T. Marker

Round Robin V Test Results

A description of the six materials used in this Round Robin was provided. Test results indicated higher than expected data scatter. Tim noted four possible causes (a copy of this presentation is available on the FAATC Fire Safety Branch website at www.fire.tc.faa.gov). The purpose of the Intake Velocity vs. Failure Testing was to investigate the conclusion of intake air velocity and failure rate at the three participating labs. The results of this test program from two of the three labs were presented. The next test program was the Heat Flux Mapping of the Burner Flame. Tim presented graphs of the results he received from some of the participating labs.

Unique Tests for Installations and Fixings Discussion – T. Marker

This test program was established to determine the method by which a lab can test a material (such as attachments) that is not covered in the forthcoming AC. The airline design variables such as width of former flange, thickness of web, height of stringer, and thickness of stringer are a few of the variables investigated in this test program. Tim presented diagrams of a number of various test set-ups investigated in these tests. Tim presented post-test photos of the 5-inch aluminum formers test. Aircraft grade aluminum was used in these tests. This test rig may be used to run future certification tests on attachments.

Review of Fire Safety Branch Website – R. Hill

The URL is www.fire.tc.faa.gov.

Radiant Heal Panel Round Robin III Results – P. Cahill

The unknown sample sent to labs participating in Round Robin III was metalized tedlar with CIC sprayed on it. Pat reviewed the results of the tests on each material and hook and loop. Pat stressed the importance of ventilating taped polyimide films prior to testing them (the Task Group will discuss this in more detail).

Backerboards for Radiant Heat Panel Test – P. Cahill

Pat described the different types of materials tested as backerboards in the radiant heat panel test apparatus at the FAATC. These will be discussed in detail during the Task Group meeting.

October 2001 International Aircraft Fire and Cabin Safety Research Conference – R. Hill

Dick gave a demo of the October 2001 Conference Proceedings CD. Each person who attended the October 2001 Conference will be mailed a copy of this CD by the end of June 2002.

A/C 116 On-Board Electrical Fire During Maintenance – B. Freeman (Delta Airlines)

July 2, 2000, insulation blanket ignition by shorted wiring during maintenance operation (layover check). Brian described the findings of the investigation of this incident. He also presented results of radiant heat panel tests conducted at the FAATC on insulation materials. Delta will

replace the AN-26 insulation blankets in approximately 150 of its aircraft during each aircraft's next regular heavy maintenance ***v*** (HMV) - an aircraft goes through an HMV every 6 years. Delta's recommendations were also presented. Delta recommends that industry conduct additional investigations to develop a radiant panel testing database of all insulation films so that films that readily propagate flames when ignited can be identified. This is a preventive action that will be taken by Delta.

WEDNESDAY, JUNE 12, 2002

Fire In Inaccessible Areas Program - R. Hill

Dick reviewed the areas in the aircraft that are considered hidden or inaccessible areas. He presented photos of a number of recent aircraft hidden fire incidents and described several of them in detail. Materials included in hidden fire areas are wiring insulation, ducting, air conditioning components, electrical components, and interior panels. The hidden fire program will include conducting tests to identify and quantify the problem. The present requirements will be evaluated.

European Hidden Fire Research – T. Klems

The objective of this program is to develop new test requirements for materials in inaccessible areas in order to bring the level of all materials to that proposed for thermal acoustic insulation. The French DGAC is supporting this program and has asked Airbus to participate. CEAT will conduct work on flammability characteristics, selection preparation of specimen and flame propagation testing at CEAT and a final report on this testing will be prepared. The project is currently delayed due to other priorities.

TSO on Blankets Update – P. Cahill

Pat reviewed the research she did on aircraft blankets prior to writing the "Development of a Flammability Test Method for Aircraft Blankets" Report that was published in 1996. The Technical Standard Order (TSO-C152), Flammability Test Method for Aircraft Blankets will be issued shortly (the comment period ended on June 7, 2002).

Lightweight Foams for Seat Cushions – R. Hill

Lightened Cushion - N. Costamagna (CELSO)

CELSO has developed a material that is 70% lighter than material (melamine foam) currently used in aircraft seat cushions.

The FAATC is willing to run some full-scale tests to compare the performance of these lightweight foams to current aircraft seat cushions. This test may be witnessed by any interested Working Group members. Also, if there are other companies with lightweight seat foams they would like tested in this full-scale test, please contact us (FAATC) as well. We will put the test plan and information on this full-scale test on our website (www.fire.tc.faa.gov). We will need to know ahead of time if you would like to witness these tests.

Surrogate Testing and Proposed Certification Procedures for Altered Interior Surfaces – T. Marker

FAA Report # DOT/FAA/AR-TNO1/112 – "Heat Release and Flammability Testing of Surrogate Panels" discusses the difficulties associated with the fire test approval of renovated material systems. This report is available on the Fire Safety Branch website at www.fire.tc.faa.gov. A review of the information presented during the February 2002 Working Group meeting was given as well as a description of the report contents and the tests conducted during the research for the report.

Task Group Reports

Burnthrough Task Group Report – T. Marker

Summary of Discussion Items at Recent Burnthrough Task Group Meeting in Toulouse

Standardization of Stator Position

Additional testing by the Boeing Company has confirmed the findings of previous FAA testing with regard to the position of the internal H215 stator. The findings indicate that slight differences in the location of the stator can have a dramatic effect on the calibration (temperature and heat flux) profiles, and likely the actual test results. Boeing has constructed a simple device, which can be inserted into the end of the burner to measure the stator position/angle. The device will be shipped to the FAA Technical Center, where the FAA's position/angle will be indicated on the device and shipped back to Boeing for comparison. Following the comparison, a decision will be made on the standardized location of the stator. Devices can then be constructed with an indicator of the standardized stator location, and shipped to the participating labs.

Standardization of Intake Duct Length

The Boeing Company has determined that the absence of intake ducting used to supply fresh air to the burner will significantly diminish the accuracy and life of the Omega air velocity meter. This is due to the combustion products being drawn back into the burner intake during testing, contaminating the air velocity meter blades, and possibly deteriorating the bearing surfaces prematurely. For this reason, the Task Group has agreed to standardize the intake duct system. Previous FAA tests have determined that different lengths of intake duct can impact the amount of air entering the burner, so it will be in the best interests of the Group to agree on a standard length of intake hose to accommodate all labs. In order to accomplish this, we ask that each lab determine what the shortest length of ducting will be required for their individual lab, and provide the FAA with this information. We ask for the shortest length in order to minimize the impact on the burner performance due to frictional air loss.

Standardization of Intake Velocity Measurement

Testing conducted at the FAA Technical Center has shown that the position of the burner (facing the calorimeter, facing the thermocouples, or facing the test rig) can have a slight effect on the intake air velocity readings. For example, a reading of 2150 ft/min while the burner is in the warm-up position may result in a reading of 2100 ft/min when the burner is rotated into the test position. Recent round robin testing has confirmed the FAA's findings. For this reason, a standard methodology of measuring the intake air velocity follows:

1. Install Omega air velocity meter into intake airbox.
2. Install standardized length of intake duct onto airbox (see above).
3. Position Burner either in the temperature measurement position, heat flux position, or test position, depending on which measurement will be taken.
4. Turn the blower motor ON, making certain that the fuel and ignitors are in the OFF position.
5. Adjust the damper position of the burner to 2150 ft/min intake velocity while monitoring the digital read-out. This may take some care, as the intake velocity will fluctuate somewhat during the adjustment.
6. After adjustment is complete, tighten the set-screw on the damper to prevent further movement
7. Rotate burner to warm-up position, and resume with normal warm-up and testing.

Standardization of Heat Flux Mapping

During the recent heat flux mapping exercise (completed by only several of the participating labs), heat flux measurements were taken at 21 locations, in an effort to produce a "map" that could indicate the hot or cold areas of the flame. This information was plotted using the topographic function in Excel, in which an isotherm chart resulted for each lab. The results indicated a variety of flame profiles, with only a few labs showing any similarity at all. It was discovered during the Task Group meeting that a majority of the labs that participated in the effort all recorded the measurements slightly differently. Several possibilities exist for the dissimilarities in flame profiles, but the lack of a defined mapping process was probably the major cause. In addition, there was a wide range of mechanisms used to hold the heat flux transducer in place during measurement, which likely contributed to the diversity of results. For these reasons, a standardized mapping methodology is recommended as follows:

First, in order to ensure that the heat flux transducer is being exposed in a similar manner, it is recommended that the device remain mounted in the 6- by 12-inch fireproof mounting block. In order to record the heat flux at the various positions, we recommend that the entire mounting block with transducer be moved to each position. This can be accomplished using an adjustable holder for the mounting block, as shown in figure 1.

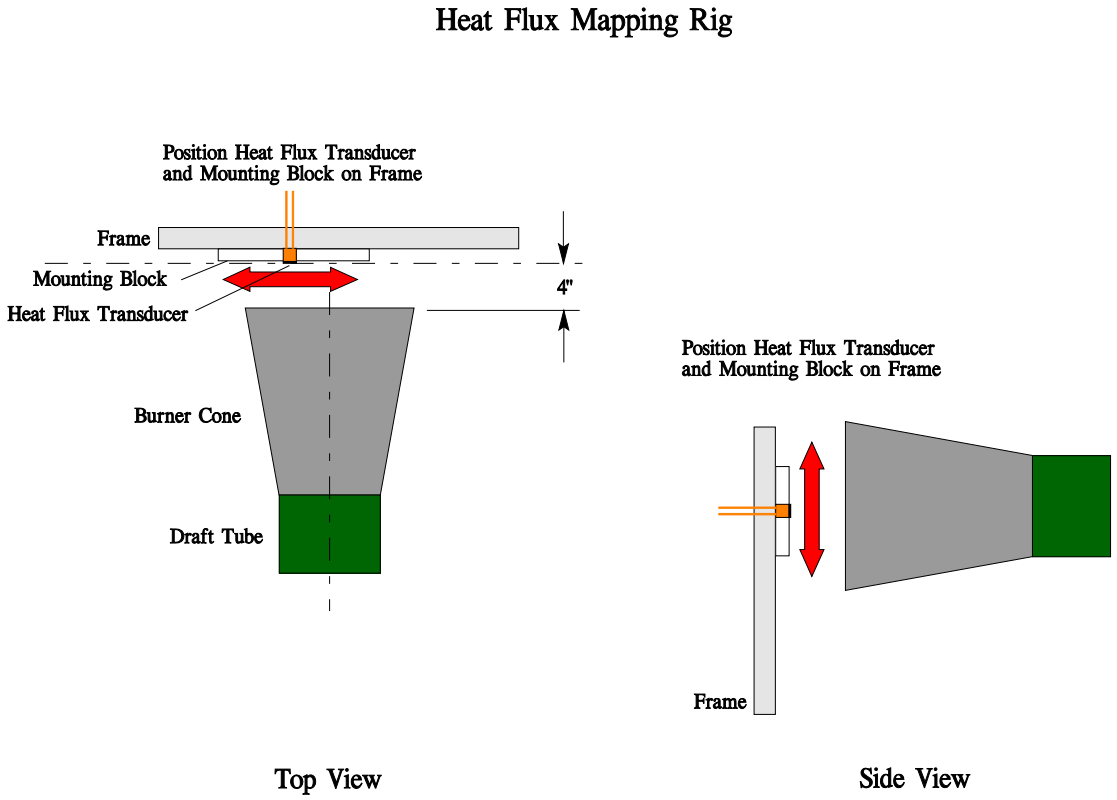

Figure 1. Heat Flux Mapping Rig

Second, we recommend that each of the 21 readings be taken individually, rather than during one continuous run. This will ensure that the heat flux transducer is exposed for only the required amount of time for each particular location. To perform the mapping, first adjust the intake air velocity to 2150 ft/min as described above. Following a 2-minute warm up, swing the burner in front of the heat flux transducer, and allow 1 minute for flame stabilization. After the 1 minute stabilization, begin recording data once every second for a total of 30 seconds. Shut burner off and swing away from heat flux transducer. The heat flux is calculated by averaging the 30 data points. Allow the burner sufficient time to cool before moving the heat flux transducer to the next position, and remember to clean the face of the transducer after each run.

Lastly, there appeared to be some confusion over the correct orientation of the mapping. The chart shown in figure 2 is viewed looking into the burner. For example, if you are positioned directly in front of the cone, looking into the mouth of it, position #1 is on the top left. If you are situated behind the burner, where the switch box is located, then position #1 is on the upper right.

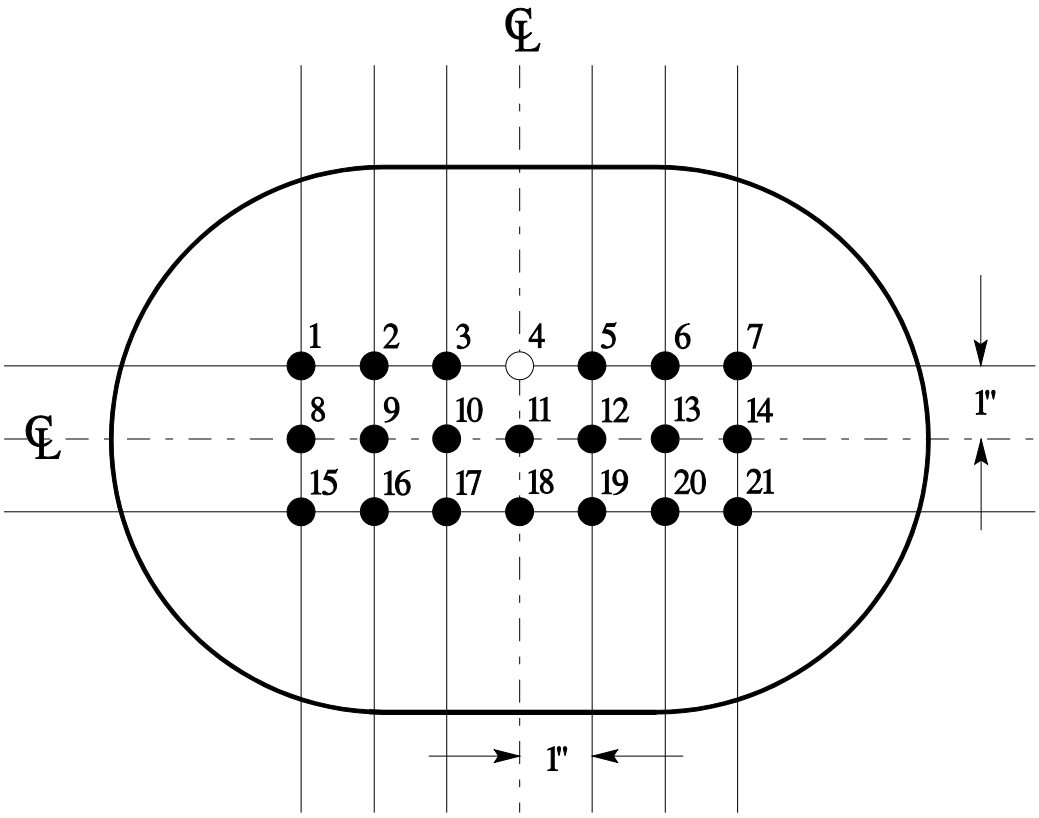

Figure 2. Heat Flux Transducer Positions for Mapping Burner Flame

Time permitting, the FAA Technical Center will also run some additional heat flux mapping trials at various air velocities, to determine if the flame profile is impacted by the intake air velocity.

Thermal/Acoustic Insulation Task Group – P. Cahill

This Task Group will conduct Round Robin 4. In Round Robin 4, this group will also run tests on the hook and loop separately in addition to the other tests run as part of Round Robin 4. A sample with the ventilation slit will also be sent to Round Robin 4 participants so all labs can see where the slit is on the sample. Kaowool will be used as the backerboard. Round Robin 4 will also conduct tests with two different CICs. Susahn Briggs (Boeing) has offered to help with the sample preparation for the samples with CIC application.

Quality Assurance Task Group – C. Lewis

We expect to have the report finalized within one month from this meeting and will discuss publication of the report with the FAATC.

Next Meeting – The next meeting will be hosted by Transport Canada in Ottawa, Canada, on October 9-10, 2002. Complete details will be available on www.fire.tc.faa.gov soon.