

# INTERNATIONAL AIRCRAFT MATERIALS FIRE TEST WORKING GROUP MEETING

MARCH 7-8, 2000

Hosted by Johns Manville,

TUESDAY, MARCH 7, 2000

Radiant Heat Panel Discussion – P. Cahill

The FAATC Electric Panel is not up and operational yet. We should have data from our electric panel testing to present at the next Working Group meeting.

Air Propane Burner

Due to the variations in types of materials, it is important to pay attention to the thickness of the sample to be tested, the placement of the sample, the location of the flame, etc. In fact, close attention must be paid to all details when conducting these tests.

A few modifications have been made to the test method since December 1999: flame location on specimen, flame immersion (flame pilot angle), flame profile, consistency of sample height, two-inch radius circle (measurement), and sample configuration, calorimeter specification and procedure, 'dummy' calibration sample.

Calibration Discussion

Dick explained calorimeter calibration discrepancies with new calorimeters recently purchased by the FAATC.

Radiant Panel Test Method Modifications under Consideration

Sample Thickness Accommodation: Eliminating the base material in the sliding platform (non-combustible material) and replacing it with a spring assembly in order to accommodate various thicknesses of test samples. Pat has been having trouble maintaining the level surface with some of the samples she most recently tested in her current test set-up. This will probably be changed on the panel in the future. M. Hirschler/J. Maillard: perhaps develop an adjustable height base for the test specimens.

Discontinue the use of the securing frame: This is nothing more than a large clamp. When Pat recently tested some thick samples using the securing frame, the test specimen was not the proper distance from the "zero point".

Measuring flame propagation to the left of the centerline of the ignitor flame:

Test Results

## Jehier Radiant Heat Panel Round Robin Test Results – V. Buffard/J. Maillard

Jacques and Vincent described their test apparatus/chamber set-up. They presented heat flux profiles for their electric radiant panel and gas radiant heat panel.

They (Jehier) presented the round robin test results for Round Robin Samples A-G. Pat presented the round robin test results for Round Robin Samples A-G. Pat and Jacques discussed the differences in pass/fail for each sample. Pat and Jacques each showed photos of the samples that were tested in each of their labs. Dick questioned the Jehier calorimeter calibration because of the burn length of the samples tested at Jehier. The burn length photos for each of the samples were compared and discussed. Dick suggested that the FAATC send Jehier a new calorimeter to check their calorimeter calibration against. This should be checked before conclusions are made on the comparisons of the round robin results from each lab.

Brian Grainger (Orcon) described the differences in size of Orcon's electric radiant panel and explained the reasons for those differences. The flame on Orcon's panel is different than the one used at the FAATC. Orcon has done some testing at a lower heat flux level and that seemed to be a more severe test for the thermoplastic films than a higher heat flux level.

We (FAATC) will take a look at the results of testing some materials at lower heat fluxes as compared to testing them at higher heat fluxes to determine which heat flux is more severe. Dan Trahan suggested measuring temperature at the sample in future round robin tests as well. Dick agreed that measuring the temperature at the sample was worthwhile.

## Seam Tape Test Results

Pat presented photos of the seam tape tests conducted at the FAATC. Pat showed a video of seam tape tests she conducted.

Dick explained that a test was conducted on some material from an aircraft that was involved in a fire incident. The metallized mylar tape that was on this material helped spread the fire when tested on thermoplastic.

Test results may vary depending on the material the tape is tested on. You will have to conduct your tests using the seam tape on the material that it will be used on.

## Burnthrough Standard Discussion – T. Marker

Tim reviewed the objectives of the test method as explained in previous meetings. Tim explained the discrepancies in calibration such as: cold-side heat flux, air intake velocity, and burner heat flux. The requirements have changed as we have learned more by conducting tests during the development of this test. Factors that can influence calibration: air intake velocity, air intake temperature, fuel flowrate, fuel temperature, instrumentation (calorimeter type), and position of ignitors and static disks, fuel type, and possibly environmental conditions.

Tim reviewed the latest calibration procedure prior to the start of the burnthrough round robin. Tim explained the reasons for measuring the airflow at the intake locations. Airbox details are available on the Fire Safety Section website for those who wish to build an airbox like the one used by the FAATC.

## Round Robin Burner Calibration Results

6 sets of 8 different materials were supplied to the labs (10) participating in this round robin so that each lab would have identical samples to test. All labs were pretty consistent on heat flux. Temperature profile comparison for the initial and final calibration was presented. Tim presented comparison results (initial and final) for the 8 materials tested. This information is on the Fire Safety Section website.

## Correlation Testing: Full Scale vs. Lab Scale

Is current configuration representative? FAATC did correlation using 6-GPH burner and 4-GPH burner (full scale vs. lab scale).

## Future Testing

Impact of heat shield?

\*Additional testing at a reduced burner output?

\*Correlation testing with additional materials (e.g.: Nextel, Curlon)?

\*Follow-up Round Robin test series?

\*These will be discussed in Burnthrough Task Group meeting.

## Discussion on Fastening Systems – D. Dodd

Darren reviewed problems Darchem Flare encountered during their participation in the recent Burnthrough Round Robin: 6-GPH nozzle problems included: fuel spillage, fuel spitting, excessive soot, and excessive fuel. Once these problems were discovered, Darchem Flare slightly modified their burner set-up; original burner set-up, 2.25-GPH nozzle, tab at top left, and 2600ft<sup>3</sup>/min. Results/Observations: no problems with soot during calibration and very repeatable tests.

## Fastening Systems Tests

Phase 1—Criticality of Overlap/Gap

Phase 2—Criticality of Fixing Methods

Darren presented results of the tests conducted using various fixing methods.

## Future Testwork

Through frame plastic pins and washers

Over-frame fixing clips

Rigid foam insulation systems

Influence of breaks in insulation systems

Becky Wulliman: Are you going to identify the fixings that work the best? Darren: We (Darchem Flare) were trying to keep them as generic as possible and tried not to name specific fixings so that

everyone went out and bought the same fixings. Dick explained that this research is being done at the request of the regulatory side so that guidance material may be written on fastening systems (are there generalities that can be incorporated, best way to install these fastening systems, etc.). We need input from this Working Group on other fasteners/methods to be tested. Richard Beckwith: Has that input been forthcoming? Theo Klems: How do these fixings perform during full-scale tests? Dick: Full scale tests were actually run to validate the Darchem Flare burner set up for this project so that full scale tests would not have to be run. Aplix will send Darren hook and loop fastening systems (with instructions on attachment) for future testing.

### WEDNESDAY, MARCH 8, 2000

#### Discussion on Seats – P. Cahill

Lantal contacted Pat in January with questions on seats with  $\frac{3}{4}$  dress covers. This Task Group will run some tests.

#### OSU Test Results – H. Betz

Hanns-Joerg Betz presented results of heat release tests conducted on galley panels. He presented photo documentation of the first 1 ½ minutes of the test. His summary states that decor material burned off within 10 to 18 seconds and the quality of the panel influenced by popping of the panel, bonding of the laminate, gas coming from the back of the panel, flaming area is also in the back area. He used video and photo analysis. He presented digital video of the test he conducted that showed the decorative material coming off the panel. A copy of his complete test report can be found on the website in the Materials Group-Presentations section.

Dick suggested that video be taken during the next set of OSU Round Robin tests in order to try to determine why there are differences in the results. After some discussion during this meeting, it was decided that this will remain open for further discussion.

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#### Potential Fire Threats Task Group Report – R. Hill

The majority of the discussion was concentrated on the Quality Assurance Task Group (due to Claude Lewis not being able to attend this meeting). However, the Task Group did agree that they will need to prepare a list of what the hidden fire threats materials are and if there are replacements available for these materials such materials include: materials that would go in fiberoptics, materials around ducting, shields around oxygen masks. What is the test that makes the most sense to raise the level of safety: is there an already existing test that can be used or will a new test(s) need to be developed? Task Group members were asked to send information and materials to Dick Hill at the FAATC.

#### Burnthrough Task Group Report – T. Marker

Overall, Tim was pleased with the first round of testing. The FAATC will fabricate the disks for participating labs so that they will all be uniform. Jim Davis is looking into getting some of the Jet A fuel analyzed to determine if there is a difference in heat output, etc., from different areas. The group will now test 4 materials in 4 tests each and continue with the 6-GPH burner. The data will be analyzed for the next Working Group meeting (June 2000).

## Radiant Panel Task Group Report – P. Cahill

Govmark will now be participating in addition to Jehier, Orcon, and FAATC.

We will have 2 electric panels and 2 air propane panels. This was not discussed in the Task Group meeting on March 7, 2000. This Task Group will investigate the use of the line burner utilizing the method described in the new E648 test method. We will follow the set up description in the new E648. We are going to investigate if the test apparatus is maintaining heat during the day. We will calibrate in the morning in three positions instead of the 10 calibration points described in the test method. We will also calibrate at the end of the day in these three positions. However, we will take a look at using thermocouples to monitor temperature inside the chamber during the course of the day. We will also do some calibration studies with the door open and with the door closed. We are going to take a look at a British test method that uses pins as well. A new calorimeter will be sent to Jehier and Orcon's calorimeter will be checked at the FAATC.

## Quality Assurance Task Group Report – R. Hill (C. Lewis unable to attend)

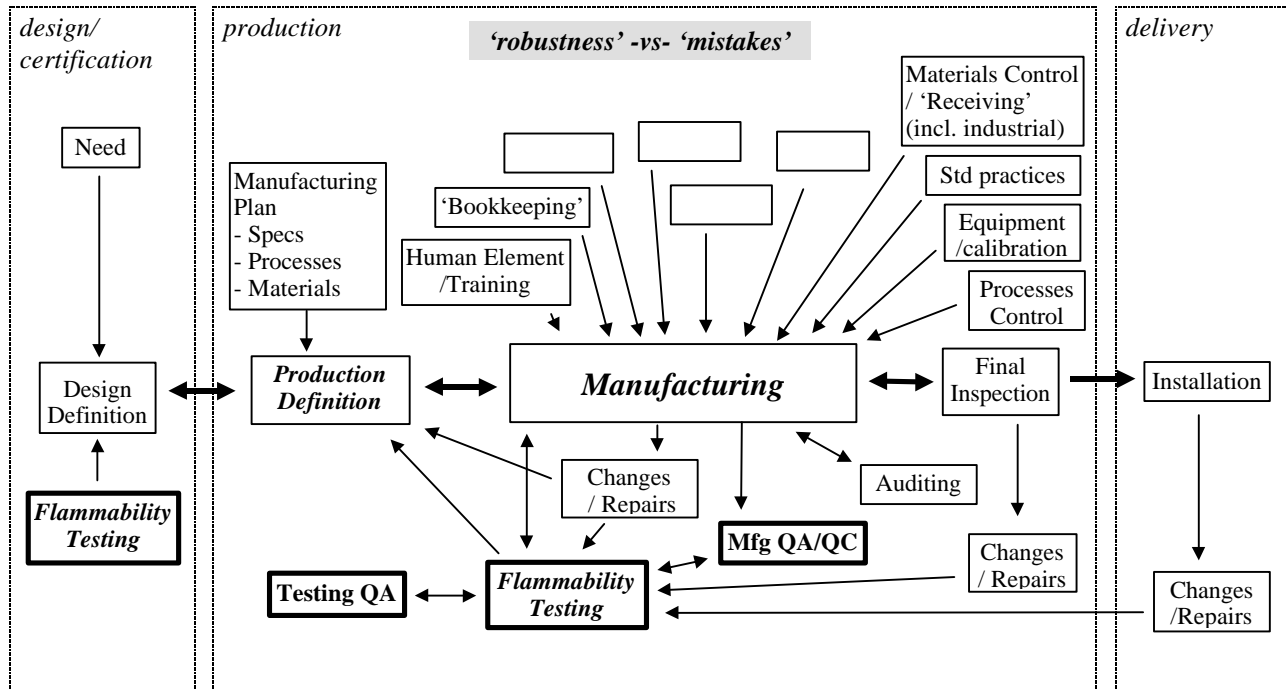
Discussion occurred on what exactly quality assurance is. Dick gave his interpretation of what the problem is: in order to manufacture a product, you will need to make engineering drawings that give all the specs and details, the product is manufactured, and the quality assurance department is responsible for checking the product against the engineering drawings to ensure that the product does what it's supposed to do, but a product gets purchased that does not do what it is supposed to do. There may be a problem with engineering if the drawing is not comprehensive or if there is something additional to what was on the drawing. Should procedures be changed in engineering or should something be changed in quality assurance? Jim Peterson: Q/A's job in aircraft manufacturing or parts manufacturing is to determine compliance to type design not compliance to the FARs. Airbus occasionally does tests in quality assurance to FARs. Scott Campbell: It might be useful for this Task Group to identify the thresholds of certain tests. There are still many questions as to how the Q/A system works and how it can be changed if necessary. Brian Freeman: Why don't you just build up a history (a day, a week, a month, etc.) like we do at Delta? Dick Hill: We are trying to determine if all those tests will need to be done or not. Are we confident enough that the information on the engineering drawings is sufficient enough for the end product to meet the FAR. Jim Peterson: Unless the problem/change is addressed in engineering, nothing will happen. Dick Hill: We will have to take the whole system (engineering through quality assurance) into account in order to ensure that the end product meets the FAR. This is what the Task Group should be looking at this time. There are a few different problems that need to be addressed.

Claude Lewis (Q/A Task Group Chairman) provided the following via email (he was not able to attend this meeting):

### **IAMFTWG - Denver, 7-8 Mar. 00 Production Compliance (Prod QA TG)**

*(As I am unable to participate in the subject meeting, I thought it would be useful to provide some thoughts on what the TG could try to address during this meeting. CL)*

- Development of process chart which captures the basic elements of the production of a component, from ‘design’ through ‘delivery’ (concentrating on the ‘production’ phase); below is a rough initial attempt at a possible approach, with some suggested basic elements:



Suggest developing through simple example process (e.g. for bin door or thermal/acoustic insulation), trying to identify as many factors/elements as possible (with inter-relationships)

- Identification of basic elements of a *fault tree* to allow determination of ‘weak’ points (which can lead to flammability performance degradation) in the process
- Input from as many segments of industry as possible (aircraft manufacturers, component manufacturers, product suppliers, etc.) regarding their *Production Compliance Programs*

#### Aircraft Materials Fire Test Handbook – A. Horner

The Handbook will be available on the Fire Safety Website on April 10, 2000. Click on: “Reports” or “Materials Group” to locate it. The report number is DOT/FAA/AR-00/12. Working Group members are asked to contact April Horner via email if they would like to request the Handbook being available on CD or to request a hard copy because they do not have access to the Internet. Please email your requests to April by March 31, 2000, at April.CTR.Horner@tc.faa.gov.

#### Aircraft Fire Protection Systems Working Group – R. Hill

This will encompass the International Halon Replacement Working Group. This group will discuss/investigate the other aircraft fire protection concerns such as fuel tank fire protection. Information on this working group can be found on the Fire Safety website.

### Additional Discussion

Theo Klems: The affect of humidity and moisture on insulation blankets should be addressed. Dick Hill: The FAA as an authority will not be addressing that issue. The manufacturers of these materials should coordinate their efforts with the airframe manufacturers to ensure these materials meet the requirements.

### Next Meeting

The next meeting will be hosted by BAE SYSTEMS in Woodford, England, on June 21-22, 2000. Additional information is available on the Fire Safety Section website.

### FAATC Fire Safety Section Website Address

[www.fire.tc.faa.gov](http://www.fire.tc.faa.gov)