INTERNATIONAL AIRCRAFT MATERIALS FIRE TEST WORKING GROUP MEETING

February 8-9, 2012

Hosted by Civil Aviation Authority of Singapore

WEDNESDAY, FEBRUARY 8, 2012

ARAC Update – R. Hill

ARAC was tasked with looking at the future organization of Appendix F of 25.853 with efforts towards simplification. Appendix F would be divided into Inaccessible areas and Accessible areas, hierarchy of tests, handle rogue samples, point to Aircraft Materials Fire Test Handbook for test methods, point to AC for each test requirement.

Task Group Session on Revised Cargo Liner Test – T. Marker

Now using sonic burner for this test. The new sonic burner apparatus has been constructed at the FAATC test lab. Development of initial set up and calibration of NexGenn burner to correlate with Park oil burner is in progress at the FAATC test lab. FAATC personnel will continue to refine burner settings (72 possible settings initially have been reduced down to a few possible settings – working on repeatability). Thermocouple degradation was observed – smaller/lower mass thermocouples are more susceptible to degradation. A large thermocouple test rig was produced to test thermocouple degradation and repeatability. Results of the thermocouple degradation tests run to date were presented. Next: complete testing of samples to ensure equivalency sonic to Park, average of NexGen test results must be within 5-10% of Park burner results?, check comments from KSN site and incorporate changes to test procedure, development of advisory material, and round robin. J. Peterson: what is it about the thermocouple that is ¾" or whatever size? T. Marker: the sheath is that diameter, not the wire gauge size. M. Spencer: are you going to use the same nozzles (Delevan) as the seat test so they are consistent? T. Marker: we are planning to use the same nozzles, and Delevan seem to work the best. We will also work on the igniters. D. Slaton: Have you run actual cargo liner materials with the baseline material? Are you going to share that data with the Task Group? T. Marker: yes, I showed some of the data and will share the data with the Task Group.

Task Group Session on New Flammability Test for Magnesium-Alloy Seat Structure – T. Marker

Development of a new test standard for Magnesium-alloy seat structure components is in progress. Issues/problems encountered with truncated cone: repeatability. Various sample configurations were tested (samples provided by Magnesium-Elektron). Hollow cylinder showed repeatability. Tim reviewed the planned activities. A drawing of the proposed magnesium alloy test configuration was shown.

Burnthrough and NexGen Burner Update – R. Ochs

Rob reviewed background for the development of the NexGen (sonic) burner. Spray nozzle: discussed with a spray industry expert/representative – several types of nozzles tested (Monarch, Delevan, Everloy and made comparisons between them). Everloy nozzles – more consistent flow. Planned work: comparative testing: position of choke muffler, sonic chokes of different throat diameter, fuel nozzles (Everloy, Delevan), cones (new vs. weathered cone), flanged vs. unflanged, thickness/steel type, exit plane shape.

Composite Structure Flame Propagation Test Method Development – R. Ochs

A drawing of the test rig was shown and described. Baseline tests were conducted using Kaowool board as the baseline (Nov. 22, 2011). P. Busch: Propagation? R. Ochs: We are not measuring

propagation like in the radiant panel test. P. Busch: How do you measure burn length? R. Ochs: comparison of panels tested – which one burned more and which one burned less. It's a comparison test. J. Peterson: Please explain what your rig is intended to simulate. R. Ochs: It is intended to simulate the hidden area – impinging on a composite panel. J. Peterson: is the test specimen intended to simulate a fuselage skin? R. Ochs: yes, a composite fuselage skin.
Experimental Setup: diagram of test setup and location of Gardon gauges. Vertical Radiant Panel (VRP) Development: Objective: to develop a "new" radiant panel type test that will: simulate conditions of a foam block test (incident heat flux on sample, duration, and geometry). Correlate results from foam block test. Photos of the VRP configuration were shown. Attempted to get heat flux gradient. This is an experimental test configuration that will correlate to the intermediate-scale test. It is by no means final.

Heat Flux Transducer Task Group – M. Burns

Mike reviewed the outline of the structure of the document (Chapter HF). Discussions during the task group session involved paint/paint thickness and its impact on calibration values, wet/dry film measurement techniques, paint thickness tolerance criteria and future round robin development (of calibration facilities). Agreement was made to remove non-mandatory language from the "Laboratory Environment" section of the document as well as a minor change to the "Required Reporting" criteria.

HRR^2 Task Group Updates – M. Burns

Mike reviewed the HRR^2 Improvement Plan Timeline: Phase I: November 2011 (completed) Phase II: November 2011 – January 2012 (completed), Phase III: January 2012 – May 2012 (Prototype Testing)

Further discussions included a summary of proposed changes to the apparatus: Thermocouple specification, overlap/second stage plate construction, insulation, airflow (Agreement was made to remove the Intermediate mixing plate/foam at the present time), changes to methane gas calibration process and method of determining heat flux – specifics of these are provided in the presentation available on the FAA Fire Safety website. What's next: Maintenance schedule guidance material, Chapter 5 Revision (Chapter HR) of the Aircraft Materials Fire Test Handbook and commencement of a new International Round Robin Test (OSU only).

Wiring Test – P. Glamoclija for P. Cahill

This test is currently under development. Test Specimens: wire or cable bundles are the preferred test specimens. The test specimen descriptions were explained. Test method and apparatus were described. A table was presented that outlined the test specimens used in this series of tests. A table was presented showing the individual cables that were tested. Results of all tests conducted were presented. Conclusions: results of these tests demonstrate that no significant difference in resistance to flame of electric wire or cable with Composite POLYTETRAFLUOROETHYLENE/POLYIMIDE insulation are noted when tested in the wire bundle configuration or as individual components, with different wall thicknesses or with different AWG. Recommendations were reviewed.

Aircraft Ducting – T. Marker for P. Cahill

Photos of aircraft ducting materials tested at the FAATC in 2011 were shown (manufacturers asked that these materials not be identified). The majority of these samples passed. More cooperation from Task Group members will be greatly appreciated. P. Busch: is air ducts or all ducts. R. Hill: ARACs thinking is all materials in inaccessible area that are not small parts or larger small parts will have to meet a test similar to a radiant panel or block of foam test.

Slide Evacuation Test Method TSO C69A – T. Marker for D. Do

Furnace Study: initially mentioned at the Savannah IAMFTWG meeting. Calorimeter study was done on one of the participating labs' calorimeters. This test is proposed to be included in the new Appendix F of Part 25 and is currently under review by one of the engineers at the FAATC who is talking with manufacturers and conducting tests and working on making the language more understandable.

Seat Cushion Test Method Update – R. Hill

Some of this is very similar to Tim Marker's presentation on using the sonic burner for the cargo liner, but this work is being conducted on using the sonic burner for the seat cushion test method. Flow tested new nozzles for consistency in flow rates. The nozzles are being tested in the sonic burner. Seat Cushion tests using sonic burner: data collected using Park burner and Monarch nozzles will be compared to data taken using new nozzles and sonic burner. Thermocouple Temperature Drift: thermocouple temperature measurements drop off after repeated heat cycling. Fuel nozzle flow rate check: comparison of Delevan nozzle and Everloy nozzle. Igniter wires were investigated: position of wires, wire length, etc. Refining burner settings: same procedure used for the cargo burner. The results of Seat Cushion Testing: comparison: Park vs. initial setting vs. revised setting (3 materials). Next Step: to start Round Robin testing.

Radiant Panel Test for Thermal/Acoustical Insulation – R. Hill for P. Cahill

The Task Group discussed pros and cons of smaller sample sizes. The Test Method is on the KSN site. There are a few differences between Airbus and the FAA test methods. Pat would like the Task Group to discuss the three position check and flame propagation measurement itself. Pat conducted tests with a shorter length sample and it does not work. A full length sample must be used. There was a difference in the test results for certain materials if you shorten the panel.

Bunsen Burner Task Group – R. Hill

Additional information was posted to the KSN site two meetings ago. We are in the process of reviewing the comments we received. However, the ARAC is leaning towards the need for the 60-second and the 45-degree to be included. As those of you who are in the Task Group know, we were only looking at the 12-second test, so we will need to look at the 60-second test and the 45-degree test, also. We might want to consider having three separate Chapters in the Workbook (ask Tim what name he wants to use for it). We plan on having the draft of the final version on the website prior to the June 2012 IAMFTWG meeting. Prior to the June 2012 meeting, we will put the test methods on the FAATC Fire Safety website. This way everyone will be able see the Test Methods prior to the June 2012 and can bring comments to the meeting. No worries about lost passwords, etc., like with the KSN site issues.

Development of AC Materials for Cargo Liner Testing – R. Hill

This is for the present amendments (not for the future like the test methods previously discussed during this meeting). We will be forming this new Task Group now and it will be a fast-track Task Group. The TG will deal with 25.855 ceiling and sidewall liner panels for Class C cargo compartments.

THURSDAY, FEBRUARY 9, 2012

Cargo Liner TG – T. Marker

Discussed: baffles and how they are used – better language needed in new Workbook & better definition of what a blank material would be. Correlation of new burner back to old burner – how do

we ensure this correlation? Thermocouple degradation issues – do we need thermocouples with new equipment – can we loosen up on the specifics of the thermocouples – use of slug calorimeter – FAATC investigating these. Igniter wire study ongoing.

Magnesium-Alloy TG – T. Marker

Discussed: Bruce Gwynne will be delivering new samples to FAATC next week to continue test program. Task Group to revisit smaller diameter tubes. No coating on base material. Once the Standard is finalized, the method will be included in the present Aircraft Materials Fire Test Handbook. Standardization of this Test Method: standardize test apparatus, the mandrill, type of talc.

Burnthrough TG – R. Ochs

Discussed: Inclusion of certain items in new Workbook: restraining the insulation blankets during the test in case they balloon out during test, gathering database of videos of burnthrough tests and including these videos on FAA Fire Safety website and in the Workbook. Possibly doing more comparative testing and comparison of fuels (do another study with more fuel types). We hope to have a draft version of the Test Method on the FAA FS website prior to June 2012 meeting. Discussion of a newer, universal material for calibration – something a little more universal.

In-Flight Flammability Test Method Development TG – R. Ochs

Discussed: Fundamental problem with correlation from intermediate to lab-scale test, new test method development with vertical radiant panel to create better database for June 2012 meeting (to discuss then).

HRR^2 (OSU) TG – M. Burns

Discussed: Agreement on increasing the uniformity for corners, agreed on having a telecom or meeting with all manufacturers of current OSU apparatus and standardize on certain parts of the apparatus, talked about the intermediate mixing plate and the airflow problems we are having and agreed to remove at this time, we are going to have better clarification on calculation for heat release in new Workbook.

Heat Flux TG – M. Burns

We agreed to remove non-mandatory language, we came to agreement on dry film requirement, minor modifications were made to the reporting criteria.

Wiring TG – R. Hill

Discussed: we agreed that there should be some additional tests done with wires that are closer to the pass/fail rather than to just test the wires and agreed that a single wire would probably be sufficient if we get good enough data with the wires that are closer to the pass/fail, additional work needs to be done on testing tie wraps and a possible recommendation on spacing of tie wraps if they are not required to meet the requirement.

Bunsen Burner TG – R. Hill

Only a couple of the TG attendees today are regularly involved in this TG. The Test Method will be posted to the FAA Fire Safety website prior to the June 2012 meeting, so people can comment on it during the June 2012 meeting.

Seat Cushion TG – R. Hill

We discussed a Round Robin. Any lab interested in participating in the Round Robin should send an email to April Horner (april.ctr.horner@faa.gov) or Dick Hill to express their interest in participating. If there is anyone out there who would like to supply additional seat cushions, please contact us, also. We would welcome more. We will specify what information we want from the participating labs prior to the Round Robin tests (what type of fuel lab is using, clocking, etc). If possible, labs are asked to video the tests. We talked about previous results and where we are going with this work. RR timeframe: we will get procedures and send seat cushions out before May 2012 with hope of getting data back before the June 2012, but some labs were not sure they could have the data by June.

AC For Cargo Liner TG – R. Hill

We fast-tracked this and asked all interested parties to make a list of all the components, pieces, parts that they can think of that they have to run certification tests on and do they think it is necessary to always run a certification test on this piece, part, etc., and what they would recommend to prove compliance and have that information back to us by the 2nd week in May 2012. FAATC will compile this before the June 2012 meeting. We discussed including the sonic burner in the AC which we will do. We discussed barrier to keep fire extinguishing agent in compartment. This is an AC for now (today) and not for the other work we are doing on for future. Tim Marker: how will this tie to the new test method. R. Hill: if there is little variation from this to new, then it will just be a drop-in to the new.

Radiant Panel TG – K. Notestine

There have been a lot of comments on the Test Method itself. There hasn't been too much comment from Pat Cahill or others, so we'd like to get a telecom or something going for clarification. We think there are a couple of drawings that could be useful if added. Kaowool board is not available worldwide – take the trademarked material out of the test method (should be based on specifications and other characteristics of the material), take trademarking out of Gardon gauge as well. There is still a lot of confusion on tolerances for the geometry. We would like to press forward with this list of concerns and clarifications. We really would like to set up a telecom with Pat to get her and the other TG members who were not in attendance today to get these issues/questions addressed and clarified and any others those not in attendance today may have.

Discussion on Format of New Test Method "Workbook" – T. Marker

New Appendix F to Part 25: anticipating ARAC/FAA discussions, the new Appendix F will be:

Better organized
Threat based
Include new requirements for materials in hidden areas

It will have similar format to current Aircraft Materials Fire Test Handbook.

Tim provided a potential outline of how the new "Workbook" will be formatted. It will also include a General Section – description of apparatus, schematics, detailed drawings, sources for obtaining this equipment. Main purpose of General Section: eliminate redundancy.

Noteworthy differences between old Handbook and new Workbook was highlighted.

General Discussion on Timeline – R. Hill

The work we are discussing now is for the future not for the present. Dick explained in more detail the length of time it may take before the new Part 25 and new Workbook will become the Requirement.

To put this into perspective, a vast majority of aircraft between now and 2050 will have to meet the present standards and not the new Part 25 and new Workbook.

AircraftFire Programme – European Union Framework 7 Research Project – G. Greene

It is a European Union Framework program. This is the mechanism for funding research and to get research organizations across Europe working together. These tend to be quite long durations. The budget is for seven years and is 50.5 Billion Euros and covers all types of research. It is designed to respond to Europe's employment needs and competitiveness. *AircraftFire*: it is a science program started January 2011 – 5 Science Work Packages. Graham reviewed the Main Objectives of the *AircraftFire* Programme. Graham provided some details on the specifics of the *AircraftFire* Programme including: to characterize the physical/chemical/thermal properties of composites and polymers onboard aircraft, fire model (developed by University of Greenwich), Evacuation Model (EXODUS), Detection (sensor signal processing: particle sensors, gas sensors, etc). Current Work and Plans: materials procured and testing about to commence. A copy of Graham's presentation is available on the FAA Fire Safety website with the presentations from this meeting.

Flammability Standardization Status – J. Gardlin

Most everything has been compiled and submitted to the FAA. Most of the work is done, and Jeff is hoping to have something this year if no priority work comes in. The final format will be an FAA Policy Statement.

Final Discussion – T. Marker

No additional questions/comments from attendees.

Next Meeting

June 20-21, 2012
Toulouse, France
Hosted by DGA Aeronautical Systems and Airbus