

INTERNATIONAL AIRCRAFT MATERIALS FIRE TEST WORKING GROUP MEETING

Hosted by DGA Aeronautical Systems and Airbus France

JUNE 20-21, 2012

WEDNESDAY, JUNE 20, 2012

ARAC Recommendations – J. Davis (Accufleet/ARAC Chairman)

Materials Flammability Working Group (ARAC TAEIG)

Jim gave the background of what this ARAC was tasked to do. ARAC team members were identified. A draft report of the ARAC Recommendations has been prepared and circulated to ARAC members. Jim's presentation mentioned: current Aircraft Materials Fire Test Handbook thoughts, proposed flammability test manual, benefit versus cost, Boeing Chart-New Regulations Timeline, compliance effort reduction (i.e.: FSTG). Jim reviewed 7.0 of draft ARAC TAEIG report Section 25.853. P. Glamoclija: you mentioned tie wraps are a small item and there is no need to test them – what if there are a large number of tie wraps? J. Davis: we had a considerable amount of discussion on this. This is one of the areas where we did not reach a consensus. We had about five different thoughts on this, but we didn't come up with a final group recommendation on this. This is one of the topics where we recommended additional discussion/consideration/etc. P. Busch: did you discuss fire source? J. Davis: we are going to propose that additional work needs to be done. We like the FSTG model where they did some test series. P. Busch: I think that in the first step the fire source has to be defined and then you can correlate the test once the fire source is defined. Q: Hierarchy of tests – which method is applicable? Is it recommended that for structural-type materials: use oil burner and panel-type materials: use the heat release test. J. Davis: we had considerable discussion on this. We struggled with using the word 'hierarchy', because some materials such as panels may also be part of seat, so would you do an OSU test or an oil burner test. Maybe do a test series. Q: what would be the criteria for the oil burner test if you test a structure? J. Davis: this is getting into testing for magnesium seat structure or composite seat structure. The FAA and Magnesium-Alloy Task group are working on a test method for magnesium seat structure. Composite seat structure: does there need to be another specific test for this type of seat structure, is it a separate issue, or can it be encompassed in the regulations we have. P. Short: 25.853 will cover in-flight fire threats and post-crash fire threats, yes? And, the Handbook will be retained – what is the Handbook going to be doing? J. Davis: regulation, test reference, Handbook, AC material, - this layered approach with all of these types of documents allows for amendments of the living documents, so things are not just bound up in the regulation. P. Short: so what would take precedence? Seems a very confusing way to make things simpler. J. Davis: if you have a broad statement in the law, in-flight threats must maintain ability for a safe landing. The reason you want that broad statement, is if we come up with a new type of aircraft in the future, we want to have an open-ended regulation so new or advanced materials can be addressed in the test reference and Handbook defines best practices and AC shows compliance to the law using such methods as you would find in the Handbook (some of this response provided by S. Campbell). J. Gardlin: we now have regulatory, multiple ACs, Fire Test Handbook, and Appendix F. In the future the role of each of the multiple documents will be more well-defined. The way we are envisioning it, it will be a lot more straightforward

and easier to follow. P. Short: where would special conditions on seats be listed? J. Davis: the hope of this new structure and clearer language is to make it easy to see what the regulation is and eliminate the need for the special conditions language. J. Gardlin: this will affect new Part 25 aircraft.

Cargo Liner Oil Burner Test – T. Marker (FAATC)

Tim reviewed the oil burner testing done using a number of stator, nozzle, and settings and positioning and the results of these tests. Ignition wires: standardized wire positions improve repeatability. Sonic test results still show higher temperatures. The results of park and sonic burner tests on different materials were reviewed. Tim described the revised stators. He mentioned the flame retention head. Rob Ochs will describe this in more detail during his presentation. A thermocouple calibration unit is currently on order. Planned activities: continue development and testing of flame retention head and conduct testing of cargo design features to support development of advisory material. B. Wulliman: you need to have some sort of check especially when testing at altitude. D. Hill: mass flow is identical out the back with the sonic burner - that's how it works. These settings are unique for the cargo liner test. D. Hill: there are two different things we are talking about when we are talking about cargo, seat, burnthrough, etc.,: today and for the future. Things like the flame retention head may be mandated in the future, but not at this time. D. Slaton: suggested separate out what is for current use and what is presented for potential future use.

Magnesium Alloy Test – T. Marker (FAATC)

Tim reviewed the history of the magnesium test program at the FAATC. He discussed the issues that arose when testing the various shapes since the beginning of this project. Photos of some of the magnesium thicknesses/materials tested were shown. Conclusions: the weight loss criteria provide additional accuracy. Planned activities: additional tests on most appropriate thickness of the bars and finalize additional test parameters. P. Busch: have you also measured the diameter of the cylinder and skin thickness? T. Marker: yes, we have tested a few different.

Composite In-Flight Flammability Test – R. Ochs (FAATC)

Lab-scale test method development: foam block fire source was characterized by measuring the heat flux gradient. Objective: to develop a 'new' radiant panel type test that will simulate the conditions of a foam block test. Modifications to VRP since February 2012: swivel doors, 4 Schmidt-Belter gauges, A multiple flame let burner like the one used in the NBS Chamber was tested. Observations: panel heat flux needs to be tweaked some.

Burnthrough/NexGen Burner – R. Ochs (FAATC)

Rob presented results of NexGen burner comparative testing. Object: to determine which cone parameters have an effect on burnthrough time. A series of tests with an insulated cone was conducted. Summary insulated cone: flame temp increased by about 85 degrees F. Burner Cone Comparison Summary: All cases tested reduced burnthrough time. Stator test series: A new stator was put in the exact position as the old stator. Ignition wires were completely removed from the burner. Optimization of position of new stator: took temp profiles at each of the axial rotations. S. Campbell:

did you do flux measurements? R. Ochs: we did not do flux measurements. Flame Retention Heads (FRH): Beckett flame retention heads were purchased from local supply store. These are used on modern oil burners for more efficient burning. They can be used to create inefficient fuel rich burning that we are looking for.

FRH for Cargo Liner and Seats – Tim Salter (FAATC) ran this test series. He saw higher backside temps.

FRH for Seat Cushion Burner – Tim Salter ran this series. He saw good repeatability. Three different types of seat cushions were tested for comparison with the Park oil burner. J. Davis: did you put the infrared camera on the set up with no igniters? R. Ochs: no.

Rob took some PIV measurements during this test series and has the data to present if anyone is interested.

Heat Flux Calibration Heat Release Rate (HR2) Task Group Updates – F. Schall (Go mark) for M. Burns (FAATC)

Fred reviewed the updates to Chapter HF (Heat Flux). The TG has been going through the old component drawings and specified material thicknesses. The list of old, new, and industry standards was presented. HR2 Standardization of Components: the mounting method and width and angles of clips for the sample holder have been standardized. F. Landroni: will this be mandatory. F. Schall: this will be part of new Appendix F for new certificated aircraft. F. Landroni: I didn't see any tolerances in the drawings. F. Schall: I will discuss this with the Task Group tomorrow.

Radiant Panel Test for Thermal Acoustic Insulation – P. Cahill (FAATC)

Sample substrate boards – numerous high temp boards are used to place the sample on when testing in the radiant panel. The FAA has called out Kaowool M™ board since the test was first developed. Pat conducted substrate board testing on different substrate boards. Several video clips of these tests were shown. Pat presented a table showing the Superwool® Regulation by Country. She discussed some of the future considerations. Upcoming Round Robin will include: Film cover and tape (Sample A), film cover and tape (Sample B), three different double-sided tapes (Samples C, D, and E), and hopefully, foam. We plan to include as many labs as possible (aiming for 25-30 labs). New boards must be heat treated to remove or 'heat off' the starch. P. Busch: what is the cleaning procedure for the boards? P. Cahill: The boards against the walls do not create dust or the internal chimney. I would not worry about chamber lining and internal chimney materials.

Wiring Tests Overview – P. Glamoclija (Bombardier) and P. Cahill (FAATC)

Petar reviewed tests performed on individual wires and cables and on bundles with 7 wires and 7 bundles. Conclusions: these tests demonstrate no significant difference in resistance to flame of electric wire or cable with XLETFE. He explained the Task Group recommendations. Pat reviewed the tests she conducted on non-aviation grade wires. P. Busch: which of these wires do not fulfill the 60-degree test? P. Cahill: to be honest, I did not go back and run 60-degree tests on these wires prior to this test series. Discussion plans for tomorrow's Task Group meeting were outlined. G. Danker: haven't we covered many times materials that pass tests by a disinvolvement/withdrawing themselves from the test? P. Cahill: Yes, we have. M. Spencer: I think using this test for the sleeving is very extreme.

Slide Evacuation Test Method: Review of Round Robin 1 – P. Cahill for D. Do (FAATC)

The Round Robin results were presented. Round Robin 2 materials are currently being distributed. Four labs will be participating. The results of this Round Robin will be available for the next Working Group meeting.

Seat Cushion Test Method Update – R. Hill for T. Salter (FAATC)

Finalized sonic burner settings for Park replacement for seat cushion tests. Tim looked into options to increase test repeatability. Seat cushion testing: new shipment of seat cushions for testing (Dax, Airflex, and fireblocked cushions). Park and sonic burner used for tests. Sonic results very similar to Park results. Seat Burner comparison results were presented. No further testing was pursued on stator. We will be looking into flame retention head in the future. Four labs have indicated interest in participating in the Round Robin. Each lab was shipped a Delevan 80B 2.0 gph fuel nozzle to use for testing. Future items: compare Round Robin results. We have calibration data back from 2 labs. We will work on flame retention head development.

Bunsen Burner Tests – R. Hill (FAATC)

The write up on “how you measure burn length” will go into Advisory material. The regulation will tell you to measure burn length. We had assumed that we were only going to have one Bunsen burner test, so we may have to go back and look into adding some of the other Bunsen burner tests back in. We do not intend to have a Bunsen burner Task Group.

Develop AC Materials for Cargo Liners – R. Hill (FAATC)

We will discuss within the Task Group how we are going to proceed. We had previously agreed that all participants would send us all the areas they thought should be addressed in an AC about one month prior to this meeting. We only received a presentation from one participant. We made some phone calls, and received a little information from a second participant, and Friday I got information from another participant. We have assigned our co-op student, Steve Rhen, to conduct tests on what we want tests conducted on based on the Task Group input we received. If you haven't submitted your input yet, do so quickly, because Steve will begin the test program very soon.

THURSDAY, JUNE 21, 2012

Task Group Reports

Magnesium Task Group – T. Marker

The group recapped the test results. For the mag standard, we decided that the raw material (basic material) would have to meet the test and the form (shape) would have to meet the test. After Tim writes the standard up, what is next step? Tim believes that getting it into the current Handbook is what should be done. We also decided to run some tests on mag with various roughnesses and see if there's a difference. We will run a round robin later. If anyone is interested, contact Tim Marker.

Cargo Liner Test – T. Marker

Round Robin: There are about 3 labs that would be ready to run a round robin. The FAATC would request calibration data from each lab prior to them participating in the round robin testing.

Burnthrough Task Group – R. Ochs

We mostly discussed the burner

Composite In-Flight Flammability Test – R. Ochs.

Foam block fire source was discussed: characterize the foam itself. Rob will send Dan Renninger a sample of the foam block to characterize. The vertical radiant panel test was also discussed. The burn length measurement was discussed.

Wiring Task Group – P. Cahill

We discussed the wire sleeves. AC-4313 Wire AC was also discussed. Pat is going to contact the wire manufacturers again to let them know there will be a new test coming up. We discussed tie wraps. Pat agreed to try testing a wire in the vertical radiant panel. P. Busch: Is there any correlation to the 60-degree test? R. Hill; in the future we are designing the test for the threat not the materials that are available, because what is available may change.

Radiant Panel Task Group – P. Cahill

We talked a little about the AC, measuring flame propagation, rule of seven, warp and fill directions (having enough data), substrate material.

OSU/Heat Flux Group – F. Schall

Chapter 2 document was discussed. The document is essentially finished now. Chapter 5 was discussed. Some decisions were made to move forward regarding calibration. Since the main document contains performance language, so we feel that the part references are not necessary. The language in the Supplemental documents will be reviewed for redundancy and clarification.

Cargo Liner AC – R. Hill

We got permission from the labs that supplied documentation prior to this meeting to share these documents with the rest of the group. Boeing offered for Steve Rhen to visit plant.

Seat Cushion Test – R. Hill

We discussed finalizing the round robin. It was suggested that the FAA come up with a Policy Letter to state that the NexGen burner is acceptable for seat and cargo liner tests if it meets certain qualifications/specifics. We will start collecting information for the AC that will be worked on later. The group discussed showing similarity of composites that

are made up of numerous components. What is the interpretation on lounges/births, etc.? – more guidance needed on these.

HR2 & OSU Round Robin Preliminary Results – R. Hill for M. Burns (FAATC)

Dick presented and discussed OSU/HR2 comparison data. He presented the results of the OSU round robin. Three of the thermoplastic materials tested in the round robin are the exact same material except for the color (material: glossed P3 texture). The difference is one is sky blue, one is black pearl, and the other is chiffon. P. Busch: do you have information on the chemical breakdown of the color? R. Hill: no, you'll have to ask the manufacturer. M. Miller: a lot of supplemental information like heat flux gauge manufacturer, etc. Is that going to be compiled, too? R. Hill: he compiled all of that data and will send it to the participating labs for review.

IAMFTWG Policy Memo Update – J. Gardlin

Proposed policy was released 8/20/09

Divided into 2 parts: Part 1 FAA accepted MOC, Part 2 MOC that need data to formalize acceptance.

FSTG formed to generate the data to support 'Part 2 Items'.

Data generation and extensive and rather time consuming, approximately 900 pages of reports.

Current Status:

Final Policy is drafted.

No more Part 2.

Summary: Policy statement is a synopsis of the MOC. An AC is probably needed to further develop discussion of the MOC. Once policy is issued, we will work with for a little while before initiating an AC. Significant effort to produce the data and guidance by all involved.

Q: what about EASA and other authorities adopting this? J. Gardlin: some of the other authorities are aware of this. Until it is published, it's hard for other authorities to determine if they will accept it.

Heat Flux Study and Flame Propagation Evaluation of Composite Materials – D. Slaton (Boeing)

Dan reviewed this work done by Boeing. A heat flux study was conducted, and a test method comparison was done. He presented some of the data from the tests conducted at Boeing (a range of composite materials were tested-sidewall panels and stow bin panels). Some post-test photos of the materials were shown. The Meeker test results and post-test photos were presented. Plans for some of the future testing with the Meeker burner were discussed. A copy of Dan's presentation is available at www.fire.tc.faa.gov.

Next Meeting

October 16-17, 2012

Hyatt Regency Indianapolis

One South Capital Avenue

Indianapolis, Indiana