INTERNATIONAL AIRCRAFT MATERIALS FIRE TEST WORKING GROUP MEETING

MARCH 1-2, 2011

Hosted by Gulfstream Aerospace, Savannah, Georgia

TUESDAY, MARCH 1, 2011

FAA Coordination with ARAC (Aviation Ruling Advisory Committee) – Jeff Gardlin

ARAC Activity: this is a forward-looking activity intended to take a fresh look at the whole subject of material fire safety of transport category airplanes taking a threat-based approach. The ARAC makes recommendations to the FAA. ARAC does not make rules. Q: what is the coordination plan between the work being done here (by the Task Groups) and the work of ARAC? A: The work being done by this Working Group relates to the current rules. The ARAC is focusing on the future using a threat-based approach. The ARAC group is reviewing fire test standards from other industries. Q: George Danker asked for an example of something potentially being reviewed by ARAC that would not be a recapitulation of old requirements. A: Appendix F is a collection of test methods. What materials are considered accessible or inaccessible to a person trying to combat an in-flight fire? Depending on whether the materials are considered accessible or inaccessible, it could be determined which test method to use on those materials. Q: Heinz-Peter Busch – what is the real intent behind any potential new requirements, a higher safety standard? A: Improve the level of safety and to simplify the requirements as much as possible so that the tests are only being done as necessary and not doing multiple tests on the same part and making it easier to determine which tests should be done on which part/material. There will be more coverage than there is now of parts that are affected by the rule partially because the current requirements may not screen out good materials from bad materials – the standard should screen the bad ones out. The simplifications will eliminate redundant testing and enhance the screening process.

ARAC and IAMFTWG Activities – Dick Hill (FAATC):

IAMFTWG focus on: How to test

ARAC focus on: What to test & When to test

Refer to Slide #2 of this presentation: "Possible New Appendix F Structure"

The intent is to simplify the test methods as much as possible. Task Groups should prioritize how to test from the large parts/materials down to the smaller parts/materials. Focus on making the test method generically as good as it can be. If you have specific concerns, talk to someone who is in the ARAC.

Task Group on Cargo Liners – Tim Marker (FAATC)

Background of development of Cargo Liner test method. Proposed structure of Oil Burner Test for Cargo Liners Test Method. Highlights of changes from current Aircraft Materials Fire Test Handbook cargo liner test method. Use of sonic burner, change in thermocouples to 1/8". Testing of patch repairs – how to test. Testing of seams, joints, fastening systems located in sidewall configuration. Testing of corner joints. Testing of lighting fixtures and lamp assemblies. Diagram of possible future burner configuration for cargo liner tests.
Planned activities: complete construction of apparatus using sonic burner parts from Marlin Engineering. Conduct temperature calibrations with set-up parameters obtained from seat burner

trials. Begin test trials using various cargo liner samples from MC Gill. Compare results with FAATC Park burner apparatus. Conduct round robin?
Q: Is the Task Group going to be involved in the types of liners (liner materials) that will be tested within the Task Group? A: We can discuss these during the Task Group meetings.

New Flammability Test for Magnesium-Alloys – Tim Marker (FAATC)

Recap of Magnesium-Alloy test program to date. This is part of Postcrash Fire Threats section. Flammability Test for Magnesium Alloy Seat Structure for New Appendix F – review of sections needing additional information/investigation. Change to 1/8" thermocouples. Specimen configuration, specimen number, specimen size. Planned activities: continue to update sonic burner with set-up parameters obtained from seat burner trials. Continue testing of various magnesium alloys, experimenting with different shapes. Q: have you looked at alternate tests to an oil burner test? A: this test method is traceable to a full-scale test. You may not have the flame exposure with other test methods.

Burnthrough and NexGen Burner Update – Rob Ochs (FAATC)

Background, objective. Review of initial concept of sonic burner. Fuel type comparison. Description of tests conducted. Q: Jeff Smith – have you ever tested with kerosene? A: we can do an informal survey within the Task Group to see what everyone is using and what they would like to try. Overview of new CNC Stator and Turbulator from Marlin Engineering. FAATC will get a machine shop to build these parts based on their 3D CAD models. If this is successful, we will go ahead and make the 3D CAD files downloadable from the FAA Fire Safety website. Task Group update: a draft test method was uploaded to the KSN site. It includes descriptions of test procedure, definitions, etc.

Development of a Flame Propagation Test Method for Structural Composite Materials in Inaccessible Areas – Rob Ochs (FAATC)

FAATC developed their own intermediate scale test rig to simulate an inaccessible area in an aircraft. Flat panels of composite material were tested due to the high cost of curved panels. A baseline test was conducted aluminum vs. ceramic fiberboard. Non-aerospace and aerospace grade composite materials were selected for the next set of tests. Radiant Panel tests were also conducted. Task Group Update: general test method description was posted to the group's KSN site including general descriptions of apparatus, definitions, basic calibration, etc.

Heat Flux Calibration Task Group – Mike Burns (FAATC)

An interim Aviation Heat Flux Calibration Standard was developed. Mike provided a brief history of the heat flux calibration situation. The Task Group is considering possibly including Schmidt-Boelter type gages. Principle of Operation – possibly include thermopile. A Radiant Panel Validation Study was conducted at the FAATC: 2 Vatell, 1 Medtherm, 1 Hukseflux were sent to NIST for calibration. Future Work: continue to look at Schmidt-Boelter type gages, install gages into OSU & NBS.

WEDNESDAY, MARCH 2, 2011

Status/Updates from Task Group Leaders:

Cargo Liner Task Group – Tim Marker

The TG talked about which labs will set up sonic burner for cargo liner test (5 or 6 labs). Airflow requirement inside the lab was discussed. The need for an established maximum airflow around the test apparatus/article was discussed. Ethel Dawson and Tim will continue working on the various nozzles. 400 degree backface temperature requirement was discussed. Eventually, we would like to run a Round Robin.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Dick Hill: Some Task Group members seem to be mixing what is being done today with what they believe should be done later. Some advisory material may be needed. The advisory material will probably be developed by the Regulatory side. Remember, the Task Groups are should be working on making the test methods the best they can be. Dan Slaton: It seems that you cannot develop some of these test methods without thinking about what the guidance material will be.

Magnesium Seat Frame Flammability Task Group – Tim Marker

Some Task Group members felt the conical sample was too simple. There was some additional discussion during this status update regarding the shapes of the test samples that should be used.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Dick Hill: The point you are missing is that when you look at full scale tests, we are not worried about the time it takes any of these components to ignite, what you should be worried about is how violently they burn and how much time they burn and if they self extinguish. We are correlating to full scale in these tests.

Burnthrough Task Group– Rob Ochs

Burner: Marlin Engineering currently manufactures the stators and turbulators and has offered that we can use their drawings to post to the Fire Safety website. Burnthrough: we discussed determining the situation for rogue failures, should the material have to pass 5 out of 6 tests? Determining exactly when the burnthrough happens can be difficult.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Composite In-Flight Flammability Test Task Group – Rob Ochs

Rob will work on increasing the heat flux on a flat panel and try moving the radiant panel down or changing the angle of the panel.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Heat Release (OSU) Task Group – Mike Burns

The group discussed changing thicknesses of thermocouples. There was a discussion on the different types of insulation. Methods of how to set the heat flux level were discussed. The group also had a discussion on posting standard operating procedures.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Heat Flux Transducers Task Group – Mike Burns

1) How do we calibrate our standard, and 2) how do we transfer that to our everyday heat flux gages?

Dick Hill: It is irrelevant how you get the primary standard. It is a comparative measure. It does not matter whether you use the Vatell Method, the NIST Method, the Medtherm method, or the FAATC method. You need to pick one. NIST is the primary setter of standards in the U.S. If you choose a company's method and that company goes out of business, what happens? Everyone needs to pick one standard, agree to it, and use it only. Spending lots of time debating over which one is the right number is meaningless. To me it is better going with the standard organization number (NIST). Once you agree on which method to use, you then have to figure out the transfer. How do you make it as concise and repeatable and reproducible? I would push for using the NIST method, because it has the most longevity going forward. The intent is not to change the standard in the future. The most important is work on the transfer method.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Wire Test Task Group – Pat Cahill

Pat will upload the latest draft of the wire test to the KSN site in the near future. Tie wraps were discussed. We are wondering if tie wraps should be investigated by this Task Group. There are hundreds of them, and they are flammable. Pat will look into sleeving when she gets back to the lab. Number of wires in a bundle needs more investigation/research. A Task Group member will be sending Pat some larger gage wire to use in some of this research.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Ducting Test Task Group – Pat Cahill

Dick Hill: The threat in the inaccessible area is represented by a block of foam of a certain size. The radiant panel represents the threat. The test method is developed against the threat. That's why the radiant panel test was developed. Antonio Chiesa (Bombardier) and Peter Busch (Airbus) explained their related specific issues and concerns during this update. We are trying to define this test method. We are not debating whether we are going to use this test method. This is for the regulatory side to ponder. We are asking the Task Group to make this test the best it can be. If you do not want to do this, then do not be part of this Task Group. I can tell you that the intent is that everything in the inaccessible area will have to show that if there is a fire the size of a block of foam that the fire will not propagate. Everything in the inaccessible area will have to demonstrate that it will not propagate from a fire the size of a block of foam.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Bunsen Burner Task Group – Dick Hill

We talked about the Bunsen burner and there were a few areas of concern. One of the major areas of concern is the Group wanted better definition of the size of the flame. Dick asked Pat Cahill to do a little research on this. The group wants a bit more clarity on how the flame size is defined. Burn length was also discussed –should we make the definition a bit clearer? Airbus has been tasked with chairing a subgroup to come up with burn length information on thermoplastic, etc. materials. The Task Group was tasked with reviewing the test method posted to the KSN site and make comments.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

Seat Oil Burner Task Group – Dick Hill

We discussed the round robin way forward and will wait a bit until the test method is standardized. We recommended that any lab that wants to be involved in the round robin and obtain the new stator and turbulator because there is a lead time on it. We agreed that we would try to have the seats for the round robin by the next meeting. It was suggested that leather seats should be part of the round robin. If someone can provide the leather seats, we will include them in the round robin. 21 sets of leather seats are needed for the round robin. 6 labs will participate in the round robin. Thin materials are being looked into by a subgroup of this Task Group.

See Task Group Summaries – March 1-2, 2011 – for detailed minutes from this Task Group meeting.

2010 NBS Round Robin Results – Mike Burns

3-Part Process. Mike showed a list of labs that participated in the Round Robin. NBS Photometric System Round Robin – Mike showed the test results of each of the filters tested.

RTCA Update – Pat Cahill

Commercial Aircraft Electronics (Avionics): RTCA is a not-for-profit corporation that functions as a Federal Advisory Committee
Dick Hill: Isn't the intent to test the representative fire load? Pat: Yes. Tim Marker: How do you do that? Weigh the parts somehow? Pat: You have a defined fire source inside the box. Is everything inside the box fire resistant enough that a problem won't occur with what's coming out of the vent holes? If you can keep the fire confined. Q: Section 26 is not recognized by the FAA. Jeff Gardlin: The current RTCA document is not recognized by the FAA. Q: What is the timeframe when it will be accepted by the FAA? Jeff Gardlin: The AC will be amended if the FAA accepts Revision G of DL 160. They have a regular revision cycle on that AC, but I don't know the specific review cycle. Jeff Smith: if they change a circuit board, are we going to have to go back and retest, what kind of criteria are we going to have for retest? Pat: all of these issues have not been investigated yet. The smaller details have not been investigated yet. Lee Nguyen at FAA headquarters officially participates on this RTCA subgroup. Q: will the box test cut out all the individual tests and if passed will it provide compliance to 853A and will it be stated in an Advisory Circular? Dick Hill: The RTCA group is going to try to develop the requirement on this, and it now sounds like the RTCA group may request further assistance from the FAA. The request for the

FAATC would have to receive a request from the FAA regulatory side to participate. If the FAA regulatory side finds the box test acceptable, there will be a link to an AC.

Composite Material Fire Fighting – John Hode (SRA International)

Purpose: Create a repeatable test method to quantitatively assess the amount of fire fighting agent necessary to extinguish aircraft structural materials. This work is done under contract for the FAA's Airport Technology Research and Development Branch. John showed photos of the initial test set up. He described the small and intermediate scale testing that has been conducted. Three (3) different materials were tested. John described the scoping tests of parallel configuration. John asked Working Group members for their input into the types of materials being tested, is he testing the right materials, comments are welcome. Kendall Krieg: We should have common fire fighting procedures that cover the gamut of aircraft out there. I think we are agreeing its just definition. Maybe we need to say generically 'composite'.

FSTG Update – Flammability Standardization Task Group – S. Campbell/M. Jensen

Update on industry progress on draft policy memo. FAA Draft Policy Memo: the policy memo divides materials and design features into 2 categories. Industry Support: approximately 200 people have been involved to date with the standardization effort. The group made a pitch to the FAA to get another 6 months to put all its data together to finalize report to submit to the FAA. Industry concerns: MOCs increasing complexity of showing compliance, FAA interpretation of data scatter on reports, and interpretation issues and definitions. Mike reviewed the items being worked on by the Task Group and their project/completion status (ie: general panels, paint color, decorative laminate color, fire reinforced cloth, etc.). Dick Hill: Boeing did a program on printed wiring boards about 7 or so years ago. The data should be available. Jeff Smith: I've talked with Jim Peterson about it. This group's next in person meeting will be held June 24, 2011, in Bremen, Germany. Let us know if you want to be informed on any of the work this group is doing, please let Scott or Mike know.

See Presentations for additional information.

Update on Special Conditions for Seats – D. Slaton (Boeing)

Dan Freeman at Boeing has been working to pull a Task Group together on this for over a year. The industry Task Group submitted their final MOC to the regulators last November 2010, and we just received their acceptance last week provided a few changes are made. It is FAA, Transport Canada, ANAC, and EASA approval provided the changes requested are made.

Next Meeting

The next meeting will be held June 22-23, 2011, in Bremen, Germany, hosted by Airbus.

TASK GROUP SUMMARIES – MARCH 1-2, 2011

Bunsen Burner Task Group – Dick Hill

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defined. Burn length was also discussed –should we make the definition a bit clearer? Airbus has been tasked with chairing a subgroup to come up with burn length information on thermoplastic, etc. materials. The Task Group was tasked with reviewing the test method posted to the KSN site and make comments.

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Wire Task Group – Pat Cahill

Items that were discussed:

Putting the latest wire test method draft on the KSN web site.
What to do with tie wraps (small parts?).
What about sleeving, What kinds of sleeving are there and how should it be tested.
Could we call out certain wires that would not have to be tested (perhaps in an AC)?
What should we do with single wires?
The Tech Center will test some larger gauge wire bundles.

Ducting Task Group – Pat Cahill

Items that were discussed:

Only one person likes the test method
The Task Group does not see any benefit to this test method
Most of the Group wants to keep the Bunsen burner test with different pass/fail criteria
The Group is concerned about the cost effect.

Thermal/Acoustic Insulation Task Group – Brian Conover (Pat Cahill covered this meeting for Brian):

Items that were discussed:

Do you put the calorimeter in the chamber when the chamber's hot or at room temperature?
Rewrite the 3-position calorimeter check. How often do you need to do this?
Define draft free
The Group would like to make smaller samples
Flame profile vs. flame propagation
Where is "zero" position? Is it measured from the right wall of the chamber or the end of the sliding platform
Use of another fuel besides propane.

Composites Task Group – Rob Ochs

March 1, 2011, Savannah, GA, USA

The radiant panel apparatus description that was previously uploaded to the KSN site was discussed. There is a need for harmonized apparatus descriptions for all tests that utilize the radiant panel, including insulation, ducting, wiring, and composite fuselage. Items such as gap size allowance and chamber draft need to be addressed.
The group mentioned the need to know what exactly is going to be tested in this method, as many members are manufacturers of composite materials that may or may not be included in this test. It is the task of the ARAC to determine which materials will be considered "small parts" and need not be tested, and which materials would be considered significant enough to interact with a moderately severe in flight fire in an inaccessible area.
The radiant panel test method was discussed, and it was determined that the configuration that did give good correlation was not necessarily the most practical (parallel to radiant panel at 30° from horizontal). Other configurations will be attempted such that this test can easily be performed in a radiant panel configured for insulation or ducting. The FAATC will try several different configurations with a flat sample, including increased pre-heat time, increased heat flux, slight incline of sample (small enough to fit under drawer), translating the heat panel closer to the sample, and perhaps making the heat panel horizontal and parallel to the test sample.

Burnthrough Task Group – Rob Ochs

March 1, 2011, Savannah, GA, USA
- Discussed the "ballooning" of backside, where the backside of the sample puffs out towards the calorimeters, resulting in the radiating surface being closer to the calorimeters, possibly resulting in higher measured heat flux. The FAATC will perform comparative testing with ceramic paper fire barrier, where one test will be a normal installation, while the other test will have the fire barrier a few inches closer to the calorimeters. The resulting heat flux traces will be compared.

- The availability of the burner plans was discussed. They are posted on our website: http://www.fire.tc.faa.gov/pdf/materials/NexGenPlans.pdf

- Updated versions will be posted soon to include CNC machined stators and turbulators, clarified dimensions, etc.

- If any task group member sees something in the plans that isn't clear please notify us so we can change them.

- Since the burner performance is highly dependent upon the construction and geometry of the burner itself, a standard procedure should be developed for measuring the critical burner dimensions before use.

- Failure statistics need to be better defined. As of now, the AC 25.856-2A allows for "rogue" failures to be allowed with certain conditions:

- If one of the three samples fails, a fourth sample can be tested. Average all four burnthrough times and if the average exceeds 4 minutes AND the fourth sample passes, the material passes.

- If the fourth sample fails, 2 additional samples can be run (for a total of 6), and all 6 burnthrough times are averaged. If 4 out of 6 pass the test AND the average BT time exceeds 4 minutes, the material passes.

- Averaging of BT times does not work for burn-through type tests, since there is a minimum time that must be met, but there is no end test time. Therefore, a true anomaly would perhaps be a failure at 1:30, while the other 2 samples never fail when exposed to the burner indefinitely. In this case you can not average BT times, since the 2 passing samples never burned through. ***In discussions with FAATC and TAD, it has been decided that for the new Appendix F, we will use standard rogue failure means for all tests of similar type, i.e. burnthrough tests (cargo liner and thermal acoustic insulation) will use perhaps a percentage pass, where X% of samples must pass the test. Other tests (radiant panel type tests) will use some sort of averaging of test results. This will be determined in the near future and will be discussed at the June Materials Meeting.***

- The single test parameter that determines pass or fail in this test is defined as "burnthrough time", which is the time elapsed from burner flame-sample introduction at which the burner flame penetrates the specimen and/or the time required for the backside heat flux to reach 2.0 BTU/ft^{2}s. The group believes that the "and" should be removed from this statement, as the sample will fail from either penetration or heat flux, but not both. It was also discussed that determining the exact moment in time at which the sample is penetrated is difficult, and can vary several seconds depending on the perspective and person watching. Often times there is backside flashing and glowing which is difficult to see through to the point where the hole in the sample is growing. We do not have an answer to this problem, but perhaps working group members can assist in this issue.

- This rule will be used for new designs of aircraft in the future, many of which will be constructed of carbon-fiber composite materials. Those aircraft can show that they meet the intent of the rule (to allow passengers extra time to escape an aircraft when an external fuel fire is burning adjacent to the fuselage) by demonstrating that the fuselage skin itself provides a sufficient burnthrough barrier, such that the insulation need not meet this rule, which is a rule for the insulation only. Perhaps this should be mentioned in the future rule, with a sample means of demonstrating compliance in the rule or AC.

- If anyone feels something has been left out or would like to amend these minutes, feel free to add items to these minutes.

<u>Cargo Liner Task Group</u> – Tim Marker

March 2, 2011

During the general meeting on March 1, an outline of the proposed new Appendix F format was presented, showing where the cargo liner test would be located. An additional slide highlighted 2 areas that would be changed/added to the present cargo liner test method as written in the Handbook. The 2 primary changes were:

1. the exclusive use of the sonic burner (removal of Park burner description) including updated drawings of the apparatus, and
2. the inclusion of a new section describing how design features should be tested, including joints, seams, corner details and associated fastening systems.

A quick run through the proposed new Chapter was done, showing highlighted areas (in red) that reflected changes to the current Handbook method. A final slide detailed the planned activities related to this exercise.

During the Task Group session, a discussion more specific to the cargo liner test itself evolved, including:

Total number of labs. How many test labs planned to set up the cargo liner rig using the sonic burner? A total of 6 labs indicated they would be setting it up (FAATC, Accufleet, Airbus, Boeing, AKRO Fireguard, and Govmark).

Final burner settings. FAATC agreed to keep the Task Group apprised of the optimum burner settings, which are still under development and review at the FAATC. One issue involves the use of a 90 degree "elbow" in the sonic burner apparatus, which has been shown to influence the calibration temperatures, and possibly the test results. It was agreed that although the elbow may influence the calibration and results, it is more practical to keep this item, since the burner would become awkwardly long without it. Action Item: The FAATC will circulate final burner settings to the group via the KSN once this data is available.

Laboratory room airflow requirement. The proposed test method includes a restriction on the amount of air movement in the vicinity of the test apparatus, in order to prevent inter-lab differences. An overly high amount of airflow could influence the calibration and test results. The FAATC has suggested the use of a standard fixture that could be installed into or attached to the burner cone of the apparatus that contains measuring points. These measuring points would be used as a guide to take vertical and horizontal air velocity measurements, to ensure that all labs are taking measurements consistently. Action Item: T. Roudebush, AKRO, agreed to investigate this further, to determine if the proposed air velocity restrictions could be expanded without impacting test results.

Fuel nozzles. As discussed in Rob Ochs presentation during the general meeting, present manufacturing techniques limit the repeatability of nozzles to the +/- 10% range, which is not very precise. An experienced nozzle representative has indicated this range could be reduced to the +/- 5% range. The FAATC is in the process of trialing this newer, more precise nozzle. Accufleet has also indicated it will be trialing various nozzles as well. Action Item: FAATC and Accufleet have agreed to disseminate the results of all nozzle studies to the task group as they become available.

Thermocouples. The group unanimously agreed that 1/8-inch diameter thermocouples should be used for the new test method. The smaller, 1/16-inch units have been prone to failure after repeated use.

Backface 400^{o}F requirement. The current requirement of a maximum backface temperature of 400^{o}F at 4 inches above the sample was discussed. The current requirement will remain in the new test method, there is no plan to remove it. The requirement prevents the allowance of a very porous material to meet the standard. Such a material would not necessarily burn through, but could allow dangerous amounts of heat to pass through the liner system to inaccessible cabin areas.

Test Sample Holder Limitations. Several Task Group members inquired into the possibility of expanding the size of the sample holder to allow for ease of testing various components. The Task Group chairman reminded the group that a new section was proposed for the new test method, which includes detailed instructions on how to test design details. There was also an additional proposal in the new test method to provide relief for testing sidewall seams that are difficult to fit into the test rig presently.

Round Robin Material Selection. Several Task Group members suggested that materials that easily pass the current test method would not provide any benefit during a round robin study on inter-lab reproducibility. Other Task Group members agreed with this philosophy, and suggested using lightweight felt materials (e.g. TexTech felts) during a preliminary screening round robin, prior to an actual round robin series. The FAATC will take the lead and determine how the screening tests should be conducted, and which materials will be used for this activity (note, a similar activity was performed for comparing sonic burners used to test burnthrough-resistant thermal-acoustic insulation. A simple "picture-frame" sample holder was developed, and specific materials such as the felted PAN material blends were tested. The sample holder used in that activity closely resembles the current cargo liner sample holder, so the FAATC suggested these screening tests be conducted using the existing cargo liner sample holder). Once the screening round robin is completed and the inter-lab reproducibility is determined acceptable, a round robin involving actual cargo lining materials can be arranged. The group recommended using materials that were close to the pass/fail criteria, to exploit any inter-lab deficiencies. An additional suggestion by the group to include a design detail such as a ceiling seam was also discussed.

Problem With Bolt Interference During Corner Tests. One Task Group member indicated a clearance issue with the existing test rig during the testing of an OEM-supplied corner detail. The claim involves the difficulty in mounting the sub-assembly part to the test fixture, as the bolts sticking out won't allow the part to be easily mounted. The FAATC suggested removing a portion of the bolts to allow for the installation of the part, if possible. A related discussion highlighted the current industry practice of not using the bolts or pegs in the test fixture, but simply clamping the retaining frame in place over the test materials. The FAATC was not previously aware of this practice, and indicated that the studs were there for the purpose of restraining the test materials that tended to shrink during flame exposure. The restraint mimics the actual installed condition, where the liners are riveted in place. It appears the current practice of not using the studs is aimed at saving time during testing, as it eliminates the need to drill or punch holes in the test samples prior to mounting them on the test frame. Action Item: FAATC will investigate further the current practice of not using the studs to determine if this procedure influences the test results.

Heat Flux Task Group – Mike Burns

Tuesday: The group started out from the previous position of conducting calibration of HFG's using a NIST calibrated gage as the Secondary Standard, radiant heat source at a stable condition and the heat flux level obtained by varying the distance or varying the heat level for the calibration process. Single point calibrations would then be calculated.

Larry Langley, from Vatell, expressed concerns that the NIST calibration method was actually a narrow view angle calibration making the gage effectively a Radiometer and that the Vatell plunge method (developed by Charles Brookley from Thermogage) was a true heat flux calibration. At this point the group basically stalled over these two viewpoints struggling on a decision on which way to move forward.

Wednesday: Dick Hill spoke to all task group members during a morning session concerning his viewpoint of calibration making recommendations on how the group could move forward. The group later convened and had decided to go ahead with using the NIST calibrated HFG as the Secondary Standard and abandon the plunge method. The group also decided to abandon the idea of using a steady state heat source to conduct the calibration transfer and return to the current "Interim" calibration method. This would involve placing the Secondary Standard HFG and the unit to be calibrated an equal distance and opposite a graphite plate, ramping up the heat and record electronic signal data as the gages cool down.

HRR^2 Task Group – Mike Burns

On Tuesday the group met and had discussions covering each of the five sub task teams. Each team leader was able to update the task group members with plans they had put together in an attempt to tackle each item they were responsible for:

Sub task group #1: A recommendation was made concerning changing the thermopile wiring from "K" type wire to "E" type with the hopes that there would be a higher millivolt signal to process, therefore potentially reducing signal errors. The group agreed and this is being looked at.

Sub task group #2: Segundo Vargas had posted his plan on the FAA KSN site with ideas on how to research extremes in construction design of overlaps etc and see what influence there may be on data. The same effort is proposed looking into various densities / types of insulation used to cover the unit.

Sub task group #3: The group agreed to abandon the idea of researching the use of 100% Oxygen for use in the pilot burners.

Sub task group #4: Discussions covering material baseline data

Sub task group #5: Discussions covering interval recommendations for calibrations etc.

(No discussions on Wednesday)

Seat Structure Flammability Task Group – Tim Marker

March 1-2, 2011

General Meeting March 1 to all participants. The FAATC gave a very brief overview of the magnesium alloy testing program, which highlighted three major efforts: initial involvement (laboratory testing and extinguisher testing), full-scale testing using OEM-style coach seats, and finally the current focus on the development of a laboratory-scale test. An outline of the proposed new Appendix F format was presented, showing where the new flammability test for seat structure would be located. An additional slide described one possible logic flow of test requirements for all materials used in aircraft seats. The FAA emphasized however, that the Task Group would focus on the development of a laboratory test for magnesium alloy seat components, and not the applicability of tests, which would be handled by the Transport Airplane Directorate, with input from ARAC. The next slide described the proposed test methodology for evaluating the flammability of magnesium alloy components using the sonic burner. Subsequent slides detailed the proposed new test method, along with photos and results of recent tests using conically-shaped test specimens. A final slide detailed the planned activities.

Task Group Meeting, March 1, Participants: Tim Marker (FAA), Antonio Chiesa (Bombardier), Al Carlo (Boeing), Stefan Bonk (Airbus), Serge LeNeve (CEAT), Bruce Gwynne (Magnesium Elektron). During the Task Group session, the group discussed the use of the word "structural" in X.1.1 of the proposed test method. Members felt that this word was not necessary, if the FAA planned to limit the test method only to those components tested during full-scale trials. The FAA confirmed that this was the plan, to use the lab-scale test for the 5 major seat component groups tested in the full-scale study, which includes the legs, spreaders, cross-tubes, seat back frames, and baggage bars. The FAA made it clear that once a lab test was developed, it could not be used to qualify magnesium components used in other areas of the seat not covered under the 5 major component groups listed above.

The proposed conical test sample shape and size were then discussed. It was agreed that the conical shape was more stable than an upright cylinder (and other upright constant cross-section shapes) by reducing the potential of the specimen to become unstable during the melting process.

If the specimen becomes unstable, it will typically topple over, thereby limiting the amount of material exposed to the burner flame. Although the cone-shaped specimen was more stable, the group felt that the use of an arbitrary specimen shape may actually be too simple. Antonio Chiesa questioned how this particular shape represented any of the 5 components tested during the full-scale trials. The FAA responded that the cone did not represent the actual components per se, but rather was a means of exposing different magnesium-alloy materials to the representative fire threat (sonic burner flames). The FAA further explained that a typical seat is constructed of components with widely different cross-sectional areas, and it would be very difficult to fabricate standardized test samples based on the entirety of shapes. For example, a seat may contain hollow cylinders (e.g. crosstubes) square or rectangular tubes (e.g. back frames or baggage bars) and irregularly-shaped thick plates that are further hollowed out to reduce weight (e.g. legs and spreaders). The hollowed out plates often do not have constant cross sections, which is the case when considering legs or spreaders. Task group members commented that by using an arbitrary shape such as the cone, the test essentially becomes a material test. The FAA acknowledged this claim and suggested the only method possible for representing the cross section of these complex shapes was to fabricate vertical samples based on the minimum wall thickness of the actual components. For example, an irregularly-shaped spreader could be thought of as an I-beam, which contains a thin web connected to thicker flanges. A representative sample would then be a vertical I-beam with a web thickness equal to the thinnest cross section of the actual component. The task group members felt that this was a better approach than the simple cone, since the test specimens more closely resemble the actual components of the seat. The FAA reminded the task members that this approach is essentially what was agreed upon at the March 2010 meeting (1 year prior), and cautioned that using various cross-sections based on actual components would result in varying melt times, which may add to the complexity of the test. The group acknowledged this aspect, but agreed this was still a better approach than the arbitrary cone shape.

Presentation of Task Group Reports to the General Meeting, March 2.
The FAA presented the Task Group minutes from the previous day's meeting. The FAA acknowledged the Task members' concern that the proposed cone-shaped test was too simple, not necessarily traceable to the full-scale tests, and re-stated their preference for a test that included samples more representative of the actual seat components. Dick Hill of FAA interjected that the cone-shaped test was a reasonable approach, which could discriminate between materials that performed poorly and materials that performed well. Antonio Chiesa of Bombardier commented that this may be true but the cone shape is not representative of actual seat components, nor is it directly traceable to the FAA's full-scale tests. Tim Marker further commented that the proposal to mimic the complex shapes of actual seat components may not be necessary, since the material needs to melt first prior to ignition. In this case, it doesn't matter what the original shape was, since the primary focus is on the performance of the material after it melts (i.e., does it ignite, and if so, how long does it continue to burn?). The melted sample (just prior to ignition) does not form any particular shape, and therefore the original shape is not of great importance. Antonio Chiesa responded that this was not what the Task members agreed on the previous day, and requested an additional meeting subsequent to the General Meeting completion.

Task Group Meeting, March 2, Participants: Tim Marker (FAA), Antonio Chiesa (Bombardier), Stefan Bonk (Airbus), Heintz-Peter Busch (Airbus), Serge LeNeve (CEAT), Bruce Gwynne (Magnesium Elektron). The FAA and Task members began discussing the proposed cone-shaped approach again. The FAA reiterated that it may not be necessary to test shapes that are representative of actual seat components, since any test sample must first melt prior to ignition, and a molten sample typically will not form any particular shape. The primary focus was on the performance of the alloys once they are melted (i.e. ignition and time to extinguish). Several members then commented that if the test sample shape is not important, and the primary focus of the test is to measure the performance of the material following melting, then there are simpler methods of achieving this objective. H. Peter Busch and Antonio Chiesa indicated that a vertical

Bunsen burner test could adequately rank magnesium alloy materials based on after-flame time. Tim Marker indicated he was not convinced this was possible, and that the Bunsen burner did not represent the actual threat. The members countered that the threat was not important, if the purpose of a test was to only to measure the performance of the materials following melting. All participants felt that an impasse had been reached, and that it would be in the best interests to simply move ahead with other issues. Stephan Bonk questioned why the test method under development by the FAA could not be used to qualify other seating materials. Tim Marker responded that the Task group members and the entire IAMFT working group had been well-informed of the FAA's testing, status, and intentions, and this aspect had been discussed numerous times in the past. The FAA Transport Directorate had made it clear that the laboratory test under development would only be applicable to the 5 major seat component groups that were tested in the full-scale trials (legs, spreaders, crosstubes, back frames, and baggage bars). The new test method under development would not apply to other components such as bottom and back pans, tray tables, etc, that were not represented during the full-scale tests. The FAA engaged in several initial meetings with industry representatives who indicated only the substantial (high mass) seat components would benefit from being replaced by magnesium-alloy materials. These meetings served as the basis for selecting only these 5 component groups for the full-scale trials, and this decision was conveyed to the IAMFTWG on several occasions.

One last item pertained to flight attendant seats. The members acknowledged that these seats have different structure and were not tested during the full scale testing campaign. Their structure does not have the 5 components mentioned previously. The FAA agreed, and indicated they may have to be treated differently.

Slide Evacuation Test Method TSO C69c Task Group – Dung Do

There was no meeting of this Task Group in Savannah. Do has provided the Task Group plans below:

. The Task Group met in Atlantic City during the Trienial conference and participants included representatives from Boeing , Airbus, Goodrich, Bombardier, and Zodiac Air Cruiser.

Task Group Members have agreed to participate in a Round Robin.

. The first objective will be check the calorimeter of the participants at the FAA Tech Center (We have received two calorimeters to date).
. Materials for this Round Robin will be provided by two Manufactures.
.The tech Center will send samples to the participant labs.
.Test duration, pass/fail criteria, proper equipment functionality, and
achieving good reproducibility will be evaluated.
.Equipment will be of key interest as furnace used for this test has changed over the years.
. Early version used wire coil.
. Recent version use either a "new" wire coil or solid coil.
. We will be evaluating the differences in test data based on the type of furnace used.

We are planning to have a Round Robin in about 3 to 4 weeks.