INTERNATIONAL AIRCRAFT MATERIALS FIRE TEST WORKING GROUP MEETING

October 30-31, 2017

Held at Resorts Casino-Hotel, Atlantic City, New Jersey, USA

AGENDA:

MONDAY, OCTOBER 30, 2017

Welcome/Logistics – Tim Marker (FAATC)

Participant Introductions

Status of Rulemaking Activity – J. Gardlin (FAA)

Magnesium Alloy Test, Development of Advisory Material – T. Marker (FAATC)

EASA CRI on Magnesium – Enzo Canari (EASA)

Cargo Liner Test/Cargo Airflow Study/Seat Test/Seat Video/Future Video – T. Salter (FAATC)

Burnthrough – R. Ochs, PhD (FAATC)

VFP Testing Update – R. Whedbee (FAATC)

Inaccessible Area Materials Flammability – R. Ochs, PhD (FAATC)

Break

Radiant Panel Update – S. Rehn (FAATC)

RTCA Update – S. Rehn (FAATC)

Evacuation Slide Test – D. Do (FAATC)

NBS Round Robin – M. Burns (FAATC)

HR2 Update – M. Burns (FAATC)

HR2 DOE II Results - Thomas Little (Boeing)

Effect of Heat Flux on Heat Release Peak, Total, and Peak Time – Yonas Behboud (Boeing)

Waste Compartment Fire Containment Task Group Interest – S. Campbell (Zodiac)

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Policy Statement/Flammability Standardization Task Group Update – Michael Jensen (Boeing)

Material Change Similarity Overview – R. Lyon (FAATC)

Assessing Material Consistency Using MCC – Natallia Safronava (TAMI)

Break

Task Group Meetings Session I:

Magnesium Alloy Testing – T. Marker
Seat Cushion Test – T. Salter
VFP Test – R. Ochs/R. Whedbee
Radiant Panel Test – S. Rehn
OSU/HR2/NBS – M. Burns
Flame Retardants/Material Change Similarity – R. Lyon
Approved Material List (TBD)

Lunch Break

Task Group Meetings Session II:

Magnesium Alloy Testing – T. Marker
Cargo Liner Test – T. Salter
Ducting/Wiring – R. Ochs
RTCA Flammability Test – S. Rehn
OSU/HR2/NBS – M. Burns
Policy Statement/Flammability Standardization TG – M. Jensen

Break

Task Group Reports

Characterization of OSU Airflow Using Particle Image Velocimetry – T. Emami (FAATC)

EASA Materials-related Rulemaking Activity – Enzo Canari (EASA)

Additional Discussion / Next Meeting / Closing

MINUTES:

MONDAY, OCTOBER 30, 2017

Status of Rulemaking Activity – J. Gardlin (FAA)

It is still planned to be issued, but there is no date set at this time.

Magnesium Alloy Test, Development of Advisory Material – T. Marker (FAATC)

Tim described the development of the new test using thin magnesium sheet (3”x6” 0.025 thickness) using truncated and perimeter sample holders, and results were presented.

Advisory Circular on Magnesium - The Use of Magnesium Alloy in Cabin Areas – T. Marker

Appropriate method of test for various applications: 5 primary seat components, use in other non-primary seat components, other cabin components, accessible below seat height, accessible above seat height, and inaccessible areas. The tests are to represent a very severe condition.

EASA CRI on Magnesium – Enzo Canari (EASA)

In 2015, EASA issued Special Conditions A350-941 to allow the use of magnesium alloys for seat components. EASA intends to revise the Special Conditions to require testing as per Chapter 25 of the FAA *Aircraft Materials Fire Test Handbook*. The official update and publication of the new A350 SC has been postponed, because EASA has no current project involving use of magnesium alloys in the cabin. EASA is considering releasing a Certification Memorandum to clarify options available to applicants to achieve certification of installation of parts made of magnesium alloys (target for public consultation: Q2 2018).

Seat Test Training Video, Seat and Cargo Handbook Chapters, 2017 Sonic Cargo Liner Test Airflow Study, Sonic Burner Configuration Notes – T. Salter (FAATC)
The Sonic Seat Test Training Video was completed and posted to FAA Fire Safety website for viewing in September 2017. It is intended as supplemental information for Chapter 7 of the Aircraft Materials Fire Test Handbook. You still need to consult Chapter 7 for test method information. The video is not alternative instruction.
Planned Video Production – Sonic Burner Assembly and Operation – video filming to begin in 2018 to include details of burner components, assembly and configuration, working principles, user operation instruction, proper calibration, and common issues and trouble shooting tips. Cargo Liner Patching – video to begin filming in 2019 to include liner patch types, method of conducting certification testing, and construction of patch samples. Additional videos planned include: Bunsen burner, OSU, and Magnesium Flammability Test. Video production rate is currently one per year.
Aircraft Materials Fire Test Handbook Updates – on an as needed basis as required for the Handbook Chapters. Tim reviewed identifying updates (red text) and locateion of date of update within Chapter of Handbook on FAA Fire Safety website.
Test Cell Airflow Interlab Study – interlab study at FAATC conducted to determine exhaust airflow range at which measured sample peak temps remained relatively steady.
Correct Configuration of the Sonic Burner – there have been instances where the sonic burners have not been configured properly. Labs must follow configuration in the respective Chapter in the Handbook. Deviations will alter flame characteristics. Tim described examples of the incorrect configurations he has seen. Please ensure that your sonic burners are set up properly.
Little (Boeing): Airflow Study: how many data points did you show? Salter: I did it in increments of 5 percent. Question: One sample in the set? Salter: yes, this was a quick test so far. There is more work to be done on this in the future. Hariram: was this done on the same day? Salter: I tried to conduct the tests on the same day. If not, I repeated the previous tests to ensure there was no significant deviation from one day to another. This is just a relative source of data representation at this time. Now, we will

go back and refine this. Jensen: Will you do the same thing in a different sized chamber in the future? Salter: yes.

Burnthrough Round Robin – R. Ochs, PhD (FAATC)

The Insulation Burnthrough Test Method is being evaluated within lab and lab-to-lab for consistency: NexGen burner – 2 configurations. Rob reviewed the 2017 Comparative Test Series: In progress and participating labs. Rob reviewed the Phase I results (8 of 11 labs reporting).
Insulation Blanket Burnthrough Tests conducted at FAATC results were presented. Phase I Summary: 8 of 11 labs reporting: 7% Std Dev for 8579. Phase 2 differs from Phase 1 by configuration of burner – the new ignitorless stator is used in place of the original stator. There was less participation in Phase 2. Some labs did not have the new stator. Results of Phase 2 were presented. Phase 2 Summary: 4 labs have submitted results. Comparing Phase 1 & 2 shows that the new configuration is trending longer burnthrough times. Question: how does it compare to Park oil burner data? Ochs: we didn't include that in this study.

Vertical Flame Propagation (VFP) Testing Update – R. Whedbee (FAATC)

Make-up Air Diffuser: upgraded to stainless steel perforated sheet that is much more durable and can be cleaned up better. Ribbon Burner: Marlin engineering has developed a new generation ribbon burner that provides more even heating and fuel flow throughout. FAATC did a quick test with the Marlin burner. The results of these tests were presented. Methane vs. Propane: verification of similar data with method and propane. The results indicated similar temps with the Marlin ribbon burner. We began to notice visible differences day/day, test/test, so we began trials with mass flow controllers. VFP Chamber Temp: setting start test temperature – we ran chamber for about 2 hours. We think a target warm up time will be at about 1 hour. This is to be discussed. Ducting Materials: ideal sample configuration? We tried multiple lay ups of this type of material – intact and sheet lay up, filet (did not work well), and vertical cross section. Future Work: establish flow rates for methane and propane as soon as new mass flow controllers are in place; finalize pilot flame parameters, substrate for sleeving, develop sample holder for wires, and verify dimensions and performance of commercial units.

Inaccessible Area Materials Flammability – R. Ochs, PhD (FAATC)

CFRP Aircraft Structures – carbon fiber composites are being used more frequently in aerospace applications. Rob reviewed details of blanket heater test conducted on CFRP and presented results. Photos of test rig developed at FAATC were shown and its configuration was described. Rob showed video of the ELT test on this test rig. Photos of results were shown. Some of the test data was discussed (battery cell temps, measured gas concentrations, measured cooling water temp, heat flux, measured surface temps, measured in-water surface temps. Summary: CFRP test was successfully completed in new heat transfer test fixture. Further analysis will be done. Spanos: can you approximate the amount of smoke that came from the fire event? Ochs: no. Quintiere: was he talking about the white smoke coming out of the top? If it is the white smoke coming out of the top, I think that is unburned fuel from the batteries. Question: where is this going? Ochs: when the AAIB finished their investigation on the

Ethiopian Airlines ELT fire, they made some recommendations. This is correlating this data with experimental data.

Inaccessible Area Wire Task Group – R. Ochs, PhD (FAATC)

We want to meet to discuss different examples of design configurations of small or non-extensively used wires. The Task Group will also discuss Mil-Spec to SAE standard.

Radiant Panel Update – S. Rehn (FAATC)

Steve reviewed the proposed *Aircraft Materials Fire Test Handbook* changes. He also discussed the new rule changes. New Advisory Circular: add a laser for flame propagation measurements – this will be discussed during the Task Group meeting. Radiant Panel aging – when should electric panel be replaced? Question: Handbook changes: are you allowed to make changes that alter what is said in the rule (i.e.: tolerance on heat flux). Can you have a Handbook Chapter that says something different? Marker: primarily what we are looking at are conversions and syntax errors being corrected. Otherwise, tests would have to be conducted to ensure the change will not change the intent of the rule.

RTCA Update – S. Rehn (FAATC)

RTCA Development of a New Flammability Test Method for RTCA Group – RTCA-DO160H, draft now due to committee spring 2020. Steve reviewed the results of the Bunsen Burner Comparison conducted. Steve showed video of circuit board tests at FAATC – Bunsen burner and line burner tests. Conclusions: Line burner test is much more severe than the Bunsen burner test; need to add wording about capacitors in the "Burner Placement" section. Jensen: you showed that basically a box that is highly vented passes a 12-second vertical burner yet it fails the proposed test, so it seems like the capacitors might be an issue. Rehn: the box the circuit board with the capacitors came from was completely sealed with no holes, but the box we used in our tests had lots of holes.

The Revised Test Method for the Evacuation Slide Test – D. Do (FAATC)
Do reviewed the work that has been done to revise the test method: power input of the heater used for the tests, calibration tests of each heater to determine the power input of the heater. Heater Comparison tests: a 1.5-inch coil-to-face distance heater and a 1.75-inch coil-to-face distance heater were used in the tests. Test results were presented. The revised test method procedure was reviewed. Round Robin 6 is being planned.

2017 NBS Smoke Density Round Robin – M Burns (FAATC)

39 labs participated in the Round Robin – a total of 44 NBS units were involved in the RR. The FAATC Fire Safety Branch sent out the RR test materials. Mike reviewed the parameters of the RR. The conclusions/observations were discussed.

HR2 Update – M Burns (FAATC)

We are moving away from a thermopile signal. All the temperatures will be displayed real time. Mike is working with equipment manufacturers on software modifications. He reviewed the thermopile change recommendations.

DOE Test Plan (Round II) – no materials tested – only looking at impact to thermopile response. Mike reviewed the data collected in the DOE. Next: Task Group will discuss DOE results.

Analysis of HR2 DOE II Results – Thomas Little (Boeing)

Objective: evaluate effect of tolerance ranges of machine input parameters on output variation and compare results of HR2 DOE I (2015) and DOE II (2017). Tom reviewed the notable differences between DOE I and DOE II and comparison of both.

Effect of Heat Flux on Heat Release Peak, Total, and Peak Time – Yonas Behboud (Boeing)

Summary/Next Steps- need voltage control limits in specifications (Handbook, HR2, etc.), power conditioners can provide up to +/- 1% voltage control.

Approved Material List Update – Scott Campbell (Zodiac Aerospace)

Scott reviewed accomplishments of the Task Group. He discussed the final concerns and next steps. There is still a significant time effort to fully release a listing specification, regulatory orders and database. The verdict for this concept is: plausible. Does anyone want to take this task over, since Scott is stepping down as Chairman of this Task Group?

Waste Compartment Fire Containment MOCs – Scott Campbell (Zodiac Aerospace)

Must be compliant to 14 CFR 25.853(h). Zodiac has compiled 15-17 MOCs accepted by various customers. If there is an interest in forming a Task Group on this, Scott will share these during the meeting on October 31, 2017. Purpose of proposed Task Group: harmonize and publish industry and regulator accepted 25.853(h) similarity MOCs for waste compartments and galley trolley carts. Develop new MOCs as needed.

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FAA Policy Statement PS-ANM-25.853-01-R2 Clarifications & Additions – Michael Jensen (Boeing)

Michael briefed on the status of this Task Group's work and described several items the Task Group submitted. Little: where do we go from here on the items that are red? Jensen: when we met this morning, Enzo said he would discuss these items with FAA regulators. It also appears the AC is nearing its final stage, and there will be a period for public comments on the AC.

Material Change Similarity Overview – R. Lyon (FAATC)

Similar in this context means equivalent with respect to flammability. Rich briefed on the background of the similarity work since 1998. The Flame Retardants/Material Change Similarity Task Group was created within the IAMFTWG in 2014. The Task Group

needs some participation from industry to develop solid case studies. Rich reviewed the 2017 Process Proposal steps. There was some discussion on specifics.

Assessing Material Consistency Using Microscale Combustion Calorimetry (MCC) – N. Safronava (TAMI – FAATC)

Natallia explained the approach. She presented 6 Case Studies: #1 films, #2 paints, #3 phenolic/fiberglass, #4 PPSU, #5 prepreg with additive, #6 adhesive. MCC was proposed as a method to determine similarity at the material level of changes to certified materials. To date we have the six case studies reviewed in this presentation. Campbell: how did you make your sample for paint? Safronava: we were given a thin cured pure paint sample. Campbell: Sometimes isolating a color on the OSU level is difficult, so I was just curious. If there is another case study to be done, maybe powder coat could be tested. We've had a difficult time isolating colors of powder coating in the OSU test. Lyon: I think if we are going to side by side comparison with the FAR, we are going to need a number more than pass/fail from VBB. Quintiere: why can't you say this MCC is better? Safronava: I think that's what Rich was trying to answer a few minutes ago. Hopefully we can eventually say that the MCC test results are sufficient, but it has to be decided on the regulatory side.

Task Group Reports

Magnesium Alloy Task Group – T. Marker (tim.marker@faa.gov)

Provided by Tim Marker, FAATC, Task Group Lead
Task Group Report for Magnesium Alloy Flammability Test
(from meeting held in Atlantic City, NJ October 30-31 2017)

1. Review of the current flammability test for magnesium alloy used in inaccessible cabin areas. The FAATC discussed the results of the most recent tests conducted using the radiant panel apparatus and thin magnesium alloy test samples. Over 270 tests have been conducted to date (109 since prior meeting). The tests were initially conducted using 0.025 and 0.050-inch thickness samples, which were laid flat on top of ceramic fiber board prior to being inserted into the radiant panel test chamber. The FAATC concluded that test repeatability could be improved by preventing the thin samples from warping when exposed to the heat and ignition source. Numerous sample holder concepts were conceived and tested to determine the most appropriate methodology. Approximately 170 tests were conducted using sample holders. A recent comparison was made between a 3-sided perimeter-style sample holder frame, and a similar sample holder with one of the edges truncated. The sample holders are simple and effective, keeping the edges of the sample from curling, and also keeping the sample at the correct distance from the radiant panel and pilot ignition. Heat transfer to the magnesium alloy test sample from the steel sample holder is minimal. Results from these tests also lined up reasonably well with initial test results when the samples were laid flat on the ceramic board without restraint. Test results indicate that the time of ignition is synonymous with the time the pilot ignition is removed. This is likely the result of a localized decreased oxygen concentration at the pilot ignition area, since the flame is consuming oxygen.

When the pilot ignition is lifted, the sample will typically ignite. Experiments were carried out in which the application time of the pilot ignition was varied, to determine if the time of ignition follows. During several of the tests, the pilot ignition was removed at 180 seconds, rather than the customary 120 seconds. The tests confirmed that the sample will ignite shortly or immediately after the pilot ignition is removed. Although this was the case, it was decided that the original 120-second pilot ignition was the most suitable for the test when using a sample thickness of 0.025 inches.

There was also discussion on the time at which ignition begins, and whether or not the test should include a required minimum allowable ignition time. Calculating the time of ignition (and time of self-extinguishment) is very subjective and difficult. During the ignition period, the propane-fired pilot ignition can obscure the actual ignition of the magnesium alloy sample, resulting in excess error. Measuring the weight loss of the sample is a much more accurate assessment of how much ignition/burning took place during the test. The proposed standard includes a maximum allowable weight loss, calculated by determining the difference in pre- and post-test weights, divided by the pre-test weight, expressed as a percentage. Testing conducted thus far indicates a 30% maximum allowable weight loss is appropriate for this test method, which allowed over 94% of the favorable (fire resistant) magnesium alloy samples to pass.

Testing indicates the current test methodology is repeatable, and a new draft procedure has been written up by the FAATC for future placement in the Fire Test Handbook (Chapter 26). The FAATC will review the recent test data to determine which of the 2 samples holders is most suitable for the test standard (three-sided, slotted perimeter holder, or similar holder with one of the long edges truncated). After selection, the draft test standard will be updated and circulated to Task Group participants for review and comments. The FAATC has also offered to build a sample holder for any lab interested in conducting tests on magnesium alloy.

2. Development of an Advisory Circular (AC) for magnesium alloy use in the cabin. Task Group participants agreed that an AC would be a very useful document in the future use of magnesium alloy components in the cabin. The AC would be based largely on work done by the FAATC and discussed at previous IAMFTWG Task meetings. The AC would include guidance on the use of magnesium alloy in both seat structure and other cabin areas, including inaccessible areas. The FAATC will continue to develop this document.

3. Additional Discussion Items. Task Group participants inquired about the possibility of having the 3 favorable magnesium alloys tested by the FAATC included in an approved materials list, since there are so few alloys, and because the FAATC has an extensive track record with each. The suggestion is that by having the alloys on an approved list, no further testing would be required. This topic has been discussed at prior Task Group meetings. In general, magnesium

alloys are classified by the major alloying elements, according to the percentage of each. For example, AZ31 is a magnesium alloy containing approximately 3% aluminum (A), and 1% Zinc (Z). However, magnesium alloy manufacturers have pointed out that this classification system is only an estimate of the actual percentages of alloying elements in the particular alloy. In the AZ31 example, it is possible for one supplier to use 2.8% aluminum, and another supplier to use 3.2%. At this point, it is unknown what influence these variations in the percentages would have on flammability. As a result, the FAA has made it clear that an approved list of qualifying magnesium alloys is not possible at this time, and each manufacturer would be required to conduct flammability testing on their particular alloy being used in the aircraft.

Surface-Area-to-Volume (SAV) ratio was discussed next. One task group participant pointed out that the allowable SAV ratios of 20 and 40 for solid and hollow components, respectively, must be calculated in inches. If another unit of measure is used in the calculation (for example millimeters or centimeters), a different SAV ratio number would result. The FAATC has discussed this topic previously, and will be including language in the Advisory Circular stating that calculations must be carried out in inches only.

An additional in-depth discussion of SAV ratio calculation ensued. Several hypothetic cases were presented. One such example depicted a 5-sided magnesium alloy box, with the 6th side utilizing another (non-magnesium) cabin component to close off the box. The question to the Task Group was whether or not this box would be considered hollow, in which case the allowable SAV ratio would be 40. Similarly, another example involved a fully enclosed magnesium alloy box, however, the faces of the box contained holes that would easily allow flames to penetrate. The discussion centered on whether an allowable percentage of voids (holes) could be developed and included as guidance in the Advisory Circular. The FAA pointed out that these were complicated, hypothetical examples, and the original effort was aimed at determining the influence of magnesium alloy when used in the construction of the bulky, heavier primary seat components. The current allowable SAV ratios of 20 for solid components, and 40 for hollow components, were based directly on the SAV ratios of the primary seat components used in the full-scale tests conducted at the FAATC. Over the past 10 years, the authorities (FAA and EASA) have assisted industry in removing barriers to the use of magnesium in the construction of cabin components, namely aircraft seat frames. The FAA and EASA were perplexed that despite all of the effort involving the research, analysis and development of appropriate flammability tests for magnesium alloys to date, there were still no formal proposals submitted to the airworthiness authorities on magnesium alloy use. During the many IAMFTWG meetings, industry had indicated that the heavier, primary components were the target areas for substitution with magnesium alloy, as this was where the most weight savings could be achieved. However, the most recent dialogue with industry seems to focus on magnesium alloy substitution in smaller, thinner applications,

to which the FAA and EASA have not yet developed flammability test guidance for. Although appropriate flammability guidance for these applications has yet to be developed, the FAA and EASA will continue to work with industry on these issues.

Seat Task Group – T. Salter (timothy.salter@faa.gov)

Provided by Tim Salter, FAATC, Task Group Lead

The majority of the time for this task group was spent viewing the recently completed seat cushion test method training video when testing with the Sonic oil burner. Attendees were then asked if any information in the video was unclear and provide feedback. Task group members had no questions or feedback and agreed the video was informative and well structured. The seat cushion test method training video is currently available for public viewing on the Fire Safety website. The video is intended to be a visual aid to accompany Chapter 7 of the Fire Test Handbook, but is not to be used as alternative instructions for conducting the test method. The next video to be released in 2018 will focus on the construction, operation, and troubleshooting of the sonic burner. Task group members suggested also including information relating to the exhaust ventilation system and test cell configuration. Other topics included updating the lab test results form for use with the Sonic burner, scale manufacturer recommendations, and relocating the spark plug on the burner cone to the bottom side of the cone.

Cargo Liner Task Group – T. Salter (timothy.salter@faa.gov)

Provided by Tim Salter, FAATC, Task Group Lead

The ongoing cargo liner test cell airflow study was the main topic of discussion for the task group meeting. There were questions regarding the data presented during at the meeting and the purpose of the study. It was explained that the data presented was a small initial study to determine if the study should be continued in a more in depth manor that would focus on the air velocity near the vicinity of the test sample. This would require additional research work and acquiring new air velocity measurement instrumentation. Related topics included intake air location and dampening, test cell design and size, exhaust hood distance relative to the test sample, and possibly using a computer model to aid in the study. These subjects will be addressed as the study continues, and an update will be provided at the next meeting.

VFP – R. Ochs, PhD/R. Whedbee (robert.ochs@faa.gov) (rick.whedbee@faa.gov)

Provided by Rick Whedbee, FAATC, Task Group Co-Lead

-An inquiry was made as to the availability of final build dimensions and drawings.
-The group discussed implementing mass flow controllers in the VFP.
-Samples need to be obtained to validate methane vs propane as well as comparison tests with the Marlin VFP.
-The idea for an additional thermocouple above the at-rest-pilot burner was introduced.
-A spec for the pilot flame needs to be established.

-An allowable tolerance around the 700 watt power shall be defined. What will be acceptable? +/- 5 watts?
-The question came up: How will we handle the testing of intumescing materials?
-Small duct configurations were discussed briefly. Side doors or similar were proposed to account for varying duct diameters.
- Criteria for wiring and sleeving needs to be established.
-DOE of the VFP parameters is pending.

Ducting/Wiring – R. Ochs, PhD (Robert.ochs@faa.gov)

Provided by Rick Whedbee, FAATC

-Policy statement 14CFR Part 23 was discussed regarding coaxial cables.
-The testing of insulated ducts vs those made of insulating materials was briefly discussed.
-The number of wires to be tested was discussed, as well as the need for a sample holder.

RTCA Task Group – S. Rehn (steven.rehn@faa.gov)

Provided by Steve Rehn, FAATC, Task Group Lead

In this task group meeting, we discussed a lot of the testing that was done and what it means for the draft test method. We plan to add some wording that the line burner should impinge on capacitors in the electronic box if they are present. We also plan to add that the line burner must be places within 3/8 inch of a vertical printed circuit board during testing.

We discussed the test method as it applies to boxes with horizontal printed circuit boards (PCB). The fuel flow rate for horizontal tests is 5 L/min for 2 minutes for all horizontal circuit boards no matter the size. The fuel flow rate is scaled based on the size of the circuit boards for vertical tests, so should we do the same for horizontal PCBs? We plan to contact the people in charge of the Telecommunications industry test ANSI T1.319 (on which our test method is based) to find out the logic behind the horizontal PCB test.

The pass/fail criterion was discussed as well. It is currently written that a flame can't escape the enclosure for longer than 12 seconds at a height of 1.5 inches. There were questions about what happens if a larger flame escapes the enclosure but for less time. Would this be considered a pass or a fail? We plan on running some tests either with the Bunsen burner or line burner with flames larger than 1.5 inches placed underneath materials for less than 12 seconds to see if they ignite more easily than the standard Bunsen burner test.

Another question was what to do if the 1 L/min starting flame goes out when inserted into the box being tested. Do you try a different flame flow rate or does that box automatically pass? It is possible to start with a smaller flame and then have the heat produced draw in more air to feed a larger flame. More testing needs to be done on boxes with limited air flow in order to determine what to do in this situation. This can go along with other planned tests to better determine which boxes will not need to be tested based on air flow limitations and ventilation designs.

Radiant Panel – S. Rehn (steven.rehn@faa.gov)

Provided by Steve Rehn, FAATC, Task Group Lead

In the Radiant Panel task group meeting, we spent most of the time talking about the electric panel and the effects aging has on it. The main difference between an old and new panel appears to be the black paint on the surface. As it gets used, the paint fades or builds up soot from material testing. As this happens the set point temperature must be increased to reach the same measured heat flux value and materials that would normally pass might start failing more often. When this happens, the panel must be replaced in order for it to operate correctly again.

We talked about possible guidelines we could add to the handbook about how to tell when the panel needs to be replaced. One idea was to replace the panel once it reaches a certain set point increase over the initial set point when it was first installed. More studying would need to be done in order to determine what this temperature increase would be. Another idea was to measure the temperature on the front of the panel with a pyrometer and compare it to the temperature measured with the thermocouple on the back that determines the set point. If these two numbers were off by a certain amount, then the panel would need to be replaced. More studying would need to be done to see if this is feasible as well.

Another possibility is to repaint the front surface of the panel instead of replacing the whole thing. This is done by sandblasting off the old paint on the surface and repainting it. If we were to add this to the handbook or AC, we would need to standardize the paint type, thickness, emissivity, etc. to match the paint used by the manufacturer of the electric panels. We would also need to run tests to make sure this is an effective method to refurbish the panel.

We talked about adding a power controller to better regulate the input voltage going to the panel. As has been shown in some other presentations, you don't always get constant voltage coming from your power source. This can cause fluctuations in the heat flux which affects calibration and test results. We plan on looking into adding some type of power controller to better regulate the power input and compare it to the current method of controlling the panel.

We talked about improvements that can be made to the pilot burner as well. The manufacturing of the burner nozzle currently in use is not very consistent with the size, shape, or placement of the orifice. This can get further complicated because the burner draws in air from inside the machine which means it can also draw in smoke and other chemicals from the burning material being tested. This can clog the nozzle and effect the fuel pressure and flame length, which affects test results. We plan on looking into other options that use an external air source so it can't become contaminated by the material off-gassing. Testing would then need to be done to ensure test results are equivalent to the current burner.

HR2 / OSU / NBS Task Group Summary – M. Burns (mike.burns@faa.gov)

Provided by Mike Burns, FAATC, Task Group Lead
10/31/17

I. OSU Update

The OSU Guidance Document is still a work-in-progress and labs are requested to submit input through the working group team leaders.
Yaw Agyei (yaw.s.agyei@boeing.com)
Yonus Behboud (yonas.behboud2@boeing.com)
Martin Spencer (mspencer@marlinengineer.com)

II. Heat Release Rate vs. Supply Voltage Fluctuation Data

Yonus Behboud (yonas.behboud2@boeing.com) from Boeing discussed with Task group members the Boeing presentation concerning the sensitivity of input voltage fluctuation to heat release rate data. Boeing has offered to develop and chair a round robin using 3 separate voltage recording devices. These units will be shared with participating labs who will measure power levels around the clock for approximately 1 week. These recordings will capture day/evening as well as week/weekend periods.

The Test plan would initially verify all voltage recording devices are recording similar values from the same power source. A data sampling rate needs to be standardized for all 3 units. A data sheet would need to be developed to capture important lab information including power supply configuration and voltage frequency (50/60 Hz). Findings from this effort will help support the HR2 test method development (initially).

III. HR2 Updates

Tech center discussed the HR2 Presentation covering the thermopile modification and new calibration method. Mike Schall from DEATAK is hopeful to have their Tech Center HR2 operational by the end of November to allow for comparative testing with the Marlin Engineering unit currently in place.

After review of DOE II data (presented by Tom Little of Boeing), Task group members and Tech center agreed with moving forward from TRL4 to TRL5. This would include material testing of simple components (alum/tape) and potentially move into more advanced honeycomb constructions and thermoplastics/foams. Boeing personnel have also agreed to put together a test plan for this work to be completed shortly. Boeing, Schneller, Kydex, General Plastics and Zotefoam have offered to provide test coupons for future testing.

IV. NSB Round Robin Results

The NBS Round Robin data was presented to task group members. I would like to again thank Zotefoams and Schneller for supplying test materials for this effort as well as all 39 Participating Labs (44 Units).

Tech center and task group members reviewed the Round Robin test plan and Ds data plots. Data was presented showing little correlation with heat flux gauge calibration

factor vs. Ds data. Conclusion and analysis of test results was discussed and outlying labs are encouraged to contact the Tech center to assist in resolving any issues they are having.

A brief review of round robin toxicity data was also presented. Tech center will send out the compiled data file next week to all participants.

V. Miscellaneous

Tech center discussed a new R&D Heater for globar replacement on HR2. The unit is still in development but will replace the entire rear globar pan, diamond mask, globars and insulators and reflector plates with a flush mounted quartz glass-type heater having upper and lower power controllers. The dimensions of the heater will be approximately 10" x 10".

Additionally, the Tech center presented photos to the task group of the new prototype heat flux gauge calibrator. Initial setup work is currently underway.

Policy Statement/Flammability Standardization - M. Jensen (Michael.e.jensen@boeing.com)

Flammability Standardization Task Group Meeting Minutes
Atlantic City 10/31/2017
Provided by Michael Jensen, Boeing, Task Group Lead

Items of discussion:
Discussed meeting with regulators earlier in the day.
Key Points:

- Went over the items we provided updates to for the FAA after Cologne.
- Items 3, 9, 10 13, 19, 21, 27, 101 and 107 were submitted after Cologne to the FAA/EASA to address their comments.
- Updates to items 21 and 101 were discussed in detail. Item 21 was divided into 4 tables to make the methods of compliance clearer. Item 101 which allows testing of fastened details separately is difficult to define to separate what is a fabricated part which must be tested together versus an assembly of fabricated parts that could be tested individually.
- No additional items will be accepted for inclusion into the AC at this time.
- The AC to replace the Policy Statement should come out as a package with the new NPRM for Flammability regulations and the ACs on the new test methods.

A discussion was held on whether the Task Group should provide comments to the NPRM for the AC. The group decided that the task team should provide comments and developed the following draft process for collecting and providing the comments to the FAA.
Everyone within FSTG should review the AC draft released by the FAA and send their comments to the SharePoint (if it still exists) or a single email. After three weeks a small group will gather and go over comments and group them into one set of consolidated

comments. This will then be put out for vote amongst the greater FSTG (defined by those who currently have access to SharePoint).
Yet to be determined is:
How do we "vote" on comments? Most likely using Survey Monkey and SharePoint (if it exists).
Address conflicting comments and somehow include in response.
We will put out an email to greater FSTG as soon as AC draft is released.

Also brought up;
Will there be an implementation period within the AC?
The FSTG still needs to submit final report to the FAA.

Approved Materials Task Group – S. Campbell (scott.campbell@zodiacaerospace.com)

Provided by Scott Campbell, Zodiac Aerospace, Task Group Lead

The task group decided to shelve the project based on interest and time constraints. The concept of an Approved Material List was proven possible with many cost saving benefits (see Presentation), however several hurdles remain:

- Volunteers from Industry and FAA would be needed to review test plans and reports to recommend a product to be listed.
- Manufacturers need assurances that industry would use the Approved Material List to justify listing costs and annual data base fees. Some end-user companies noted that they must buy products only from qualified sources and that could deter using an Approved Material List.
- A significant effort is needed to flesh out the listing specification. The task group identified all of the key characteristics needed including provisions how to disposition qualified material non-conformances.
- The FAA believed the path to using an Approved Material List wouldn't be difficult, however the task group didn't receive equivalent assurances from other regulatory agencies.
- The data base developer/ Provider (PRI), the regulators, materials manufacturers and task group specification developers all request assurances before investing more time in the process.

Waste Receptacle Fire Containment Task Group – S. Campbell

Provided by Scott Campbell, Zodiac Aerospace, Task Group Lead

A new task group was formed to develop/ codify industry accepted Methods of Compliance (MOCs) to substantiate waste compartments or meal/waste carts by similarity. Additionally, the task group will examine test aspects in order to recommend best practices and harmonization. A list of initial MOC suggestions used by several OEMs and a list of test parameter best practices will be sent to task group members. Next meeting we will discuss and make task group member assignments to develop a report format and flesh out these lists for regulatory consideration. Any questions or interested in joining the task group- Contact Scott Campbell at scott.campbell@zodiacaerospace.com.

Flame Retardant/Material Change Similarity Task Group – D. Slaton (Daniel.b.slaton@boeing.com)

Task Group Summary: Material Change Similarity using MCC
Provided by Dan Slaton, Boeing, Task Group Co-Lead

During the full working group meeting, Dr. Rich Lyon presented a brief history of the development of the MCC criteria to compare a modified material to an original certified formulation. Dr. Lyon and his team have defined an update of the criteria defining ignition capacity and heat release capacity as the key properties to compare. These two properties provide an excellent assessment of the overall ignition potential and flame propagation behavior of materials which together determines the basic fire resistance properties of the material. Natallia Safronava presented some case studies comparing MCC results.

The task group break-out session focused on discussing updates that will be made to the draft policy. The draft policy was first drafted in 2016 and posted to the FAATC Website: https://www.fire.tc.faa.gov/pdf/materials/MCC_Guidance_June_2016.pdf The draft document will be updated with the new MCC criteria and include more information about the statistical analysis approach and further guidance to clarify the application of the methodology. Currently there is a description of a "component change" to help users understand how to apply this analysis approach. Additional guidance will be provided including comparison of one supplier's material to another within boundary conditions that the material is a similar chemistry and the material is used in the same way to manufacture/process parts. This will help address the scenario when a supplier discontinues a material and a new source for that material is needed.

Discussions regarding statistical analysis clarified that that the criteria comparison is "equivalent or better" for the material change to be considered similar. Details of the statistical analysis will include information about number of samples required, ensuring a normal distribution for the analysis, and T-test information. Examples will be provided in the revised policy. The concept of "minor change determination" will need further discussion on how to implement.

Currently the decision tree for this comparison process is simple, describing that either the MCC criteria is met or that FAR testing would be needed to compare the material properties. It was suggested that an intermediate step be included before a full range of FAR tests is done. By using a simplified FAR configuration, for example, adhesive applied to a standard ply of fiberglass material could be run in Bunsen burner or OSU. This would help establish the material performance and help provide confidence in the FAR configuration tests to help reduce the test matrix for FAR testing. This approach is similar to the "standard substrate" approached defined in the Flammability Standardization Policy Memo. A standard substrate was recommended for use for the case studies that will validate this MCC Similarity process. Additional industry members have offered to participate in the validation of this process and will supplier materials and data from FAR testing. There is also a separate but related activity to perform MCC

industry round robin testing to support an update to the ASTM. The FAATC has asked for material samples to use in this round robin. Phenolic resin products were suggested.

Overall, there is good enthusiasm for this new test method and this initial proposal to use MCC for comparing material changes.

Characterization of OSU Airflow Using Particle Image Velocimetry – T. Emami (FAATC)
Tina will begin work on Flow Visualization in the OSU – Cold Flow Through Clear OSU – PIV will be peering into OSU from left-hand side. Tina briefly reviewed some of the PIV work that has been done on the OSU by Rob Ochs. Tina will be using the transparent OSU to determine what the air is doing when it first enters the OSU. The laser will be peering into the OSU from the right-hand side and the camera will be located in the front. A 3D drawing of her planned set up was shown.

EASA Materials-related Rulemaking Activity – Enzo Canari (EASA)

Update of CM-CS-004: Flammability Testing of Interior Materials was published in October 2013 – EASA is in full agreement with PS-ANM-25.853-01-R2. EASA strongly recommends that design organizations develop their compliance documentation following the guidelines provided by FAA PS-ANM-25.853-01-R2. EASA will work with FAA on review of the items submitted by the FSTG.

Update of CM-CS-004 (2/2): The FAA plans to release an AC that will supersede the FAA PS. Using project-specific MOC Certification Review Items (CRIs) is not considered an efficient solution. EASA will update CM-CS-004 to include allowance to use only the items that will be in the final list provided by the AAs to the FSTG. The revised CM should undergo public comment in Q2 2018.
CM on Qualification of Flammability Test Organizations: EASA Parte 21 requires Design Organization to qualify as subcontractors the test organizations that conduct certification testing on their behalf. EASA receives on a regular basis queries related to qualification process of test houses. EASA is considering the opportunity to issue a CM (Target for publication: Q2 2018) to provide official guidance on the qualification process of test houses, including the use of the sonic burner for certification testing.

CM on Use of Magnesium Alloys – New Special Conditions will have to be developed in coordination with the FAA in order to allow the use of magnesium in inaccessible areas. The reference standard will be the modified radiant panel test method currently being developed at the FAATC. Additional installation limitations may apply.
EASA is considering the release of a Certification Memorandum (target for public consultation: Q2 2018 to clarify the options available to applicants to achieve certification of installation of parts made of magnesium alloys. The content of the CM will be based on the guidance material extensively discussed in the past IAMFTWG meetings.

Jensen: I would like to request that the FAA consider adding this as official training to go toward my required training hours. Designate this as an official class. Other attendees seconded Michael's request.

Next Meeting:

March 6-7, 2018

Hosted by Gulfstream Aerospace
The meeting will be held at a Gulfstream Campus in Savannah, Georgia, USA.
Meeting location address and hotel information will be sent to Materials Working Group and posted on the FAA Fire Safety website when it is available.

Please Note: The Gulfstream Campus is **entirely smoke free**.
There is **no smoking allowed** on the premises.