Activities & Lessons Learned to Maintain Compliance of the Radiant Panel Test with FAA Requirements

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Time Frame

- **Official Document Dates**
  - The Test Method to Determine the Flammability and Flame Propagation Characteristics of Thermal Acoustic Insulation Materials became effective in July 2003.
  - Compliance date September 2005.
  - The test method is specified in Title 14 CFR 25.856 Part VI of Appendix F.
  - Advisory Circular 25.856-1, which provides guidance concerning the test method, was issued June 2005.

Electric Radiant Panel Test Chamber

Road to Compliance

- **Background**
  - FAA Technical Center personnel were present at all of the facilities in the US and Canada during their equipment and operational compliance check.
  - A radiant panel training session for EASA personnel was held in 2005 at Airbus in Bremen, Germany.
  - There are approximately 25 labs/companies throughout the world that perform radiant panel testing.
- ***So*** … Two years have passed since the *Rule's* compliance date. What have we done and what have we learned?

Activities

- Conduct yearly Round Robin testing. Why? Best way to ensure reproducibility among the labs.
- Continued support of compliance checks for new labs.
- Perform Radiant Panel comparison testing with individual materials manufacturers.
  - Serves as an equipment check for both parties.
  - Demonstrates reproducibility.

Review of Radiant Panel Round Robin 9 Test Results

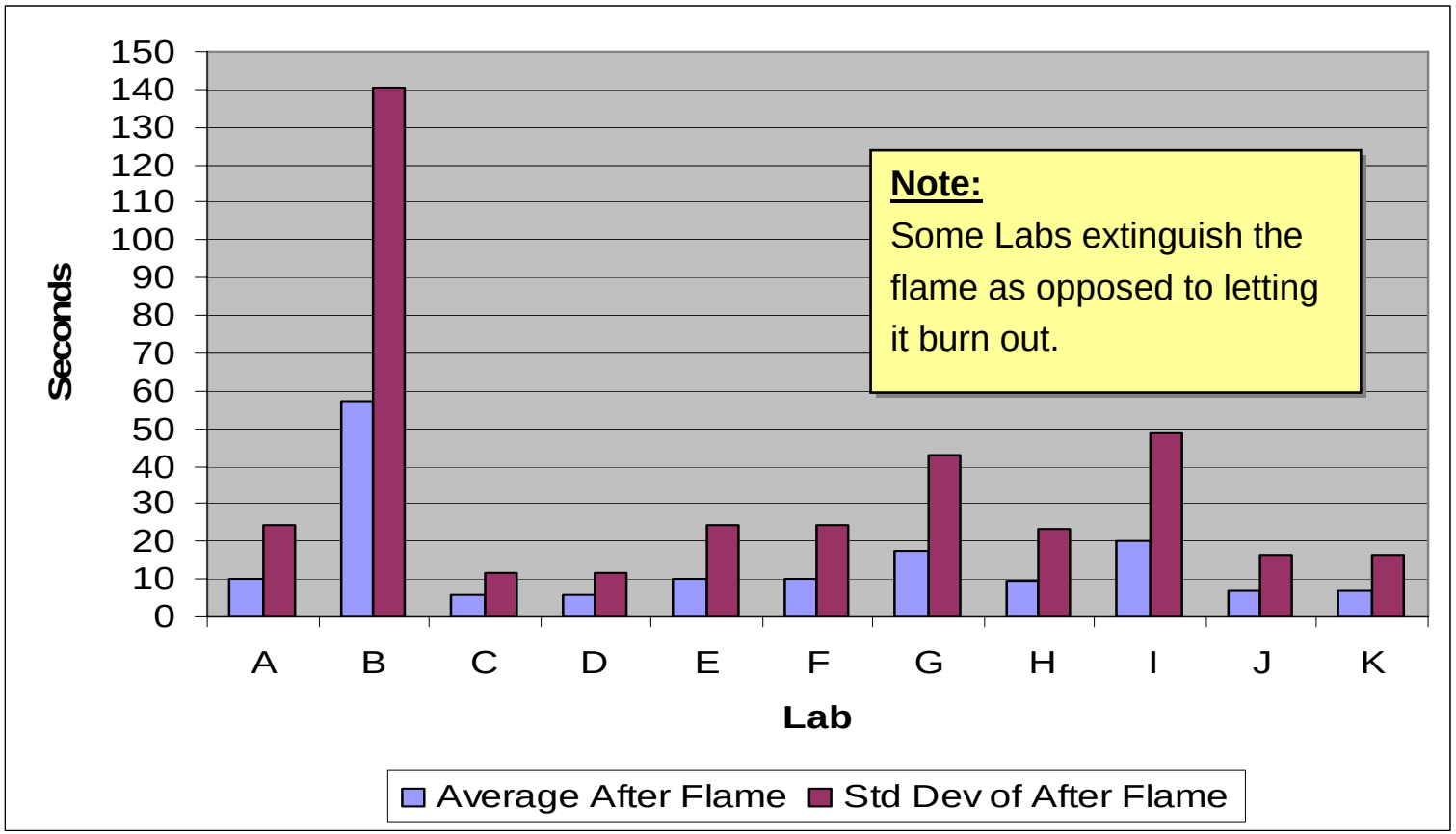
- Conducted in order to evaluate independent labs and OEMs.
- Future Round Robins will include **all** labs.
- Each participating lab received 6 taped samples.

Review of Radiant Panel Round Robin 9 Test Results

Picture of Sample:

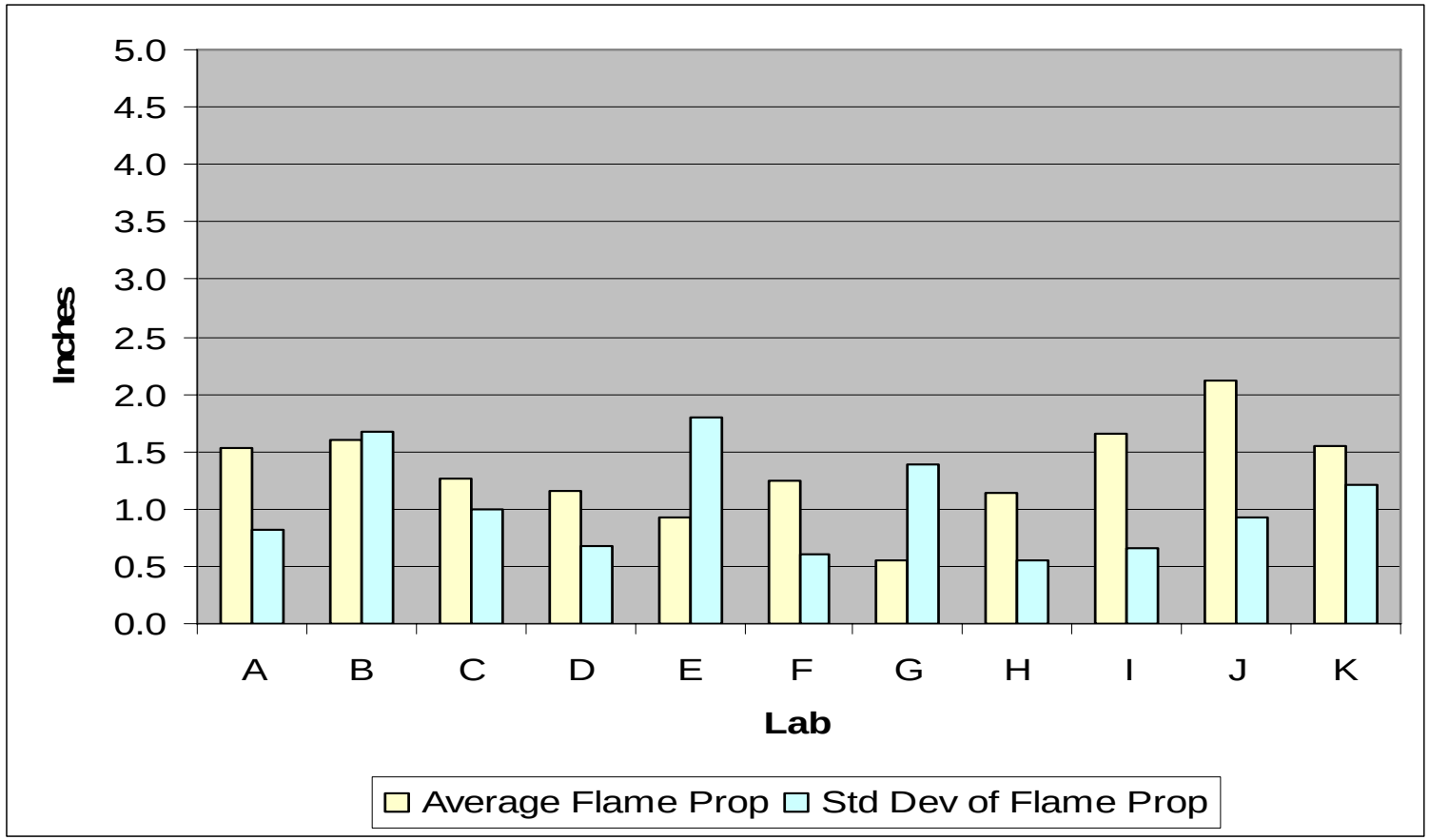
Review of Radiant Panel Round Robin 9 Test Results

After Flame



Review of Radiant Panel Round Robin 9 Test Results

Flame Propagation



Review of Radiant Panel Round Robin 9 Test Results

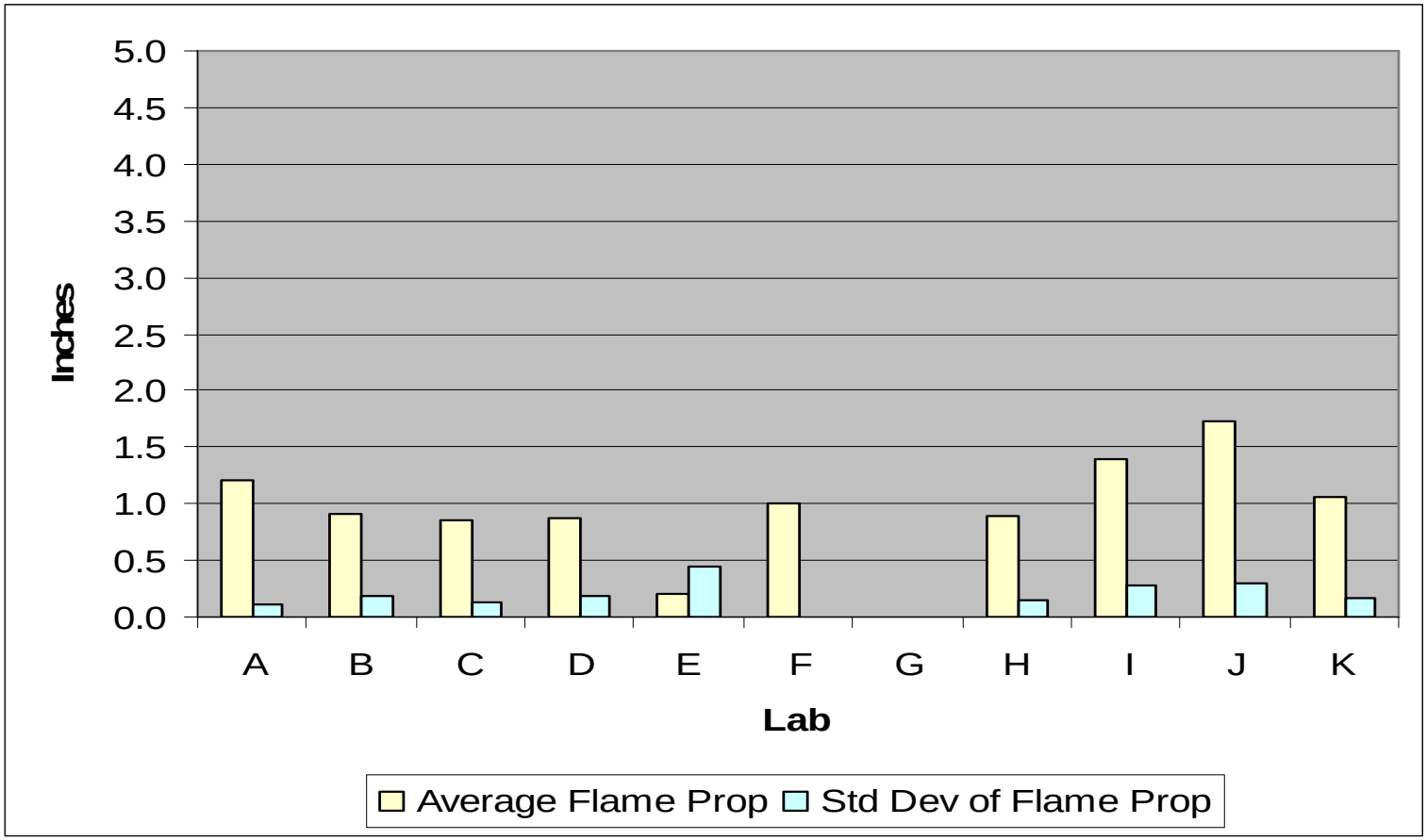
- Something seems strange with these results (*with respect to the Standard Deviation for both After Flame and Flame Propagation*) when compared to the Standard Deviations observed in previous Round Robins.

Review of Radiant Panel Round Robin 9 Test Results

- **Question**: What went wrong?
- **Answer**: You were all set up.
- All samples were numbered 1 through 6 and were tested in that order by each lab.
- Everyone failed sample #4, just as they were supposed to.
- When sample #4 is eliminated from the data set, things look ***much better …***

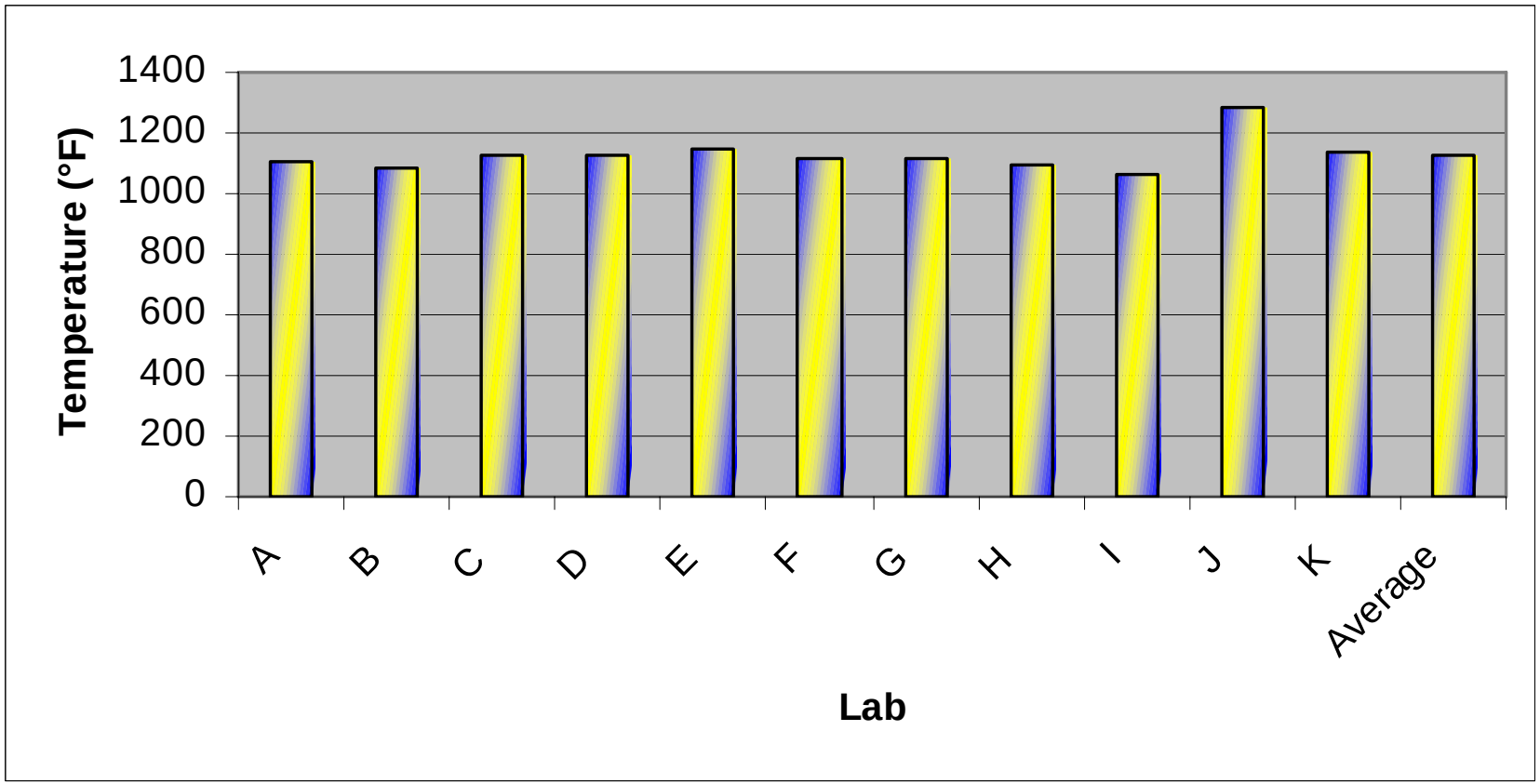
Review of Radiant Panel Round Robin 9 Test Results

Flame Propagation



Review of Radiant Panel Round Robin 9 Test Results

Reported Controller Set Points



Review of Radiant Panel Round Robin 9 Test Results

- We were very pleased with the results from this Round Robin.
- Each Lab's equipment appears to be functioning properly.
  - Lab J's higher than usual Controller Set Point is the result of their special "electrical" configuration.
- A future Round Robin is in the works and is scheduled for Winter 2007.

Lessons Learned

- **Radiant Panel**: Why do I need to increase the Set Point temperature on the controller?
  - The emitter strips may be “dirty” due to combustion by-products or actual debris may adhere to the emitter surfaces. Therefore, you decrease black body radiation.
  - The panel manufacturer states that you can use a plastic scraper, brush, or cloth to clean the emitter strips.
  - You don’t want to use a metal brush or anything else that will damage the paint.
  - The thermocouple in the panel has aged and may need to be replaced. *We recommend keeping a spare on hand*.
  - Irregularities with individual power sources.

Lessons Learned

- Can I resurface the emitter strips?
  - The panel manufacturer states that it is acceptable to resurface the panel.
  - The black paint used should be rated up to 1300ºF.
- Why 1300ºF?
  - The front face of the panel is approximately 150ºF hotter than the Set Point temperature.
  - There are high temperature paints available that can be used.

Lessons Learned

- **Calorimeter**
  - My panel is fine, so why can't I achieve calibration?
  - When was the last calibration check performed?
  - The calorimeter is the most critical element of the test!
  - All of the excellent information on calorimeter "care" that Mr. Dick Johnson (FAA, Retired) has presented over the years should be followed!

Lessons Learned

- **Propane Nozzle**
  - What happened to the sharp needlepoint flame?
  - The flame is distorted, “cloudy,” and sometimes there is more than one flame.
- Possible Explanations:
  - The nozzle orifice may be partially blocked.
  - The propane bottle could be almost empty.
  - The tip of the metal guide may have debris on it.
  - The filter in the aerator tube may be dirty.

Lessons Learned

- **Polyimide Film Cover Material**
  - Lamart Corp.’s polyimide film (and other films) is always included in compliance checks and frequently in Round Robins.
  - ALL polyimide films from other manufacturers that we have tested at the Technical Center have performed very well.
  - Lamart’s film cover is used because of the distinct charring effect on the film after burning.
  - This charring effect helps us to determine if there are problems with the equipment.

Lessons Learned

- **<u>Advisory Circular 25.856-1</u>:** Provides guidance concerning the test method 25.856a.
- What is covered in the AC?
  - Tapes
  - Hook and Loop
  - Damping Materials
  - The AC also specifies installations that do not require testing to 25.856.

Lessons Learned

- **Advisory Circular 25.856-1**
  - The “rule” of 7 for Flame Propagation
    - If a situation arises where one out of the three samples tested fails due to flame propagation length, a minimum of seven additional samples may be tested.
    - The average of all the samples, including the original failed sample (10 total), must meet both the flame propagation/ after flame requirements.
  - The “rule” of 7 for After Flame
    - Test an additional seven samples (same as flame propagation).
    - The average of the after flame time for all 10 samples must be 3 seconds or less.
    - The flame propagation distance must not exceed 2 inches on any sample.

Lessons Learned

- **Advisory Circular 25.856-1**
  - Flame Exposure Time
    - 15-second propane flame exposure time specified in 25.856a.
    - It is acceptable to expose a sample to a longer flame time?
    - The AC states that a 30-second flame exposure time is acceptable, however, it is permissible to expose the sample to a longer flame time.
    - How long? A lab that would want a longer flame exposure time would need to contact their ACO in advance for approval.

Summary

- Since the inception of the Rule, the Radiant Panel Flame Propagation test has proven to be a reproducible test as shown by the results of recent Round Robins.
- The “Lessons Learned” portion of this presentation has greatly benefited us and should be of help to all labs that may encounter any of the problems discussed.
- The Tech Center is available to assist all the labs that have any questions or problems.