

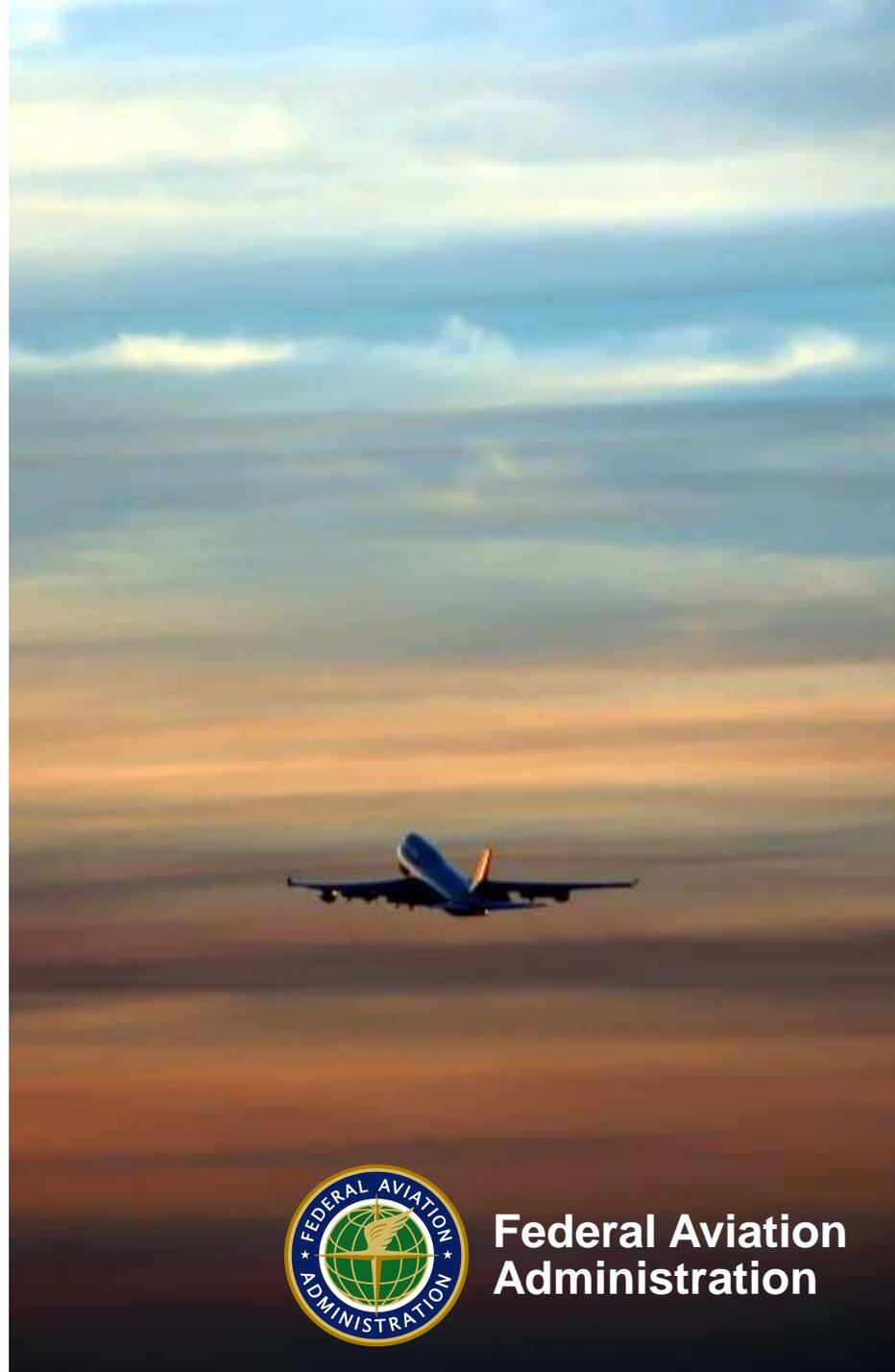
# Next Generation Fire Test Burner for Powerplant Fire Testing Applications

International Aircraft Systems Fire  
Protection Working Group  
Cologne, Germany  
May 10 – 11, 2017

Steve Summer  
Steve Rehn  
Federal Aviation Administration  
Fire Safety Branch  
<http://www.fire.tc.faa.gov>



**Federal Aviation  
Administration**



# Background

- **Currently specified oil burners are no longer commercially available**
- **Industry is left with the propane burner, however this burner has been shown to be less severe than an engine flammable fluid flame**
- **FAA Tech Center Fire Safety Branch has been tasked by Transport Airplane Directorate to develop burner performance standards for the next-generation fire test burner for powerplant fire testing**
  - New burner should be much easier to calibrate, provide more consistent results, and be readily available for industry use.

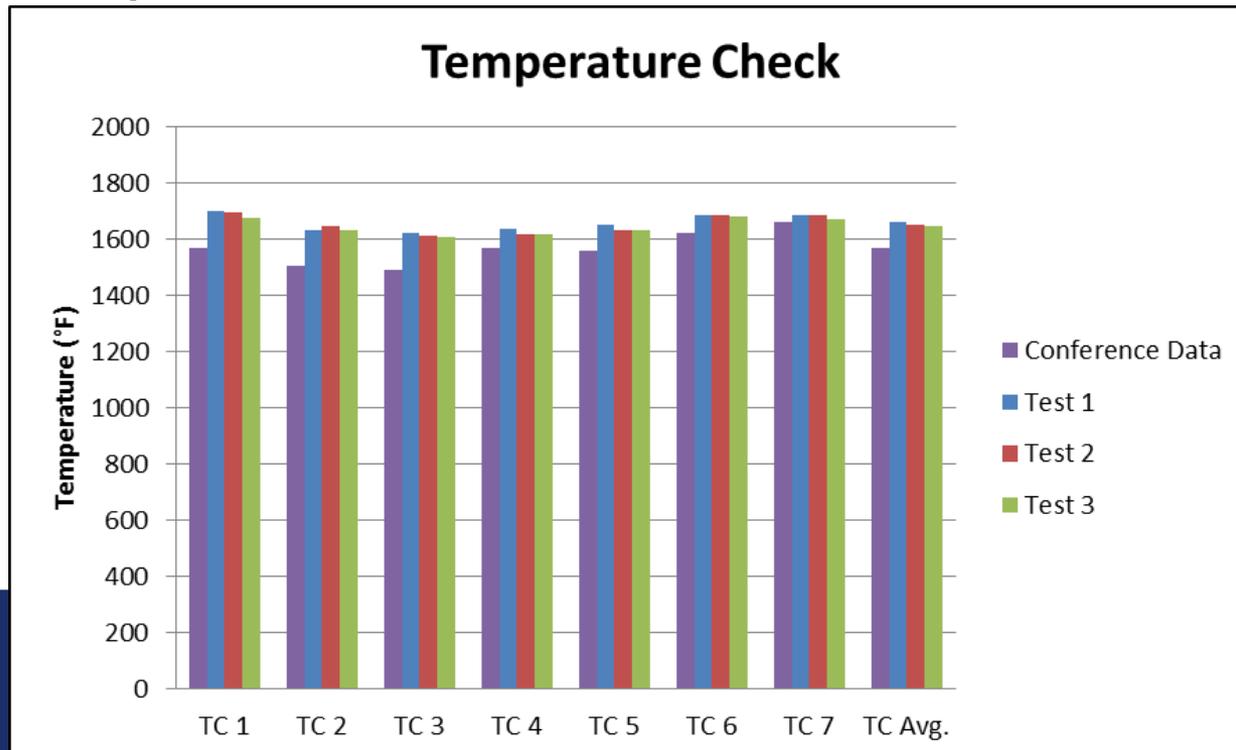
# Current Status - Testing

- **Searching for additional non-metallic materials to test in a round robin with objectives of**
  - Utilizing results to ensure proper settings of sonic burner
  - Ensure consistency of testing within lab using sonic burner
  - Ensure repeatability across burners at various labs

# Burner Settings

- **Nozzle: 80° B 2.0 gph**
- **Flow-checked 2.00 gph @ 102 psi**
- **Air Pressure: 50 psi**
- **Copper Tube Heat Flux (3 test average): 5111.3 Btu/hr**
- **Temperature check (first 3 tests with brand new 1/8”**

**exposed-bead  
thermocouples**



# 17" x 17" Test Samples

Material	Burn Through Time	
4872-18 1-Ply Carbon Fiber*	15:00	Did not burn through, Backside burning at beginning
4872-28 2-Ply Carbon Fiber*	15:00	Did not burn through, Backside burning at beginning
4872-38 3-Ply Carbon Fiber*	15:00	Did not burn through
4846-1B 1-Ply Fiberglass*	15:00	Did not burn through, Backside burning at beginning
4846-2B 2-Ply Fiberglass*	15:00	Did not burn through
4846-3B 3-Ply Fiberglass*	15:00	Did not burn through
10 Ply Carbon Composite (@2 in. burner distance)	15:00	Did not burn through

*\* Material also tested at NIAR (Carlin burner with vibration), producing similar results*



•4846-3B 3-Ply Fiberglass

# 24" x 24" Test Samples

Material	Burn Through Time	
2-Ply Fiberglass cargo liner	15:00	Did not burn through
1-Ply Fiberglass cargo liner	15:00	Did not burn through
1/4" Honeycomb panel	15:00	Did not burn through



•2-Ply Fiberglass Cargo Liner



•1/4" Honeycomb Panel

# 10-Ply Carbon Composite Test

## Start of Test



# 10-Ply Carbon Composite Test @ 5 Minutes



# 10-Ply Carbon Composite Test



**Backside – 5 minutes**



**Backside – 10 minutes**

# 10-Ply Carbon Composite Test @ 15 minutes



# 10-Ply Carbon Composite Test Post Test



# Current Status - Testing

- **Due to difficulty of finding non-metallic materials that will provide consistent burnthrough results, two proposed options moving forward:**
  - Test with pressure on the sample
    - This will likely yield failures, however also introduces an additional test variable into the round robin testing
  - Test varying thicknesses of aluminum

# Current Status - Regulatory

- **Industry-led group has been meeting regularly**
- **Decided on a list of ‘top-10’ items that need to be addressed in rewrite of AC20-135**
  1. **Burner, Flame Temperature**
  2. **Flame Calibration, Method**
  3. **Post-test Burning / Backside Ignition**
  4. **TC’s (size, type, number)**
  5. **Test Pass/Fail Criteria, including TSO hoses**
  6. **Definition: Fireproof; Fire resistant; Heat Flux**
  7. **Environ / Op conditions**
  8. **Panel Size**
  9. **Vertical Propane Burner**
  10. **Harmonize with Other Specs/References**

# Current Status - Regulatory

- **Authorities group held face-to-face meeting March 28-30**
  - Completed initial review of 65 industry comments
  - Moving forward will work to incorporate changes into a revision of AC20-135 with possible industry participation/assistance to be requested
  - Draft policy memo regarding the use of the Propane Burner is in the works

# Questions?

## Contact Information:

**Steve Summer**

**609-485-4138**

**Steven.Summer@faa.gov**

**Steve Rehn**

**609-485-5587**

**Steven.Rehn@faa.gov**

