

# Next Generation Fire Test Burner for Powerplant Fire Testing Applications

International Aircraft Systems Fire  
Protection Forum  
Atlantic City, NJ  
October 31 – November 1, 2018



**Federal Aviation  
Administration**

Timothy Salter  
Steven Summer  
Federal Aviation Administration  
Fire Safety Branch  
<http://www.fire.tc.faa.gov>



# Background

- **Currently specified oil burners are no longer commercially available**
- **Industry is utilizing legacy oil and propane burners**
- **Propane burner has been shown to be less severe than an engine flammable fluid flame**
- **New Technology Sonic Burner developed and approved for use in interior and fuselage testing.**
  - Sonic Burner provides numerous advantages to legacy burners
- **FAA Tech Center Fire Safety Branch has been tasked by Transport Standards Branch (TSB) 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/Plan

- 1. Support Thermocouple Round Robin Testing for SAE**
- 2. Support post-test burning/residual flame testing for SAE**
- 3. Support composite testing for future round robins**
- 4. Conduct internal comparative testing of Park vs Sonic burner to develop FAA recommended practice.**

# T/C Round Robin

- **Initiated by Resonate Testing through the Task Group**
- **Objective is to investigate effect on temperature readings caused by:**
  - External sheath diameter and wire gauge
  - Exposed junction vs sheathed
  - Thermocouple age
- **In process of procuring thermocouples**
- **14 labs in agreement to participate**

# T/C Round Robin

- **Four T/C types to be evaluated:**
  - 1/8” exposed junction
  - 1/16” exposed junction
  - 1/8” Grounded/Sheathed
  - 1/16” Grounded/Sheathed
- **Proposed testing to utilize four rakes, with a center control T/C in each**
- **Initial comparison testing of 5 measurements per rake**
- **Cycling test to consist of 20 measurements per rake**

Rake one:

1	2	3	4	5	6	7
1/8	1/8	1/8	1/8	1/8	1/8	1/8
exposed	exposed	exposed	exposed	exposed	exposed	exposed
			control			

Rake two:

1	2	3	4	5	6	7
1/16	1/16	1/16	1/8	1/16	1/16	1/8
exposed	exposed	exposed	exposed	exposed	exposed	exposed
			control			

Rake three:

1	2	3	4	5	6	7
1/8	1/8	1/8	1/8	1/8	1/8	1/8
sheathed	sheathed	sheathed	exposed	sheathed	sheathed	sheathed
			control			

Rake Four:

1	2	3	4	5	6	7
1/16	1/16	1/16	1/8	1/16	1/16	1/16
sheathed	sheathed	sheathed	exposed	sheathed	sheathed	sheathed
			control			

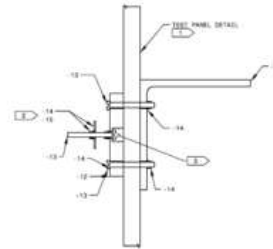
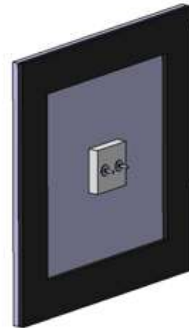
# Post Test Burning

- **Concerns of post test burning requirements have been discussed during SAE A-22 meetings.**
  - Is there an allowable amount of post-test burning?
  - What should the pass/fail requirement be?
- **FAA is looking to support this by conducting tests on materials supplied by SAE group and providing the results back to SAE for them to review and discuss.**

# Composite Material Evaluation (Spirit Aero)

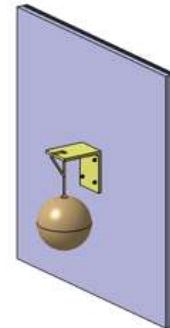
- Cantilevered weight installed on rear center portion of 4-ply and 8-ply composite panel
- Initial testing at NIAR showed promising results with burnthrough occurring in 2-3 minutes without vibration.
- Testing ongoing at NIAR to refine weight loading and ensure repeatability
- Testing at 1 or 2 additional labs to ensure reproducibility to take place in coming months
- Following that a round-robin study is planned to evaluate legacy and sonic burner
- Details of testing will be provided by Spirit Aero at the SAE A-22 Meeting on 11/1.

Flame Side  
Shown



Fitting Section View

(graphics from Spirit AeroSystems)



Cold Side  
Shown

# Comparative Testing with Park Burner

- **Intent is to develop FAA recommended practice for sonic burner, given current AC 20-135 calibration requirements.**
- **FAA's Park oil burner will be operated using current AC 20-135 calibration requirements and utilized as our baseline.**
- **Recommended Sonic burner settings and operating parameters which result in comparable results will be determined.**



# Questions?

## Contact Information:

**Tim Salter**

**609-485-6952**

**Timothy.Salter@faa.gov**

**Steve Summer**

**609-485-4138**

**Steven.Summer@faa.gov**

