Oil Burner Testing of Powerplant Components

International Aircraft
Systems Fire Test Forum

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Federal Aviation Administration

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http://www.fire.tc.faa.gov

Background

- **Industry is currently utilizing legacy oil and propane burners**
  - Propane burner shown to be less severe than an engine flammable fluid flame
  - Recommending oil burner be used for all powerplant tests

- **FAA Tech Center Fire Safety Branch has been tasked by Transport Standards Branch (TSB) to develop burner performance standards for the Sonic fire test burner for powerplant fire testing**
  - Sonic burner much easier to calibrate, provides more consistent results, and is readily available for industry use

Current Status/Plan

1. **Support Thermocouple Round Robin Testing for SAE**

   - Completed

2. **Support composite material testing round robin**

   - In Progress

3. **Conduct internal comparative testing of Park vs Sonic burner to develop FAA recommended Sonic burner configuration for Powerplant testing**

   - In Progress

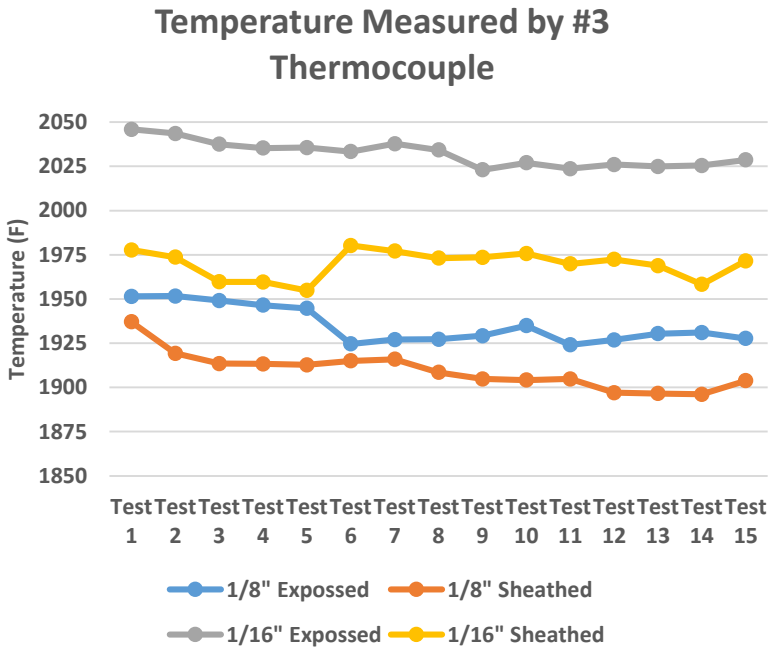
T/C Round Robin

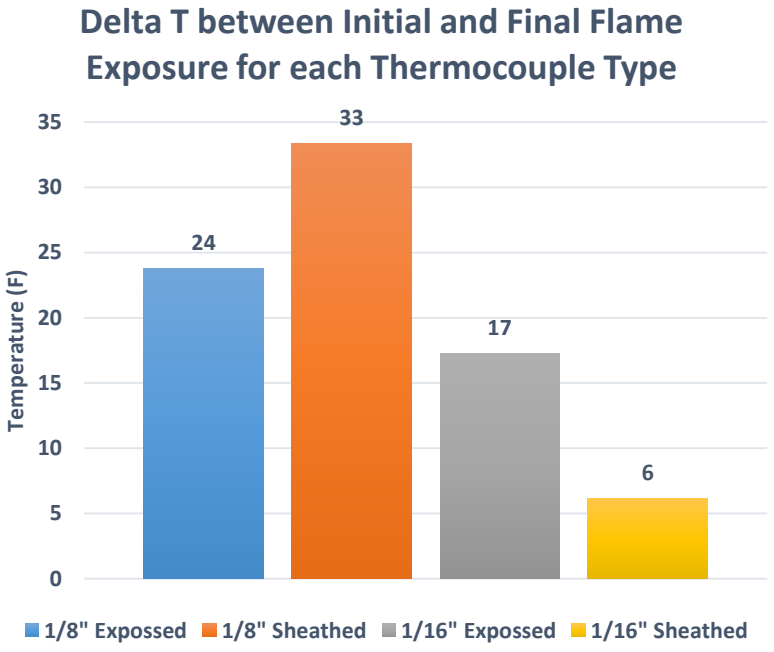
- **Initiated by Resonate Testing through Powerplant Task Group**
- **Objective is to investigate effect on temperature readings caused by:**
  - External sheath diameter and wire gauge
  - Exposed junction vs sheathed
  - Thermocouple age
- **Thermocouples have been procured**
  - Testing at FAA Technical Center completed April, 2019
- **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
- **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**

T/C Round Robin

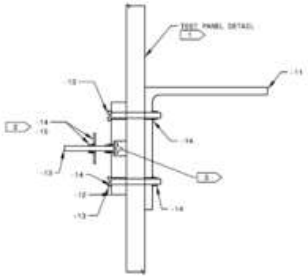




Composite Material Evaluation (Spirit Aero)

- **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.**
- **Burnthrough occurs at the time the weight detaches from panel**
- **Testing ongoing at NIAR to refine weight loading and ensure repeatability**
- **Testing at additional labs to ensure reproducibility**

Flame Side Shown



Fitting Section View

Cold Side Shown

(graphics from Spirit AeroSystems)

SPIRIT AEROSYSTEMS

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**
- **Run back-to-back comparison testing of materials using both the Park and Sonic burner**
- **Recommended Sonic burner settings and operating parameters to produce results equivalent to legacy burners**

Comparative Testing with Park Burner

TexTech PAN Felt

0.125” 2024-T3 Aluminum

Questions?

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