Next Generation Fire Test Burner for Powerplant Fire Testing Applications

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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  – 1/8” Grounded/Sheathed
  - 1/16” exposed junction  – 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
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.
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?

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