Next Generation Fire Test Burner for Powerplant Fire Testing Applications

Presented to: International Aircraft Systems Fire

Protection Working Group Meeting By: Steve Summer, Steve Rehn

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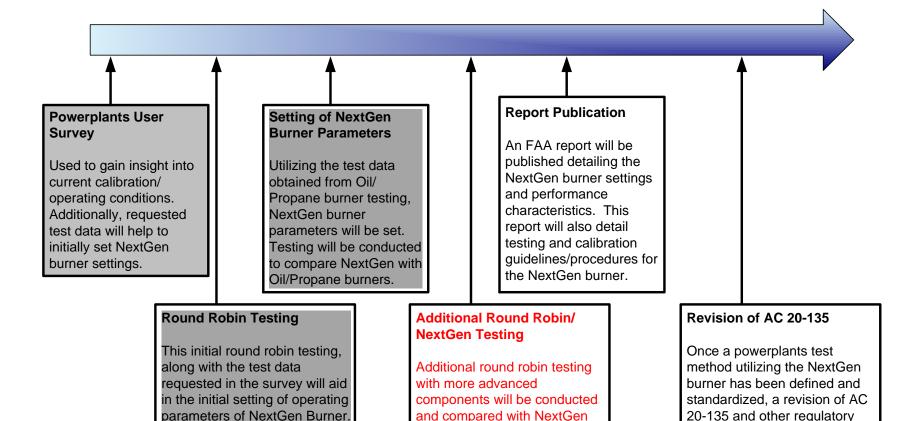


Background

- 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 nextgeneration 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



and compared with NextGen

refine NextGen burner settings.

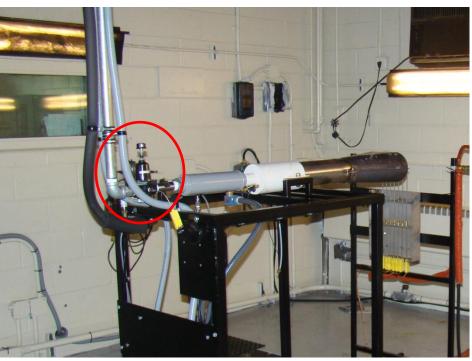
burner performance to help

20-135 and other regulatory

material will be able to

proceed.

Burner Changes



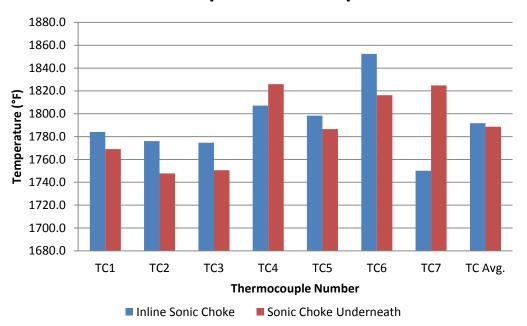


Old Configuration: Air pressure regulator and sonic choke in line with burner

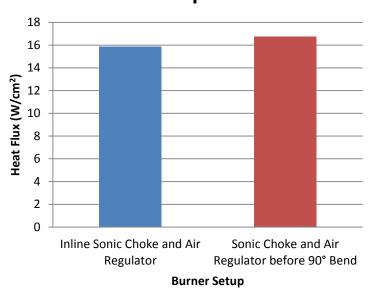
New Configuration: Air pressure regulator and sonic choke before a 90° bend to match material fire test Next-Gen Burners

Burner Changes

Flame Temperature Comparison



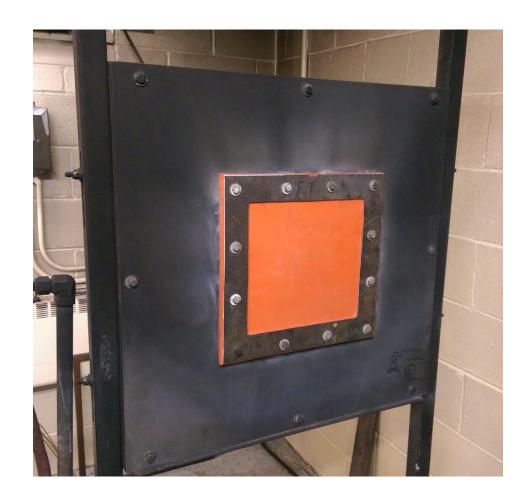
Copper Slug Calorimeter Heat Flux Comparison



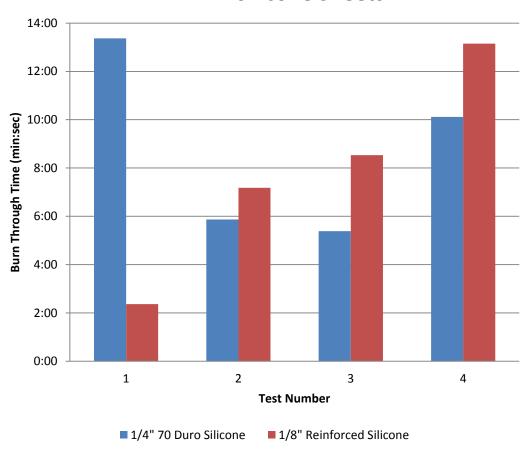
- Temperatures stayed relatively consistent
- Heat flux increased by about 5%

 Searching for additional non-metallic materials to test in a round robin to fully prove results are comparable to current burners and repeatable across each new Sonic Burner

- 12" x 12" Silicone samples
- 3 Types Tested
 - 1/8" Reinforced silicone
 - 1/4" 40 Duro Silicone
 - 1/4" 70 Duro Silicone
- 40 Duro (measure of hardness) warped and melted too much so only one sample was tested
- Four samples each of reinforced and 70 Duro silicone were tested



12" x 12" Silicone Sheets

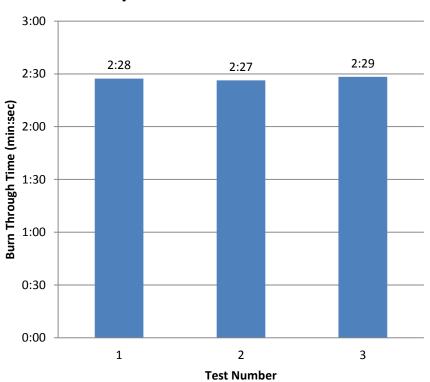


- No changes made to test setup between each test
- Material burn through times were extremely inconsistent
- Neither would be a good material for a round robin

- 24" x 24" Impact-Resistant Garolite Test Sample
- Tested at thicknesses of 1/16" and 1/4"
- 1/16" had too short of a burnthrough time at only 26 seconds



1/4" Garolite Sheets



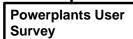
- Extremely Consistent burn-through times
- Unfortunately this material is very flammable and flames reached ~5 feet above the sample during testing.
- It continued to burn for about 15 minutes after test was completed.



Future Material Tests

- Flame-retardant Garolite is available
- Also plan on testing carbon fiber and Conolite cargo liner

Current Status



Used to gain insight into current calibration/ operating conditions. Additionally, requested test data will help to initially set NextGen burner settings.

Setting of NextGen Burner Parameters

Utilizing the test data obtained from Oil/
Propane burner testing,
NextGen burner parameters will be set.
Testing will be conducted to compare NextGen with Oil/Propane burners.

Report Publication

An FAA report will be published detailing the NextGen burner settings and performance characteristics. This report will also detail testing and calibration guidelines/procedures for the NextGen burner.

Round Robin Testing

This initial round robin testing, along with the test data requested in the survey will aid in the initial setting of operating parameters of NextGen Burner.

Additional Round Robin/ NextGen Testing

Additional round robin testing with more advanced components will be conducted and compared with NextGen burner performance to help refine NextGen burner settings.

Revision of AC 20-135

Once a powerplants test method utilizing the NextGen burner has been defined and standardized, a revision of AC 20-135 and other regulatory material will be able to proceed.



Current Status – AC 20-135

- A sub-group had been formed with the goal of developing proposed rewording of AC20-135 in a parallel effort with NexGen burner development.
 - Testing requirements (i.e. when/how to vibrate sample, orientation of sample, etc) and testing equipment (i.e. thermocouple type, heat transfer calibration device, etc) will be addressed.
 - Actual burner operation and calibration will be left open subject to burner development.
- After initial sub-group meetings, it became evident that a more formal involvement from FAA was required and it was suggested that a proposal be submitted to the FAA from industry with the request that a formal group chartered for this task.

Current Status – AC 20-135 (cont.)

- Dirk Kearsley (BAE Systems) had drafted this request and submitted to FAA (6/2014).
- Internal FAA group of experts (Headquarters, Directorates, ACOs, etc) has been formed to initiate an evaluation of AC
 - Sham Hariram working as industry focal point with group
- Work to be completed in two phases
 - Incorporate NexGen burner as an acceptable burner for powerplant testing utilizing existing calibration requirements and clean up initial wording to ensure consistency
 - Address longer term, more complete revision of AC to fully incorporate NexGen burner with operating/calibration specifics and address all of industry comments



Questions?

Contact Information:

Steve Summer 609-485-4138

Steven.Summer@faa.gov

Steve Rehn

609-485-5587

Steven.Rehn@faa.gov