

Next Generation Fire Test Burner for Powerplant Fire Testing Applications

Presented to: International Aircraft Systems Fire Protection Working Group Meeting
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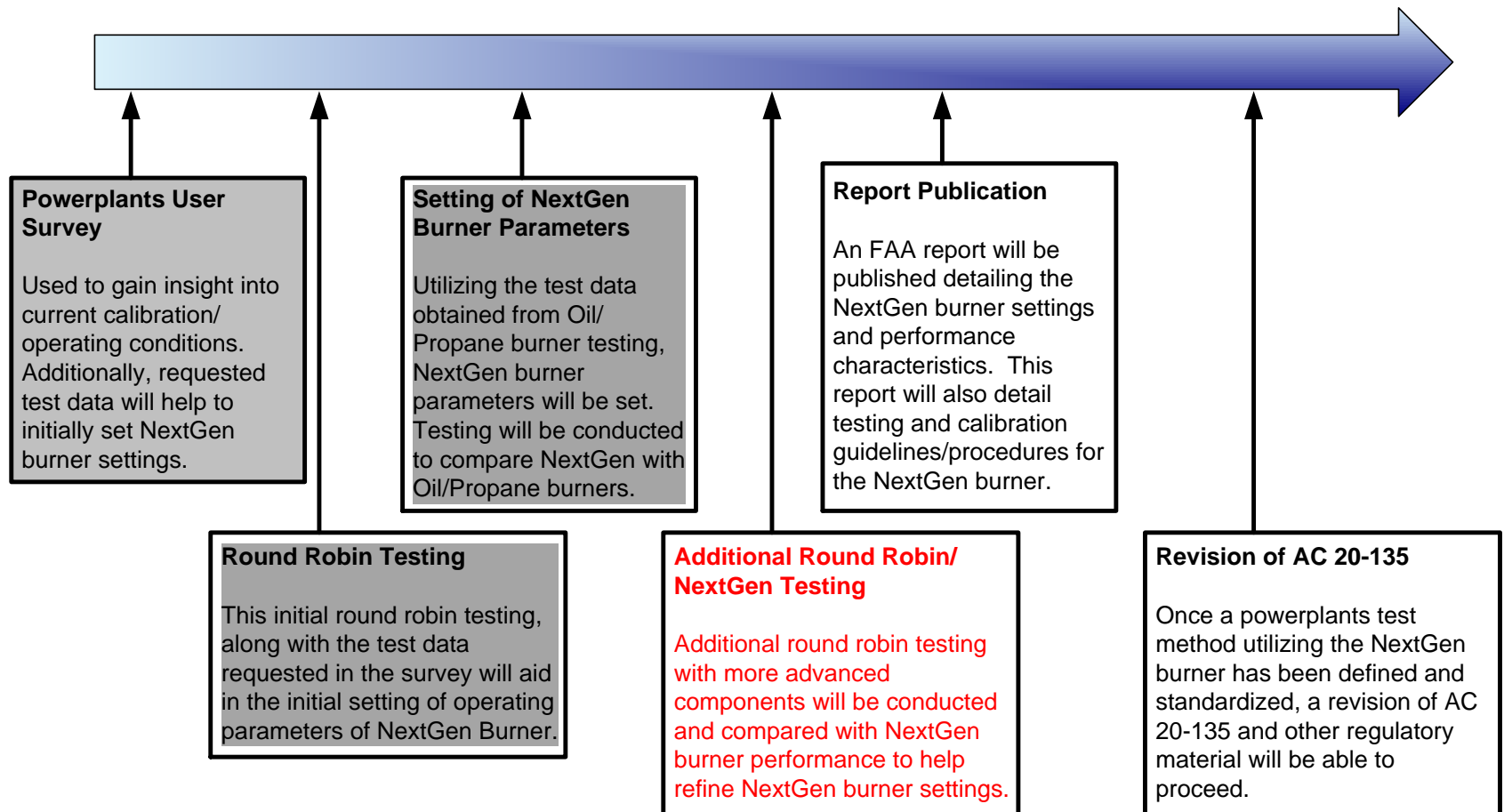
Federal Aviation
Administration



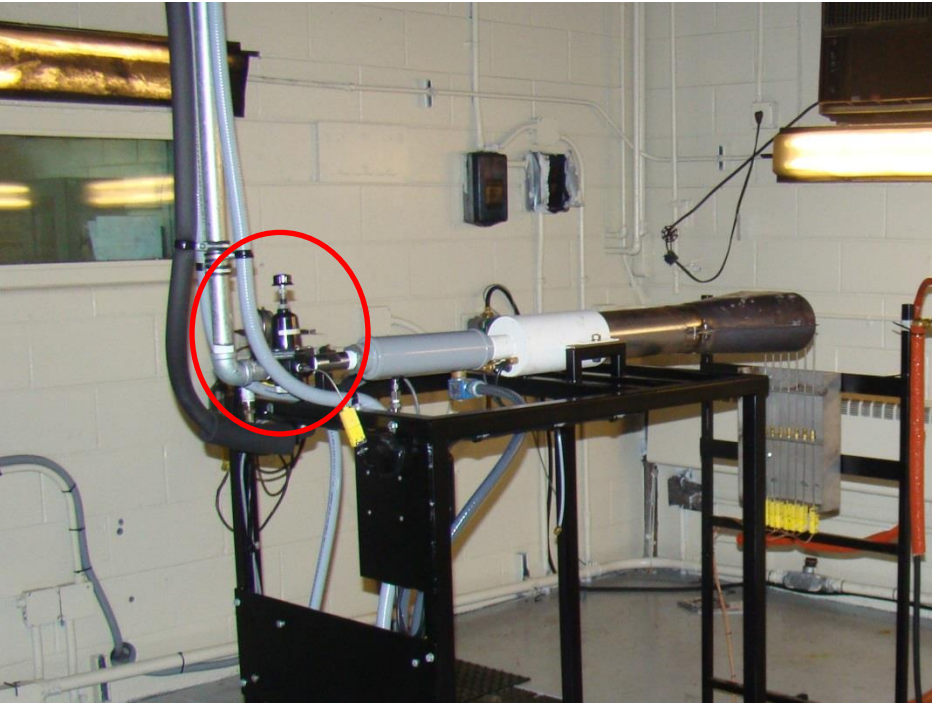
Background

- **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.

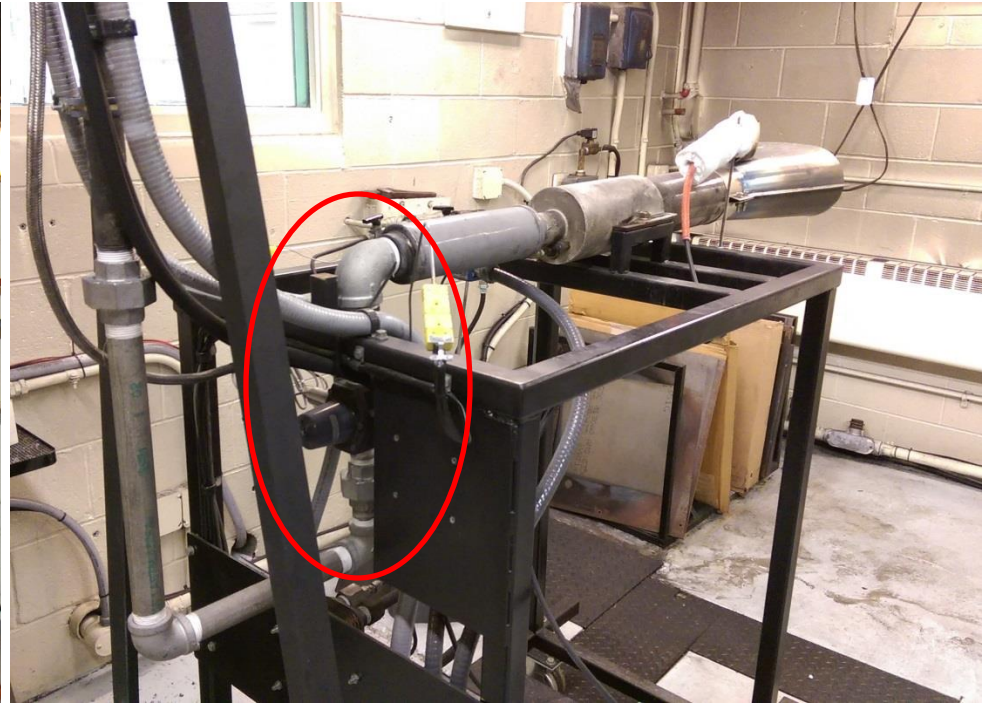
Current Status



Burner Changes



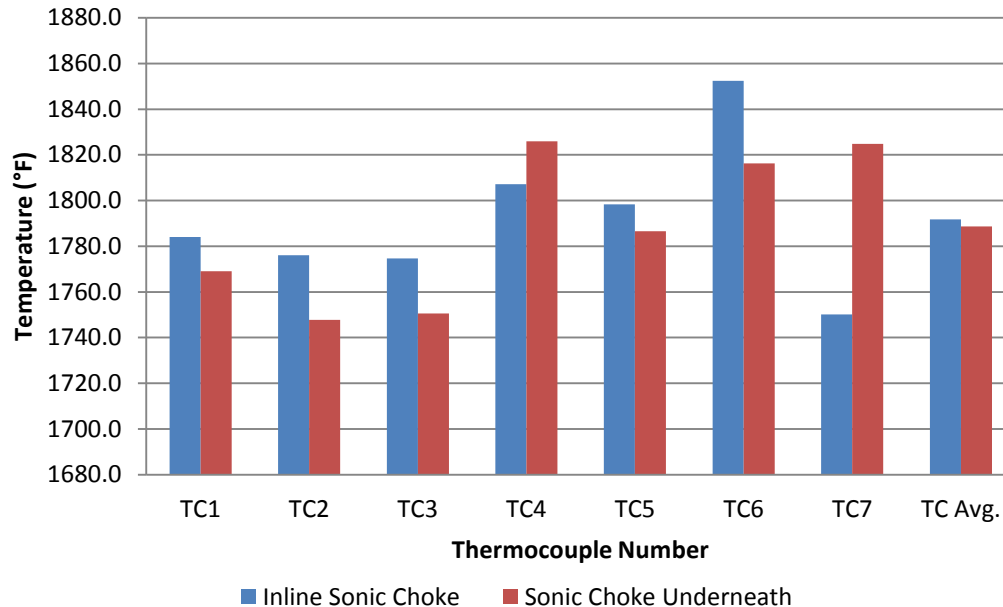
Old Configuration: Air pressure regulator and sonic choke in line with burner



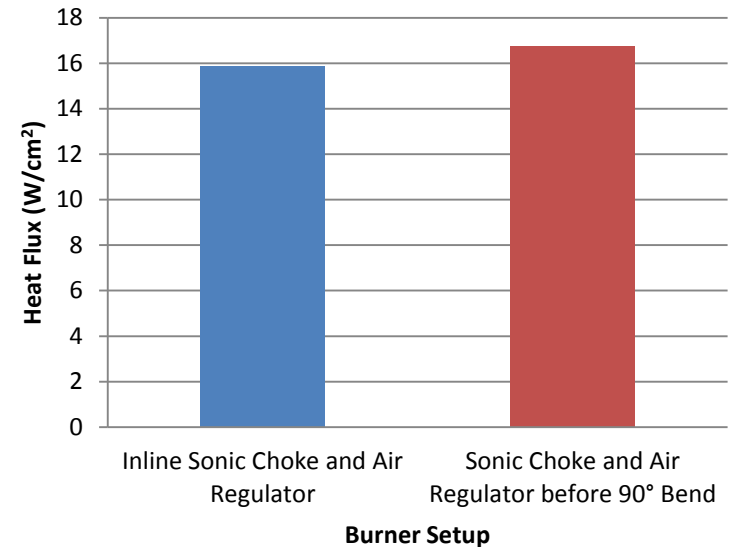
New Configuration: Air pressure regulator and sonic choke before a 90° bend to match material fire test Next-Gen Burners

Burner Changes

Flame Temperature Comparison



Copper Slug Calorimeter Heat Flux Comparison



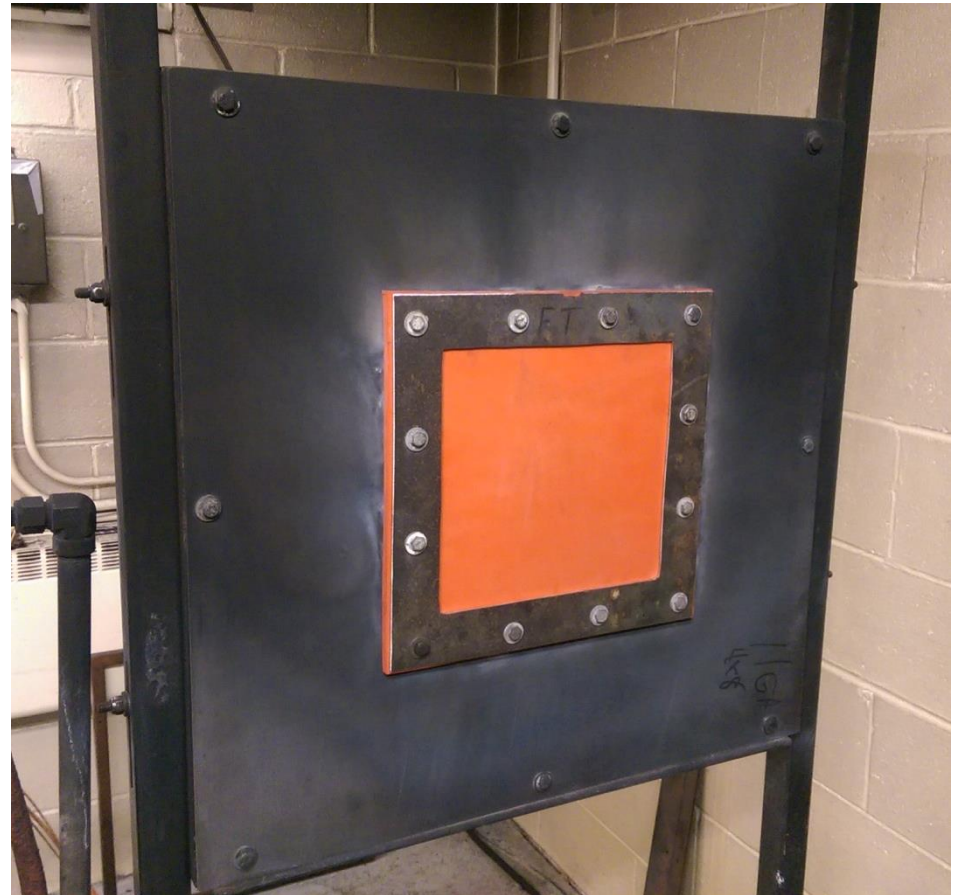
- Temperatures stayed relatively consistent
- Heat flux increased by about 5%

Material Tests

- **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**

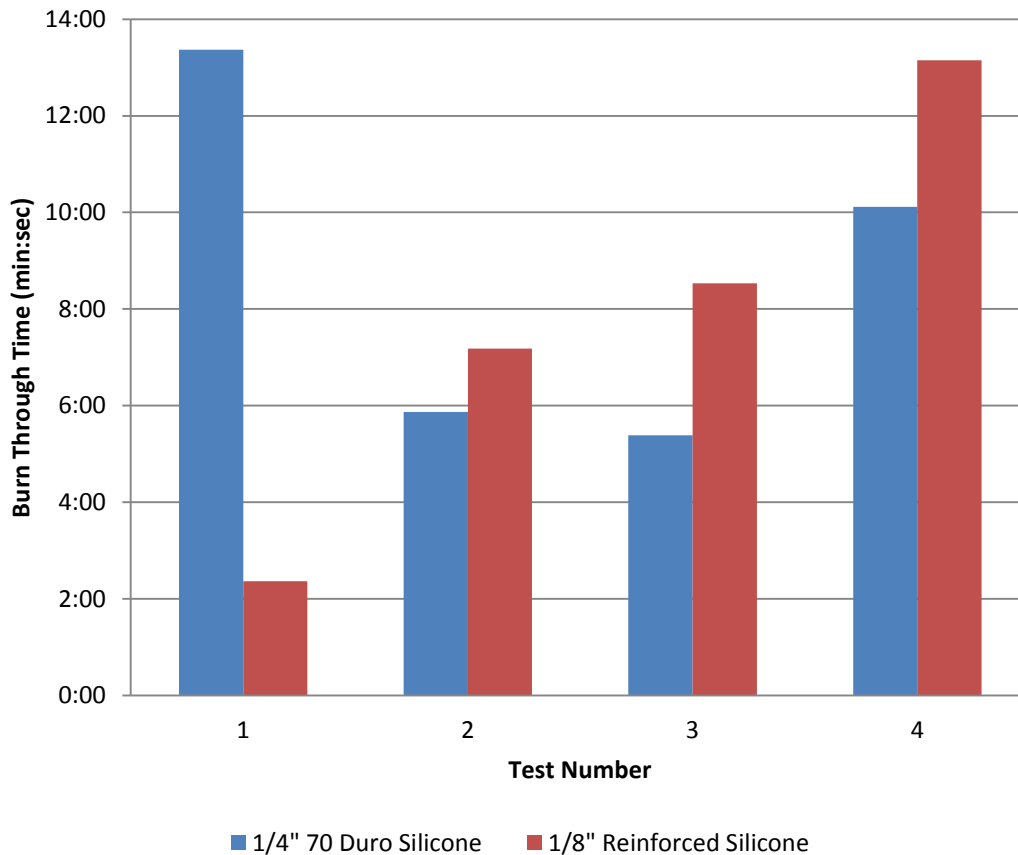
Material Tests

- 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



Material Tests

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

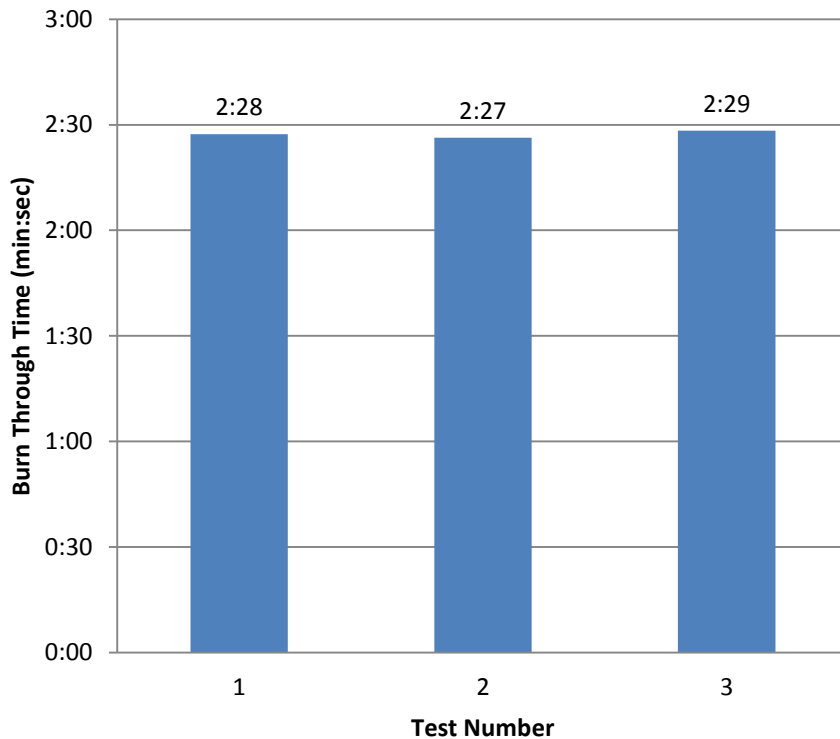
Material Tests

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

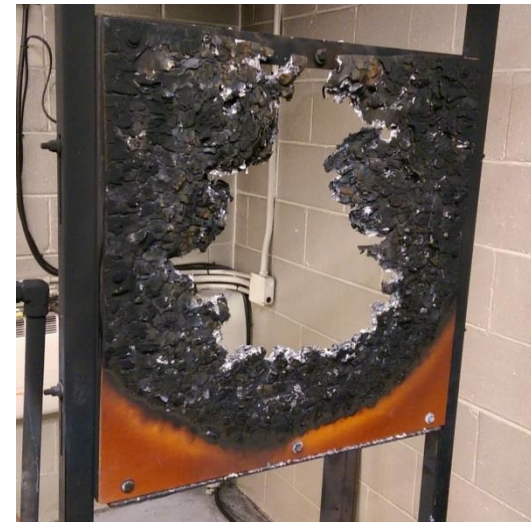


Material Tests

1/4" Garolite Sheets



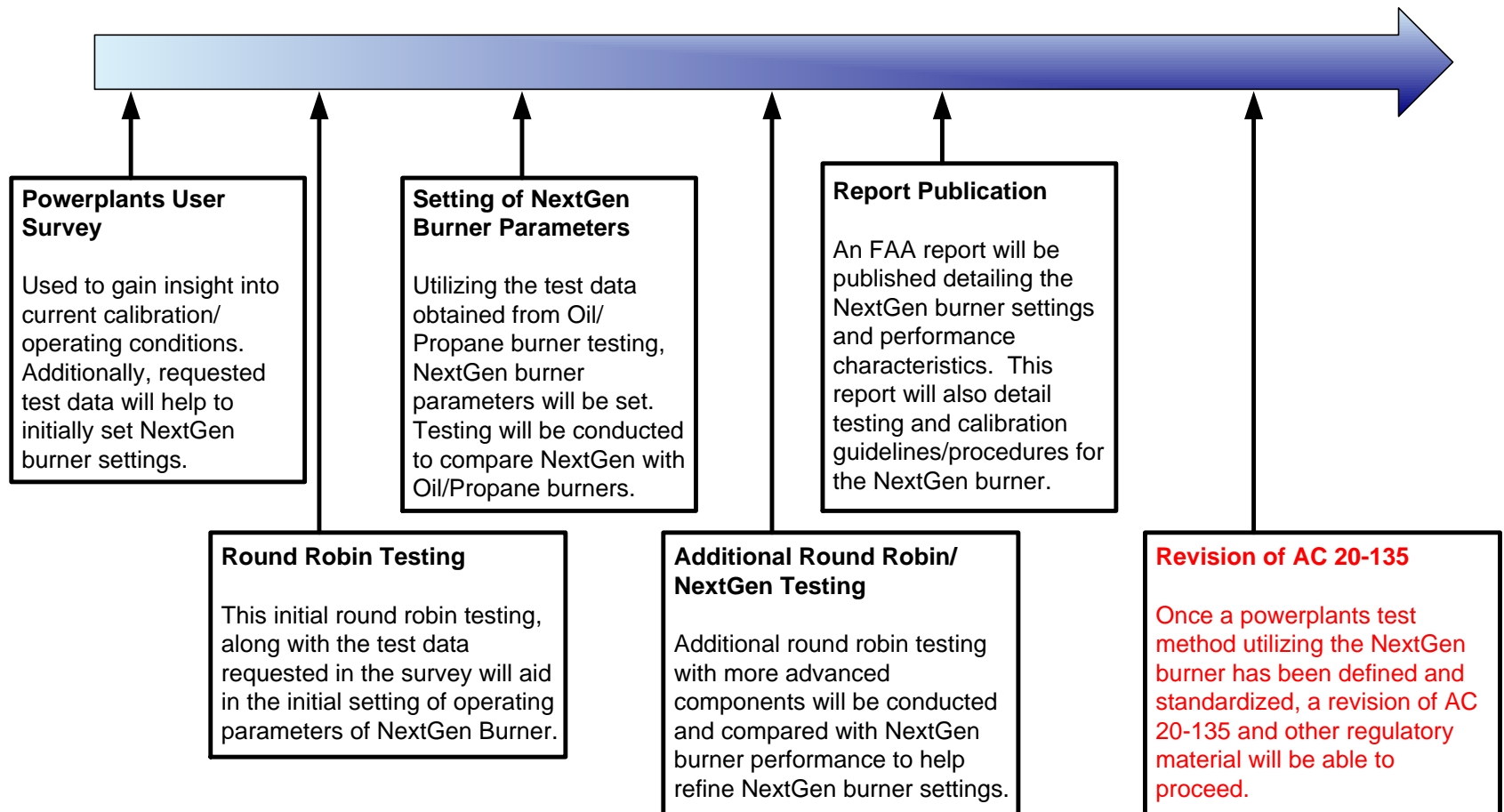
- Extremely Consistent burn-through times
- Unfortunately this material is very flammable and flames reached ~5 feet above the sample during testing.
- It continued to burn for about 15 minutes after test was completed.



Future Material Tests

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

Current Status



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**
 1. Incorporate NexGen burner as an acceptable burner for powerplant testing utilizing existing calibration requirements and clean up initial wording to ensure consistency
 2. Address longer term, more complete revision of AC to fully incorporate NexGen burner with operating/calibration specifics and address all of industry comments

Questions?

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