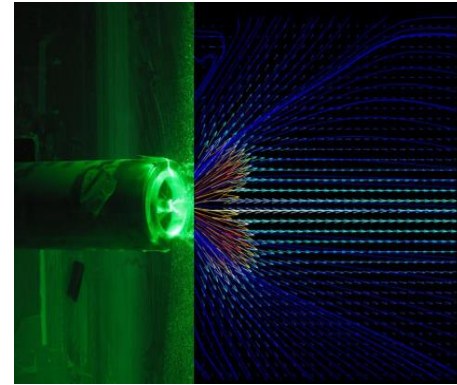
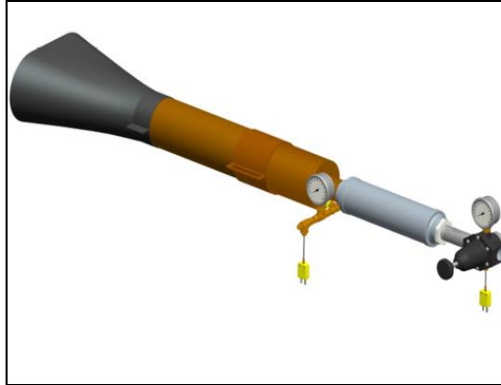


NexGen Burner Comparative Testing for Burnthrough Test Method



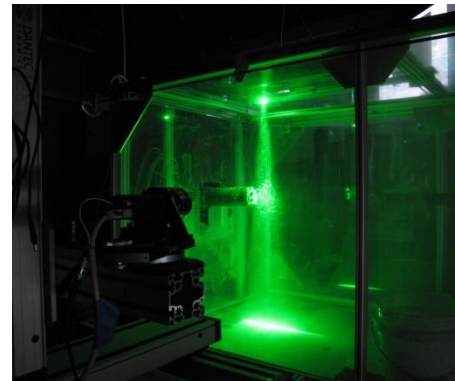
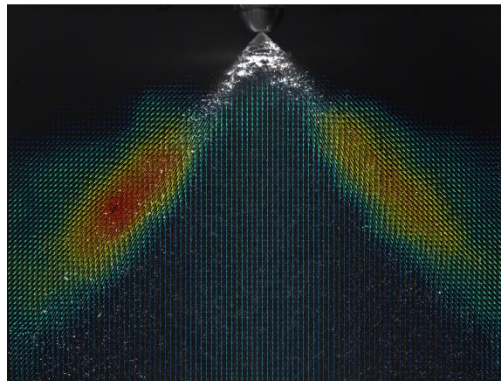
Federal Aviation Administration



Presented to: IAMFTWG, Manchester, UK

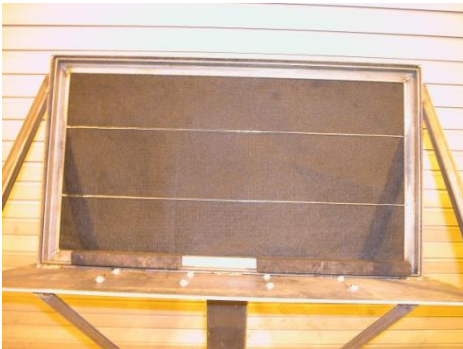
By: Robert I. Ochs

Date: June 19-20, 2013



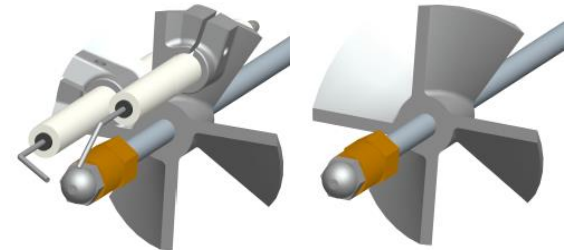
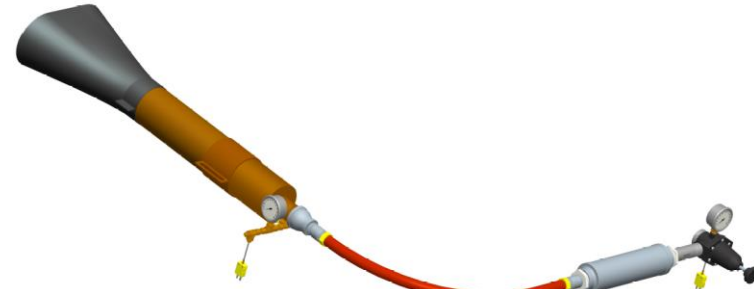
Objectives

- Perform comparative burnthrough testing to determine the effect of various parameters on test results
 - Use picture frame sample holder and PAN material to determine burnthrough performance
- Test results will help to determine which parameters are most critical when specifying the burner in the new workbook

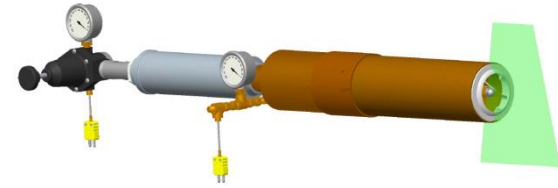


Review from Toulouse June 2012

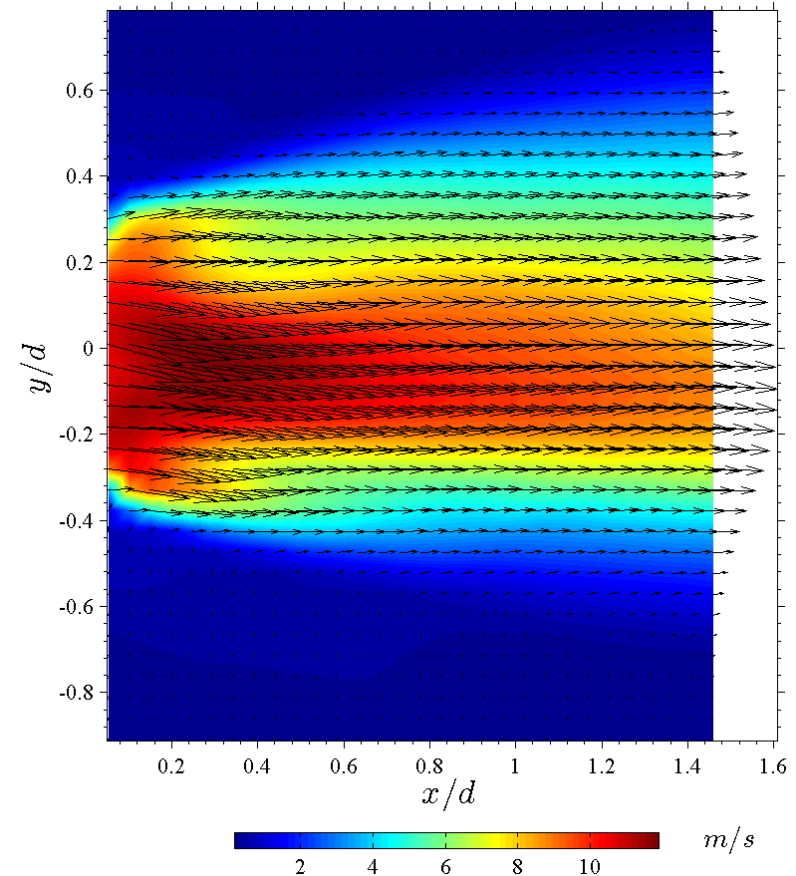
- Comparative BT tests were performed to determine effect of various parameters on BT time
 - Sonic choke location
 - Moving the choke upstream before a 6' flex hose had little effect on BT
 - Burner cones
 - Cones of different construction and age had an effect on BT times
 - Igniter-less stator
 - Introducing a symmetric stator and removing the igniters significantly increased the BT time
 - Flame retention heads
 - Combined stator-turbulator devices on new OEM oil burners
 - Different FRH's had different effects on BT times
 - F-22 model showed similar results to current NexGen burner configuration



Review from Indy October 2012

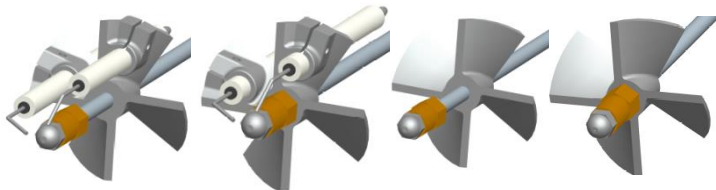
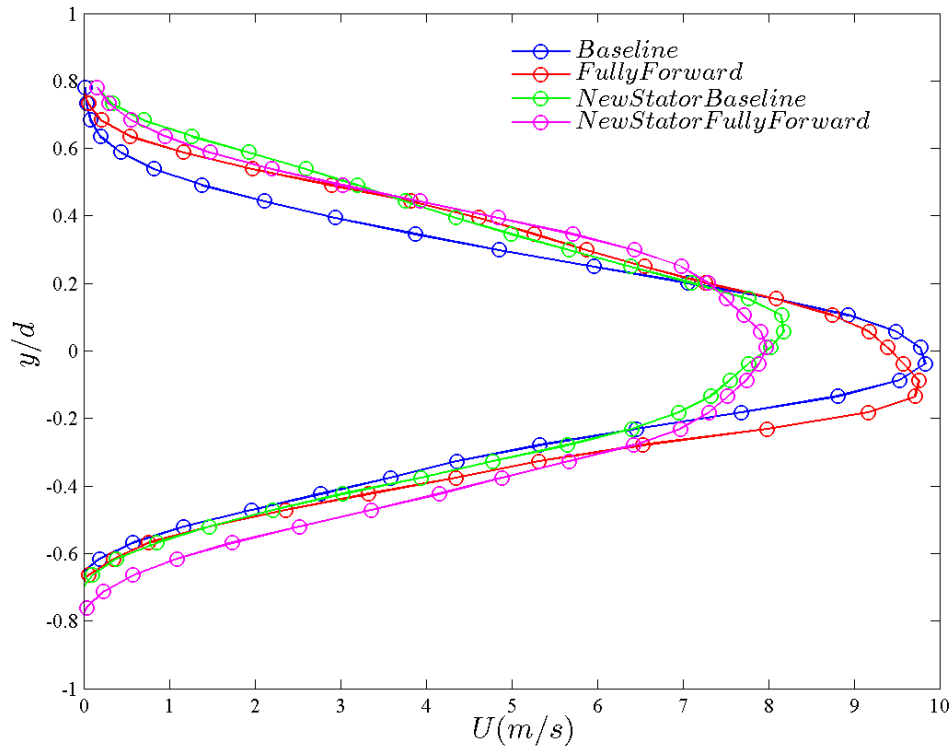


- PIV measurements were made for various configurations of the stator and flame retention heads
- Despite having the same mass flow rate of air (regulated by sonic choke), different configurations resulted in varying velocity profile shapes and peak velocity
- A strong correlation was made between measured peak velocity and burnthrough time
- Indicates that not only is the mass flow rate a critical parameter, but the configuration of the internal components can result in drastically different velocity profiles which can affect the burnthrough performance



Mean axial velocity profiles at one pipe diameter (4 inches) downstream from turbulator exit

Stators + Turbulator



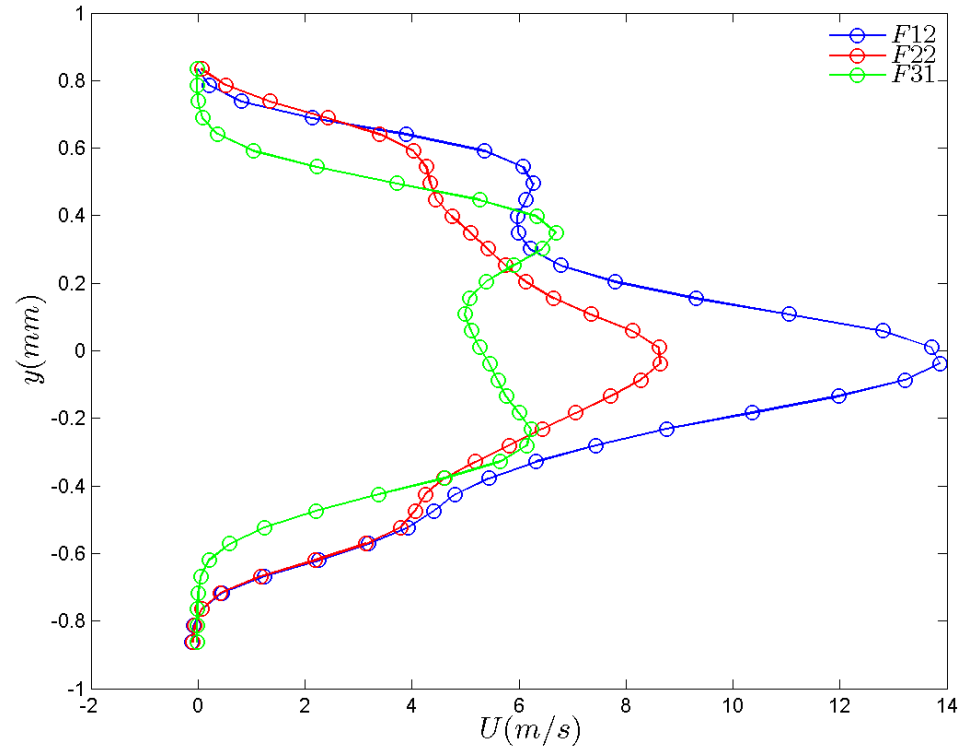
Baseline

Baseline
Fully
Forward

New Stator

New Stator
Fully
Forward

Flame Retention Heads



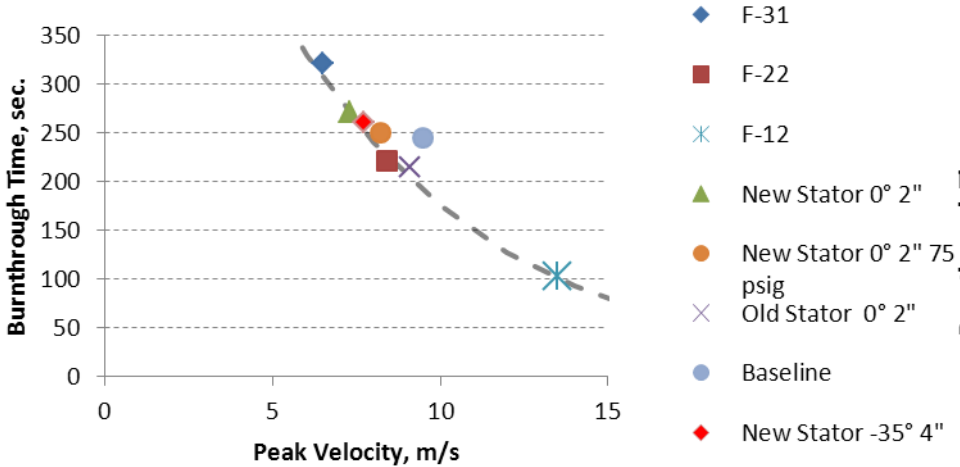
F12

F22

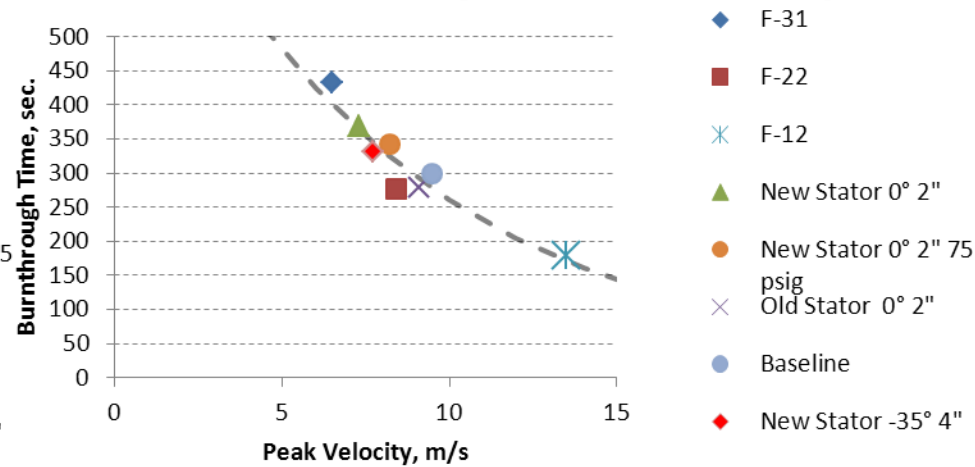
F31

Burnthrough vs. Peak Velocity

8579 Burnthrough vs. Peak Velocity

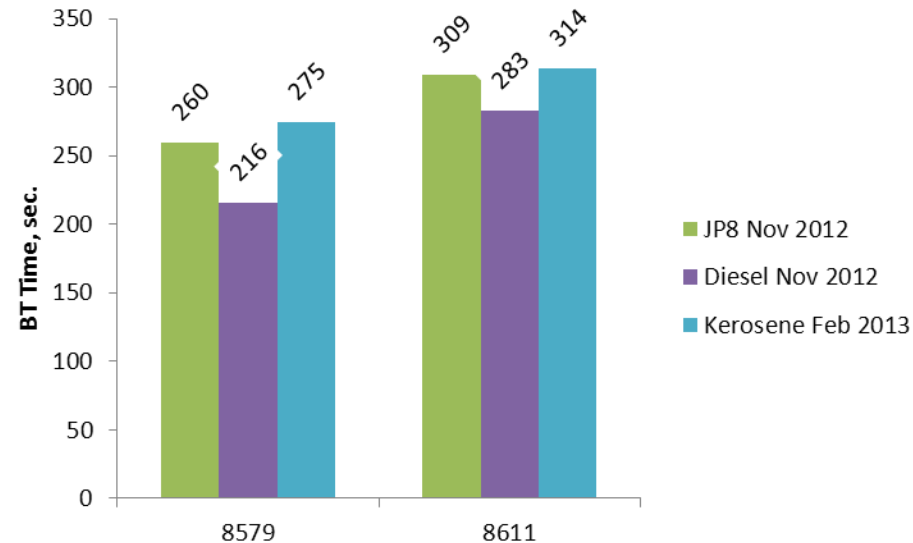
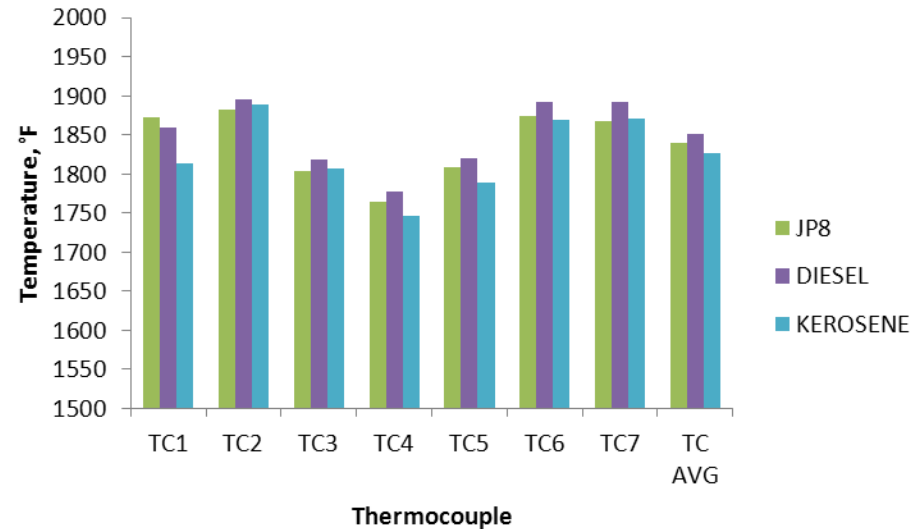


8611 Burnthrough vs. Peak Velocity



Fuel Type Comparison

- 3 fuels found to provide similar measured flame temperature
- JP8, K1 kerosene found to provide similar BT results
- Diesel fuel found to provide quicker BT times due to high soot content, large chunks of soot blasting away at material causing early BT



NexGen Burner Round Robin

- Discussed starting up an inter-laboratory comparative test series at last task group meeting
 - Received interest from six labs worldwide with NexGen burners
 - Will use the picture frame blanket holder and PAN materials to measure a lab's burnthrough performance
- Will be a two-part test series
 1. Evaluate current burnthrough performance of all labs as they are currently set up without making any changes
 2. Evaluate burnthrough performance after making changes recommended by FAATC and with parts provided by FAATC
 - Changes could include cone, nozzle, FRH provided by FAATC. Same combination would be sent around to all labs
 - Fuel type can not be changed, only noted
- FAATC will develop test parameters over the next several months
 - Test data sheets
 - Instructional video
 - Photos/videos of tests would be helpful



Test Matrix


Apparatus Configuration	8579 9 oz./yd ²	8611 16 oz./yd ²
6.0 gph NexGen Standard Configuration, Newer Burner Cone	4 tests	4 tests
6.0 gph NexGen F-22 Flame Retention Head, Delavan/Everloy Nozzle, Newer Burner Cone	4 tests	4 tests

- Labs with NexGen burners for burnthrough with picture frame blanket holder (that I'm aware of):
 - FAATC
 - Boeing Seattle
 - Airbus
 - Embraer
 - Accufleet
 - Jehier
 - DGA Aeronautical Systems
- FAATC will send out to the labs
 - Cone
 - Draft tube
 - F-22
 - Nozzle
 - Fuel Tube
 - 8579 and 8611 samples
- Each lab will receive the components and materials, run the tests, then forward the components on to the next lab

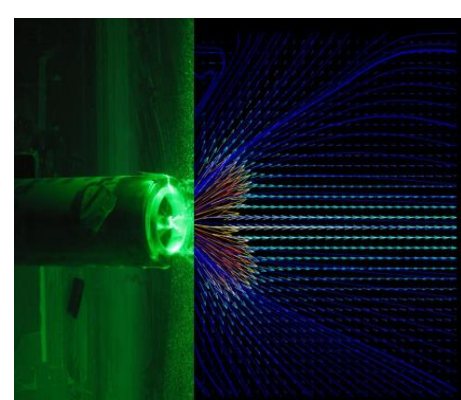
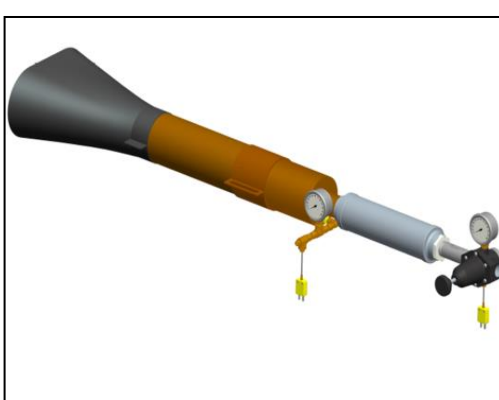
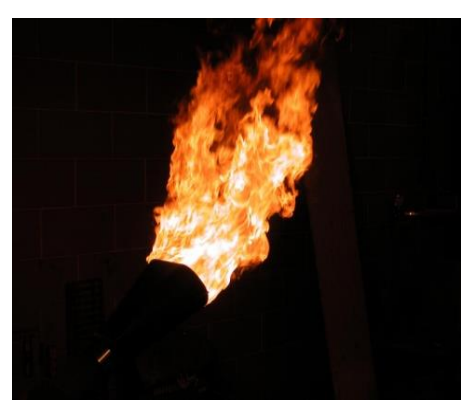


Task Group Activity

- Make comments or suggestions on current 25.856-2A AC
 - Current rule
 - Future rule

	<h2>Advisory Circular</h2>
Subject: INSTALLATION OF THERMAL/ACOUSTIC INSULATION FOR BURNTHROUGH PROTECTION	Date: 7/29/08 AC No: 25.856-2A Initiated by: ANM-115 Change:
<p>1. PURPOSE. This AC provides guidance for the test method to determine burnthrough resistance of thermal/acoustic insulation materials installed in transport category airplanes. This guidance applies to airplanes required to comply with § 25.856 and part VII of Appendix F to 14 CFR part 25.</p> <p>2. APPLICABILITY.</p> <p>a. The guidance provided in this document is directed to airplane manufacturers, modifiers, foreign regulatory authorities, and Federal Aviation Administration (FAA) transport airplane type certification engineers and their designees.</p> <p>b. This material is neither mandatory nor regulatory in nature and does not constitute a regulation. It describes acceptable means, but not the only means, for demonstrating compliance with the applicable regulations. The FAA will consider other methods of demonstrating compliance that an applicant may elect to present. While these guidelines are not mandatory, they are derived from extensive FAA and industry experience in determining compliance with the relevant regulations. On the other hand, if we become aware of circumstances that convince us that following this AC would not result in compliance with the applicable regulations, we will not be bound by the terms of this AC, and we may require additional substantiation or design changes as a basis for finding compliance.</p> <p>c. This material does not change, create any additional, authorize changes in, or permit deviations from, regulatory requirements.</p>	





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