

# NexGen Burner for Seat Cushion Fire Testing

Presented to: IAMFTWG, Renton, WA

By: Robert Ochs

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Federal Aviation  
Administration



# Outline

- **Background**
- **Objective**
- **NexGen Burner Configuration**
- **Results**
- **Future Work**



# Background

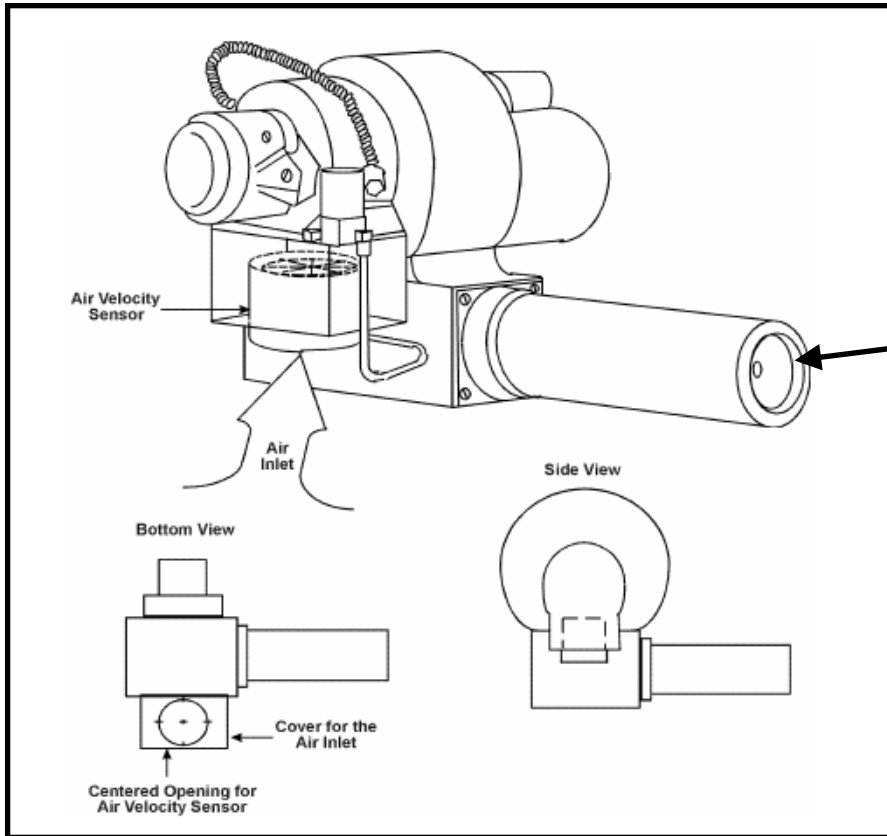
- **Lack of availability of burners for seat cushion fire testing has resulted in the need for a readily available, equivalent burner**
- **The NexGen burner has already been found to provide equivalent results to the Park burner for thermal acoustic insulation burnthrough testing**



# Objective

- **Configure a NexGen burner to achieve seat test performance similar to a Park burner calibrated to standards set in chapter 7 of the Aircraft Materials Fire Test Handbook**
  - Fuel flow rate of 2.0 gph  $\pm$  0.1 gph
  - Equivalent to an inlet air flow of 67  $\pm$  4 cfm
  - 30-second average heat flux of at least 10 BTU/ft<sup>2</sup>s
  - Flame temperatures of at least 1800°F on 5 of 7 thermocouples and at least 1750°F on at most 2 thermocouples
  - 30-second average of 7 thermocouples at least 1800°F

# Equivalent Air Flow Rate

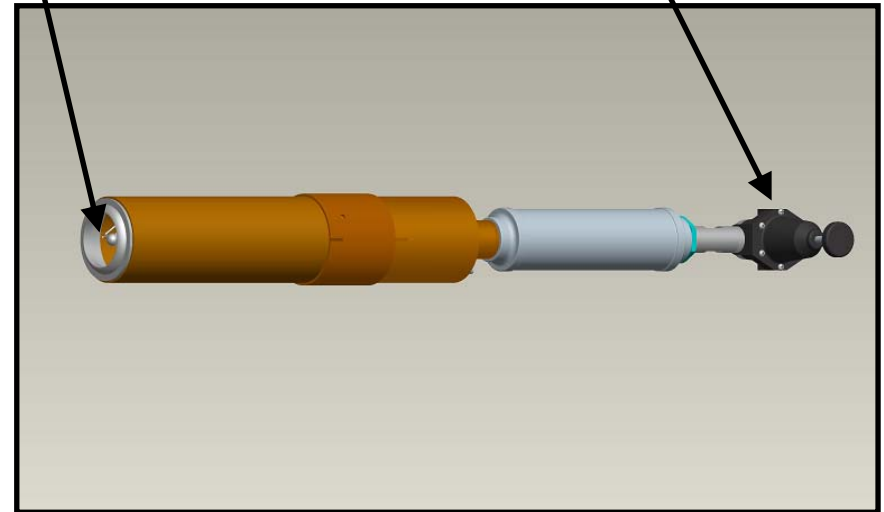


Inlet Air Flow:

67 cfm  $\approx$  1800 fpm in 2.625 in<sup>2</sup> air flow meter (HH30)

Exit Air Flow ~ 1600 fpm

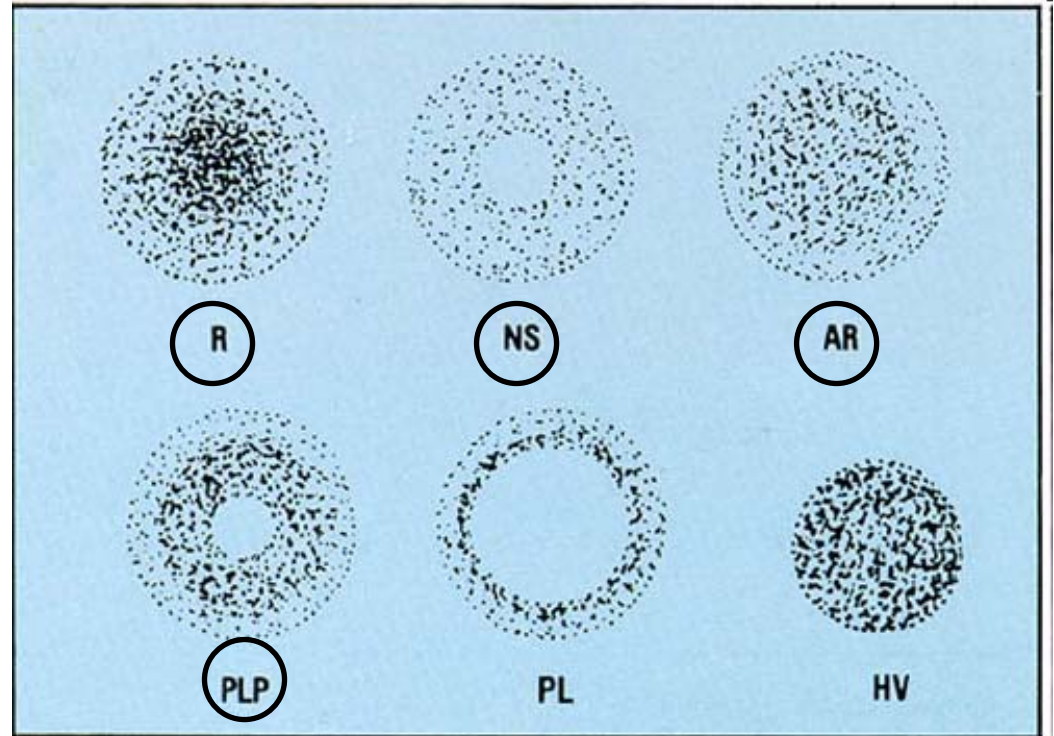
Resulting Sonic Choke  
Inlet Pressure: 47 psig



*Note: Exit flow measurements taken with turbulator on*

# Fuel Flow Rate

- **Fuel flow rate is dictated by**
  - Specific nozzle used
  - Inlet fuel pressure
  - Fuel viscosity
- **Several nozzle types were attempted**
  - R: Solid
  - NS: Hollow
  - AR: Special Solid
  - PLP: Semi Solid

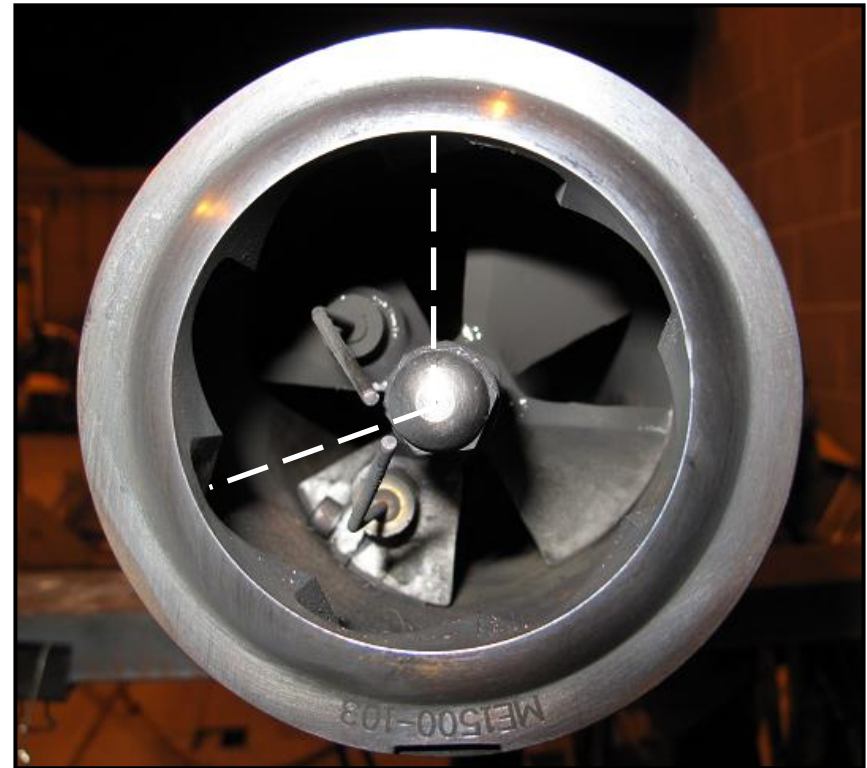


[www.monarchnozzles.com](http://www.monarchnozzles.com)

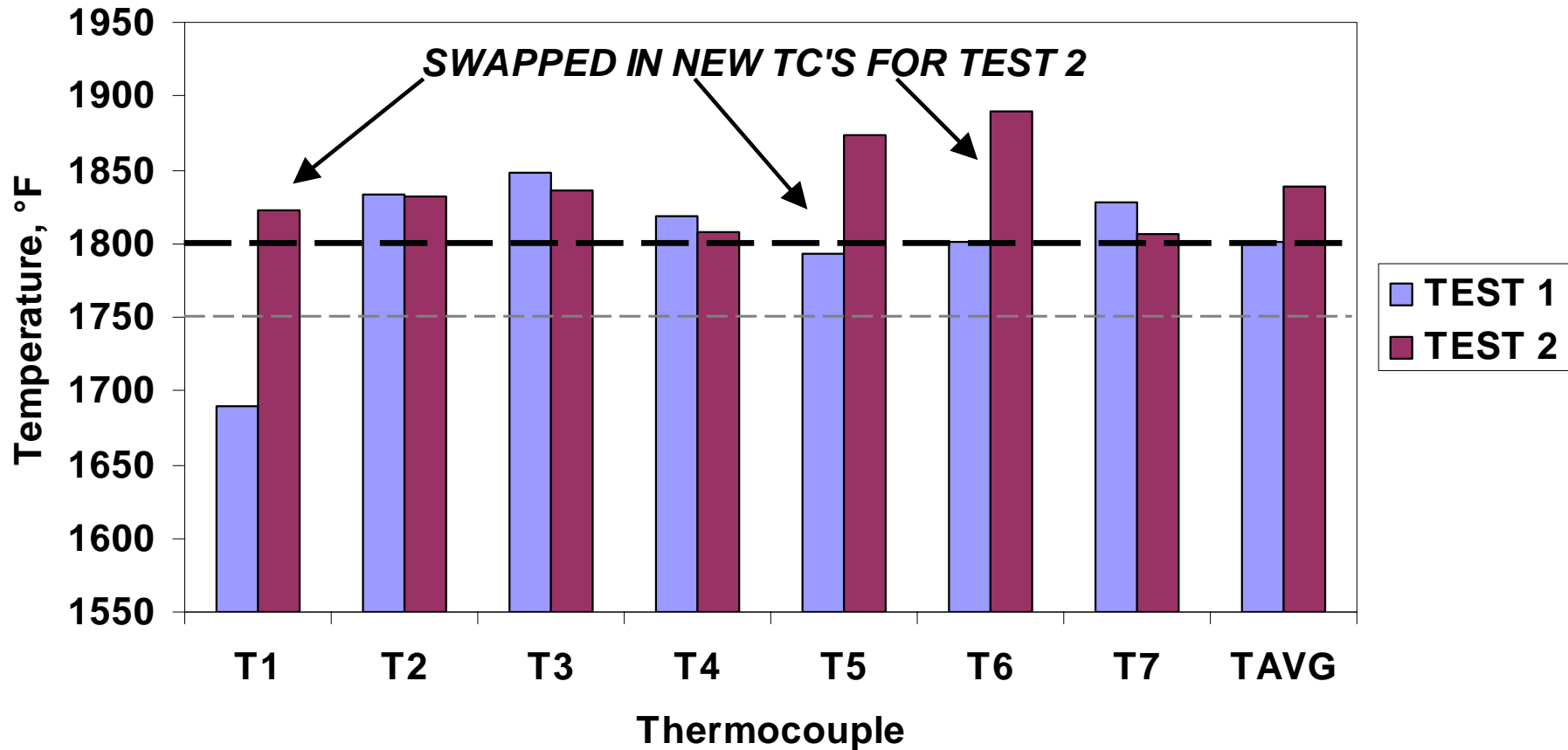
# NexGen Burner Settings

- **Fuel Nozzle**
  - 2.25 gph-rated 80° PLP @ 95 psig → 2.03 gph
- **Stator Distance**
  - 3 1/16” back from nozzle tip
- **Stator Clocking**
  - Approximately 262° from vertical
- **Air Flow**
  - Sonic choke inlet pressure = 47 psig → 1600 fpm exit velocity

*Stator Clocking Measurement Example*

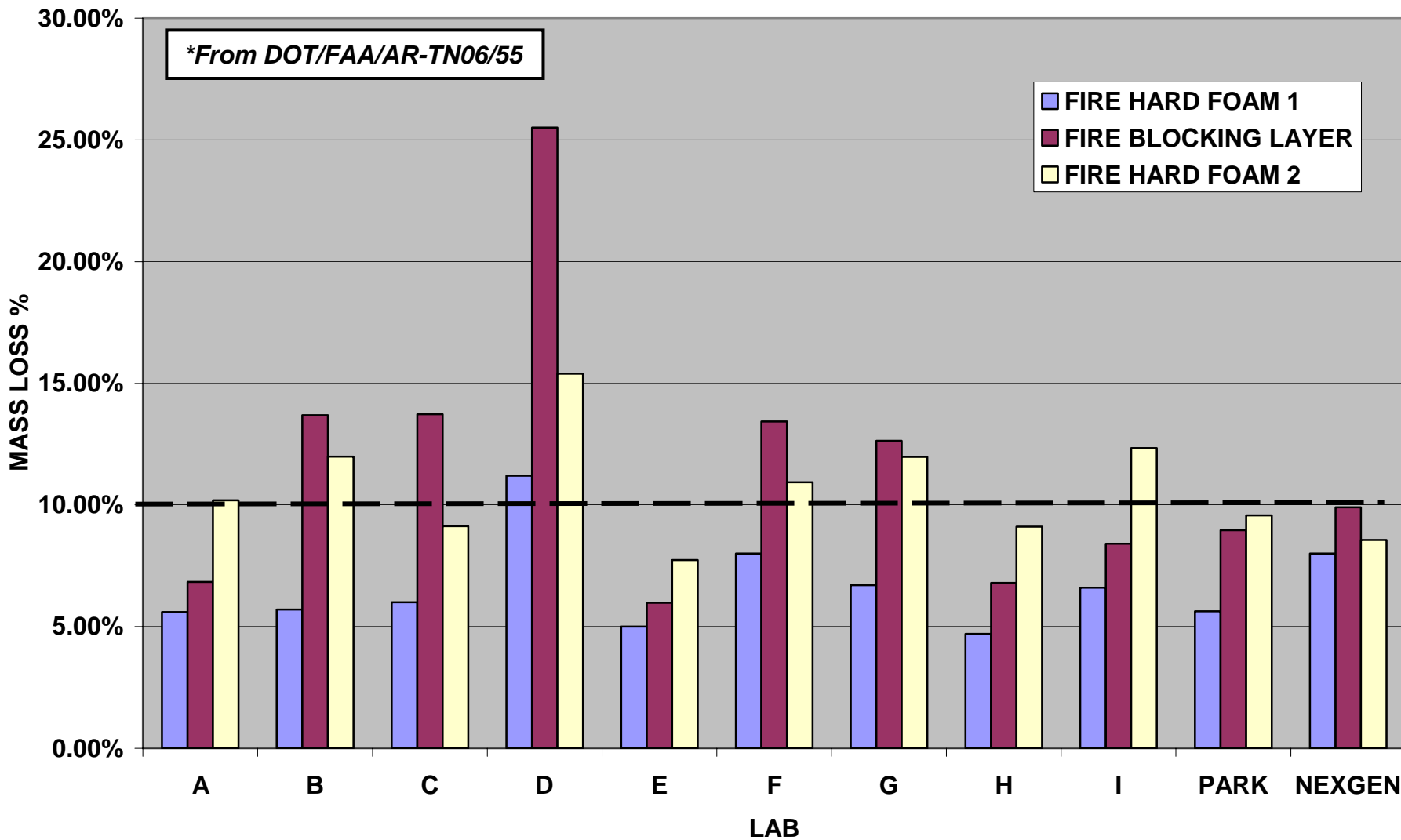


# Measured Flame Temperatures





## COMPARISON OF NEXGEN BURNER WITH SEAT ROUND ROBIN 2006\*



# Summary

- **After much trial and error testing, the NexGen burner was able to achieve burner calibration according to the specifications in chapter 7 of the Aircraft Materials Fire Test Handbook**
- **The NexGen burner results compared well with the results from the seat test round robin described in DOT/FAA/AR-TN06/55**
  - Burner airflow reduced to 35 psig to achieve similar results to the Park
- **More cushions are on order to perform more thorough testing to determine the limits of burner settings**

# Questions?

## Contact:

**Robert Ochs**

**DOT/FAA Tech Center**

**BLDG 287**

**Atlantic City Int'l Airport**

**NJ 08405**

**[robert.ochs@faa.gov](mailto:robert.ochs@faa.gov)**

**1 609 485 4651**

