

NexGen Burner Update

**International Aircraft Materials Fire
Test Working Group Meeting
October 21, 2009
Atlantic City, NJ**



Outline

- **Background**
- **NexGen Burner Drawings**
- **Recent findings**



What is a NexGen Burner?

- The next generation (NexGen) burner was designed by the FAA Technical Center to be used as an equivalent burner to the Park DPL 3400 which is no longer in production
- The NexGen burner relies on the same operating principles as the Park DPL 3400, which was designed for home heating purposes
 - Oil burner fuel nozzle, 80° hollow cone, 6.0 gph
 - Air flow approx 1350 fpm exiting draft tube
 - Average flame temperature ~ 1900°F
 - Average flame heat flux ~ 15 BTU/ft²s
- The NexGen burner uses compressed air and fuel to supply the burner, whereas the Park DPL 3400 uses an electric motor to spin a blower fan and mechanical fuel pump
 - Air Flow Metering:
 - Park uses a butterfly throttle valve
 - NexGen uses a sonic orifice
 - Fuel Pressure
 - Park uses pressure regulator on pump
 - NexGen uses fuel tank head pressure
- Major advantages of a NexGen burner:
 - Precise metering of inlet parameters
 - Can be constructed in-house with easily obtainable materials
 - Can be easily modified for future upgrades (as a result of FAATC research)

Park DPL 3400



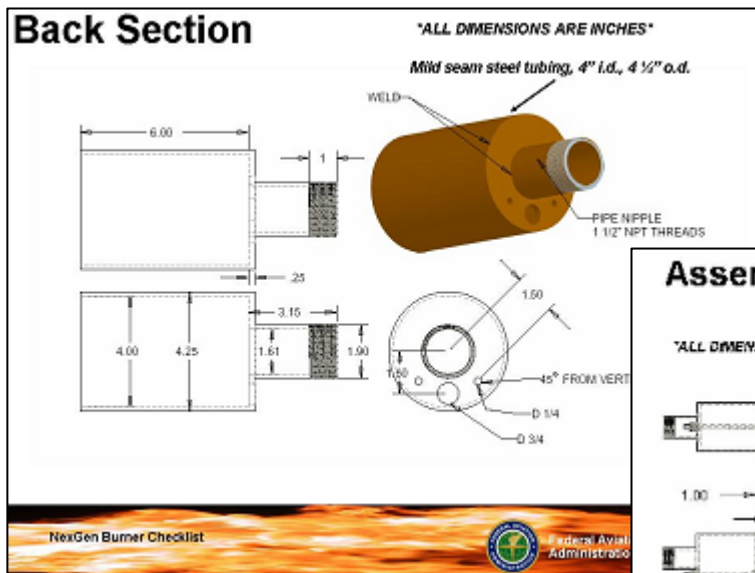
NexGen Burner



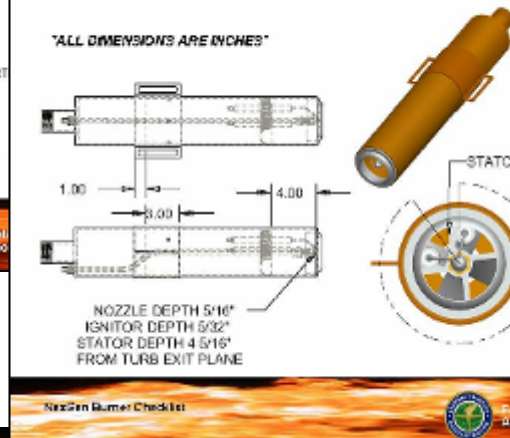
NexGen Drawings

- Drawings are available online at

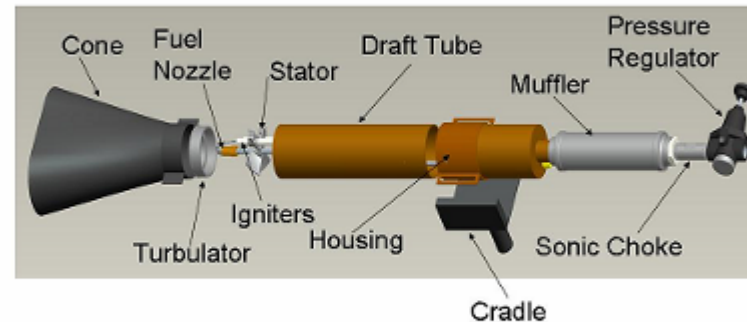
<http://www.fire.tc.faa.gov/pdf/materials/NexGenPlans.pdf>



Assembled NexGen Burner Housing



NexGen Burner



Burnthrough Update

IAMFTWG, Atlantic City, NJ

Remanufactured Stators and Turbulators

- **MarlinEngineering, Inc was able to digitize the original stator and turbulator**
- **Irregularities were corrected in design software, symmetry was restored to design**
- **A computer numerical controlled (CNC) mill was used to cut new, corrected stators and turbulators**
- **The new prototypes were sent to the FAA Tech Center for evaluation and comparison with a properly configured NexGen burner**

Front View

Original Turbulator



Prototype Turbulator



Rear View

Original Turbulator



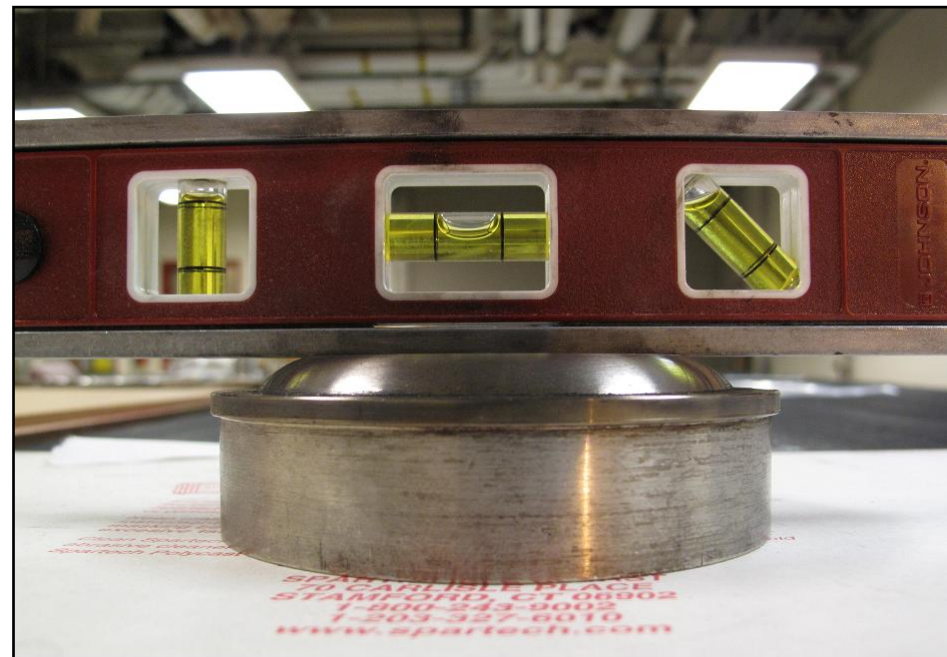
Prototype Turbulator



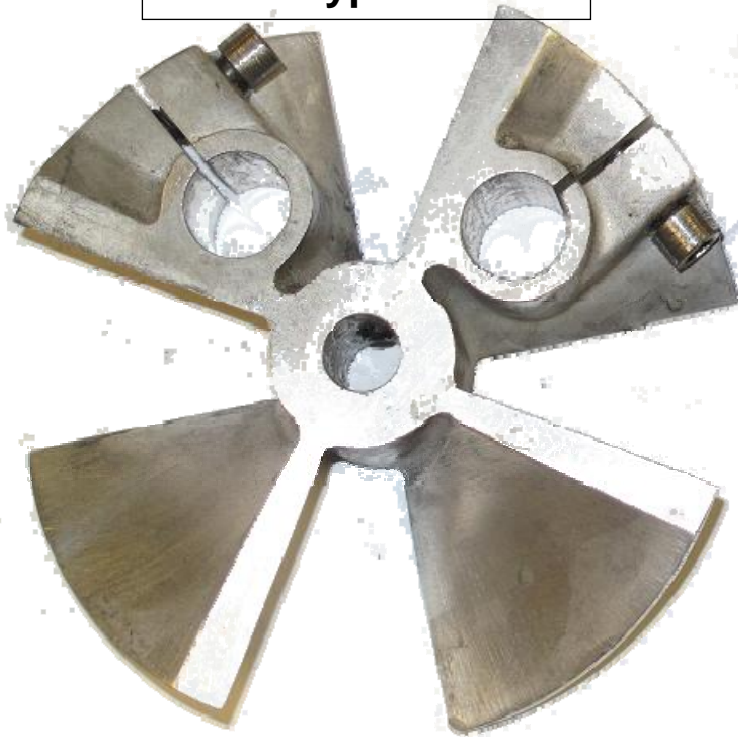
Original Turbulator



Prototype Turbulator



Prototype Stator



Original Modified Stator

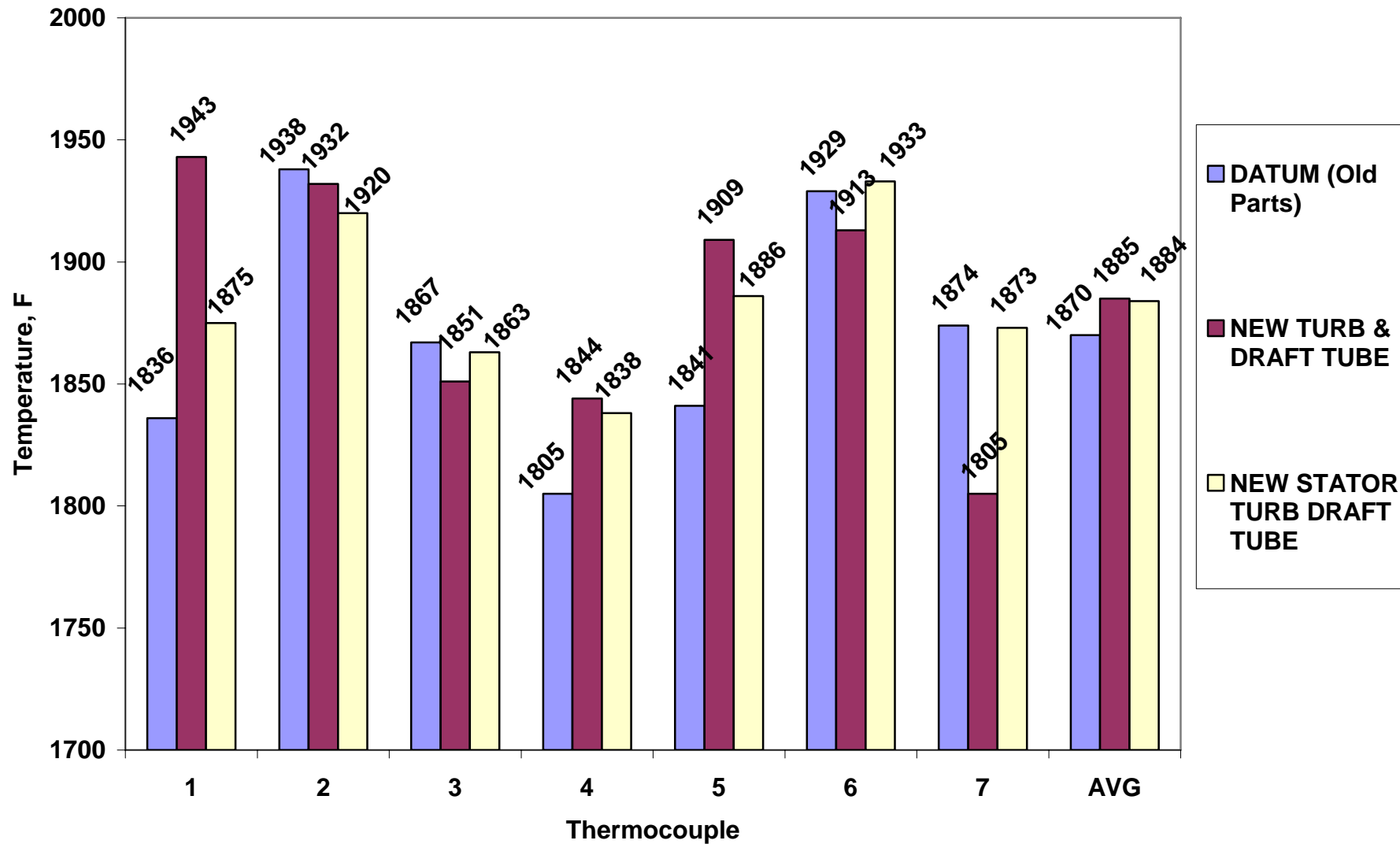


Comparison Tests

- **Datum:**
 - FAA NexGen 2 burner
 - Constructed as per FAA NexGen burner guidelines (<http://www.fire.tc.faa.gov/pdf/materials/NexGenPlans.pdf>)
- **A new draft tube was made to fit the precise 4" round stator**
 - Original 4" i.d. pipe is not perfectly round
 - Stator could have been cut, but then we would have 2 imperfect parts
 - Tube was honed out to precisely fit the new stator
 - In the future, extruded tube with tight tolerance may be necessary for re-engineered CNC stators



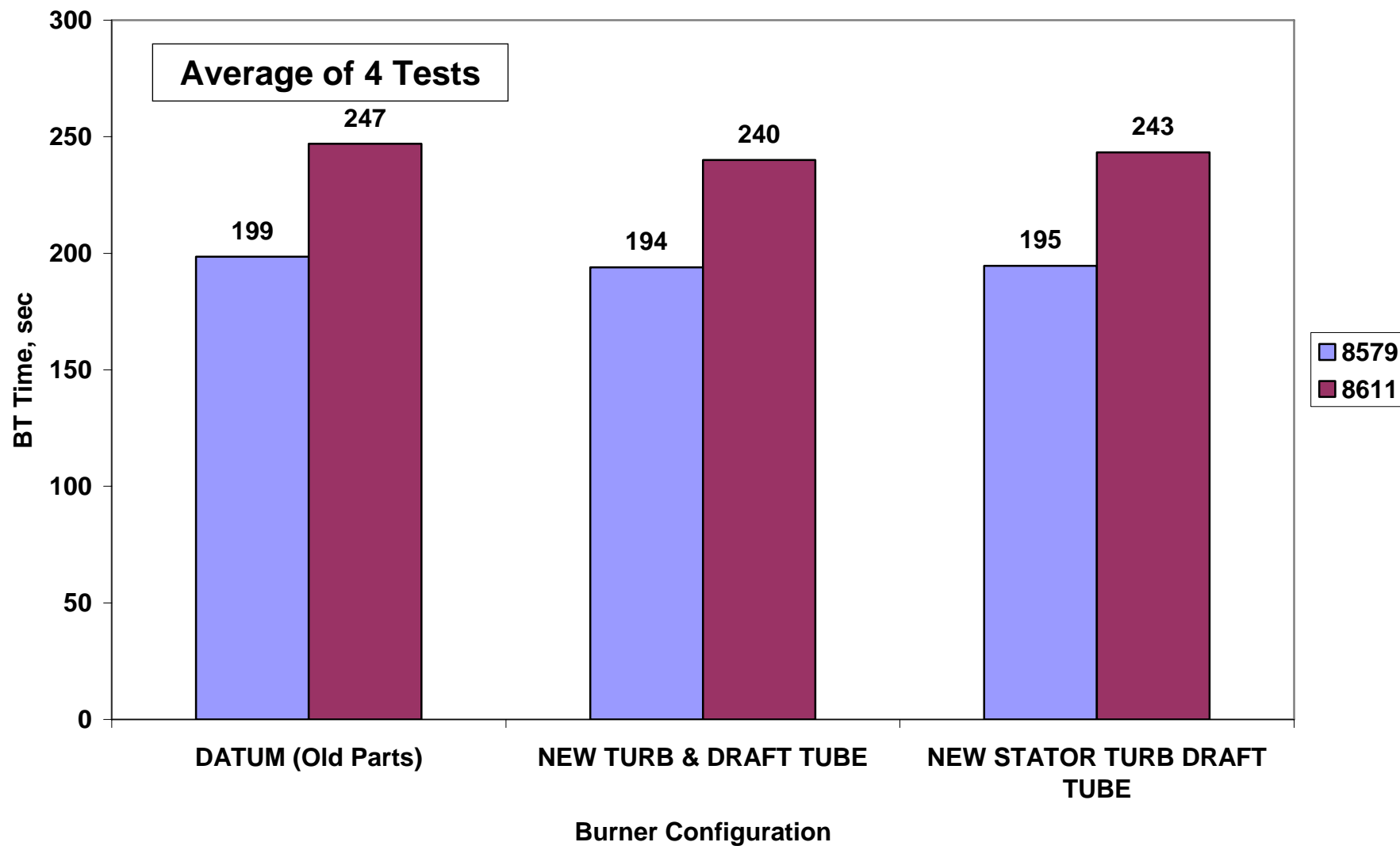
Flame Temperature Measurements



Comparison Tests

- **Testing was performed on the picture frame sample holder with polyacrylonitrile (PAN) materials of 2 densities**
- **Samples were kept in conditioning chamber until testing**

Picture Frame BT Times



Results

- **The new stator and turbulator had no significant effect on overall flame temperature or burnthrough times of PAN materials**
- **These new parts could be considered equivalent to the Monarch H215 stator and F124 turbulator**

NexGen, Burnthrough, and PIV Task Group

- Discuss plans, construction of burner with those interested in building a burner
- Discuss remanufactured stator and turbulator
- NexGen burner for other tests (seat cushion, cargo liner, powerplants)

Questions?

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