Seat Cushion Test Method Update

Federal Aviation Administration

Presented to: IAMFTWG

By: Richard Hill

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Introduction

- **Finalized sonic burner settings for Park replacement**
- **Test results show new settings will allow sonic burner to reproduce Park test results**
- **Have been looking into new stator designs which could simplify sonic burner setup and increase repeatability in test results**
- **Also looking into other options that would increase test repeatability**

Summary for this Meeting

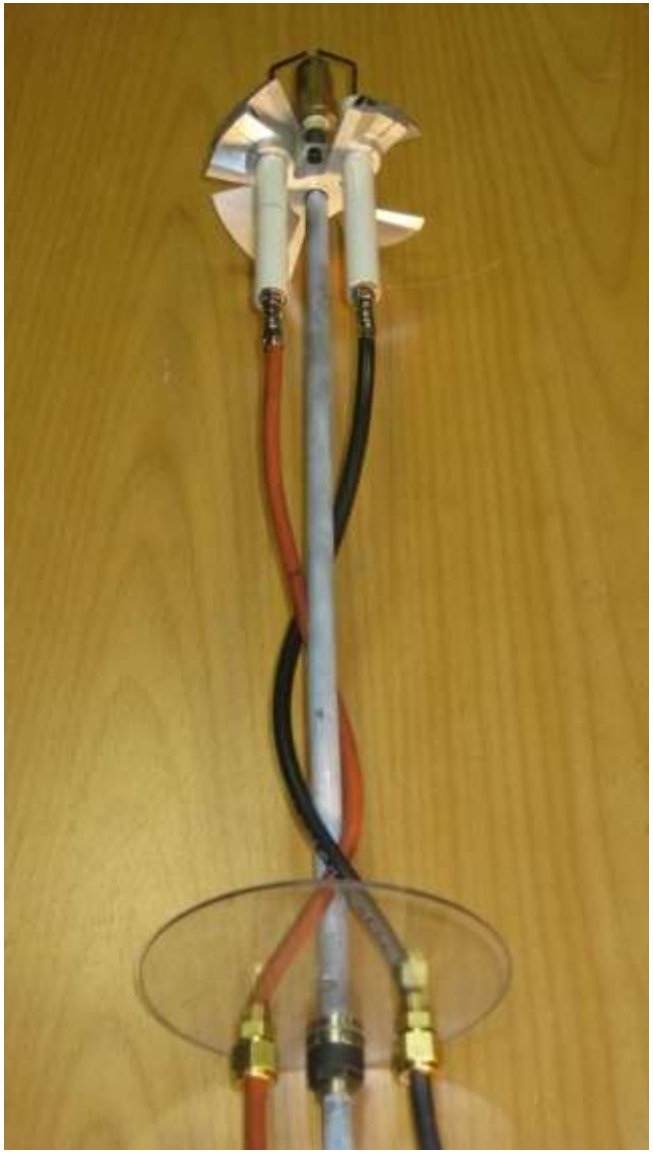
- **Finalized Seat Burner Settings**
  - Ignition wire positioning
  - Igniter positioning
  - New stator and nozzle settings
- **New seat cushions tested using sonic burner for comparison to Park results**
- **Round Robin Update**

Finalized Seat Burner Settings

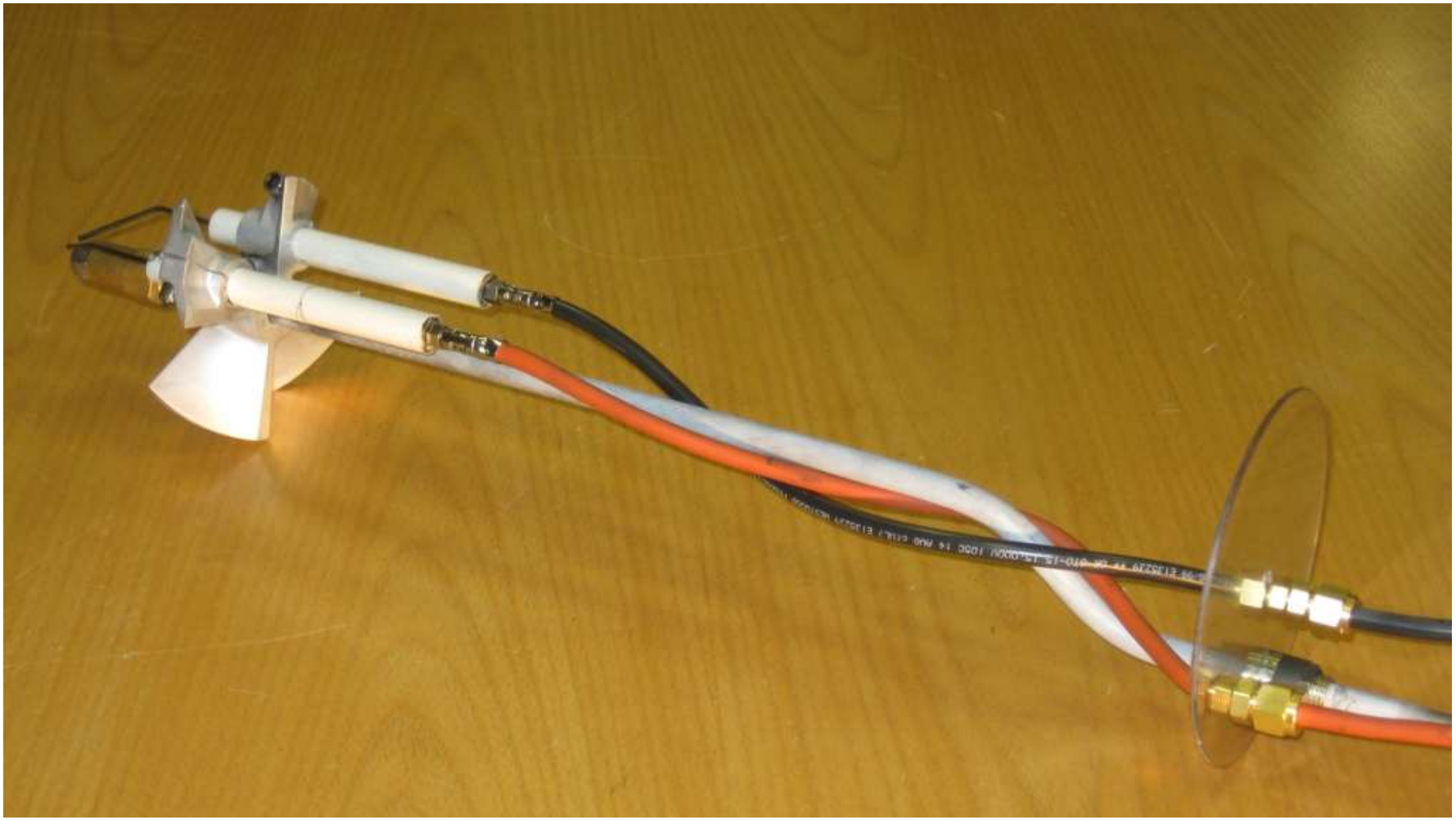
- **Recommended Nozzle: Delevan 80°B 2.0 gph**
- **Nozzle Depth: 3/16”**
- **Stator Depth: 2 11/16”**
- **Stator Angle: 0° (igniter centerline from vertical)**
- **Igniter Position: (see pictures)**
- **Ignition Wires: (see pictures)**

Ignition Wires

- New wire length and positions minimize airflow disturbance
- Standardized wire positions to minimize variability in burner performance and data results
- Improved repeatability

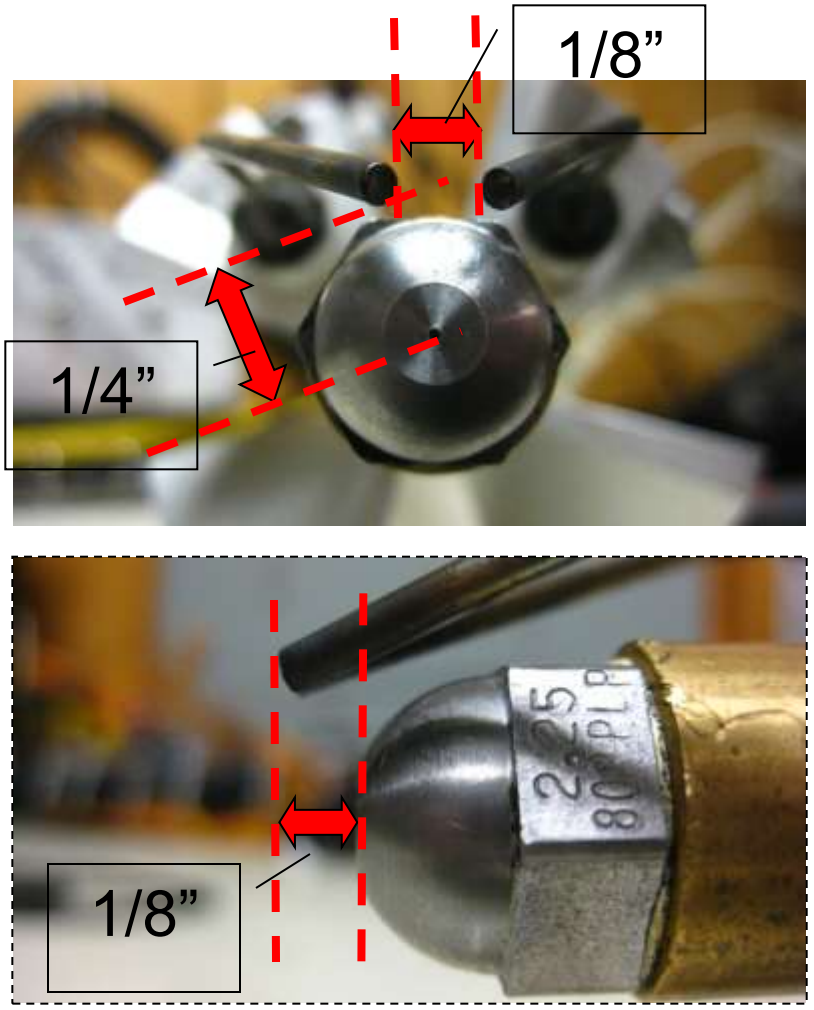


Ignition Wire Positions



Igniter Positions

- **Standardized igniter positions**
- **Gap between igniters**
  - 1/8”
- **Nozzle center to igniter**
  - ¼”
- **Nozzle face to igniter**
  - 1/8”



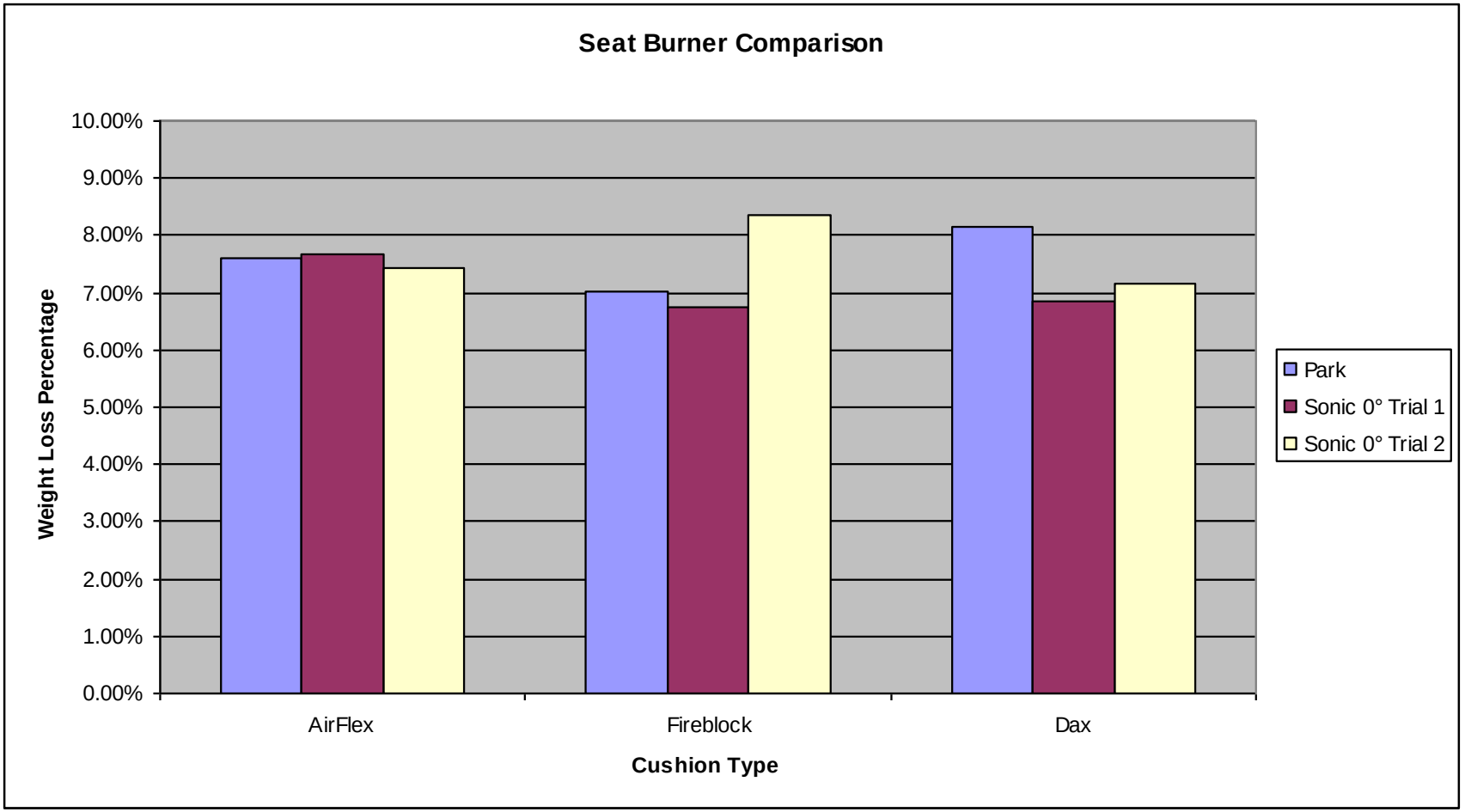
Seat Cushion Testing

- **New shipment of seat cushions for testing**
  - Dax, Airflex, and fireblocked cushions
- **All cushions now covered in the same type of fabric**
  - Previous tests had different fabrics on different cushion types
- **Used Park and sonic burners to collect data and compare test results**

Seat Cushion Testing

- **Finalized burner settings**
- **Sonic results very similar to Park results**
- **Calibration temperatures slightly lower, although weight loss % remains the same as Park**
  - Higher measured temperatures do not necessarily mean greater burn lengths and/or weight loss

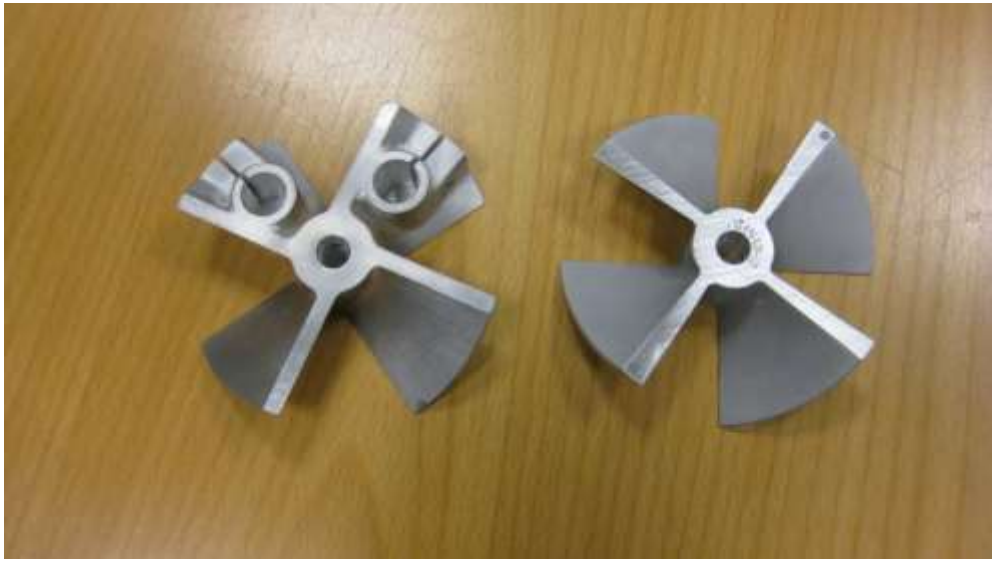
Seat Cushion Testing



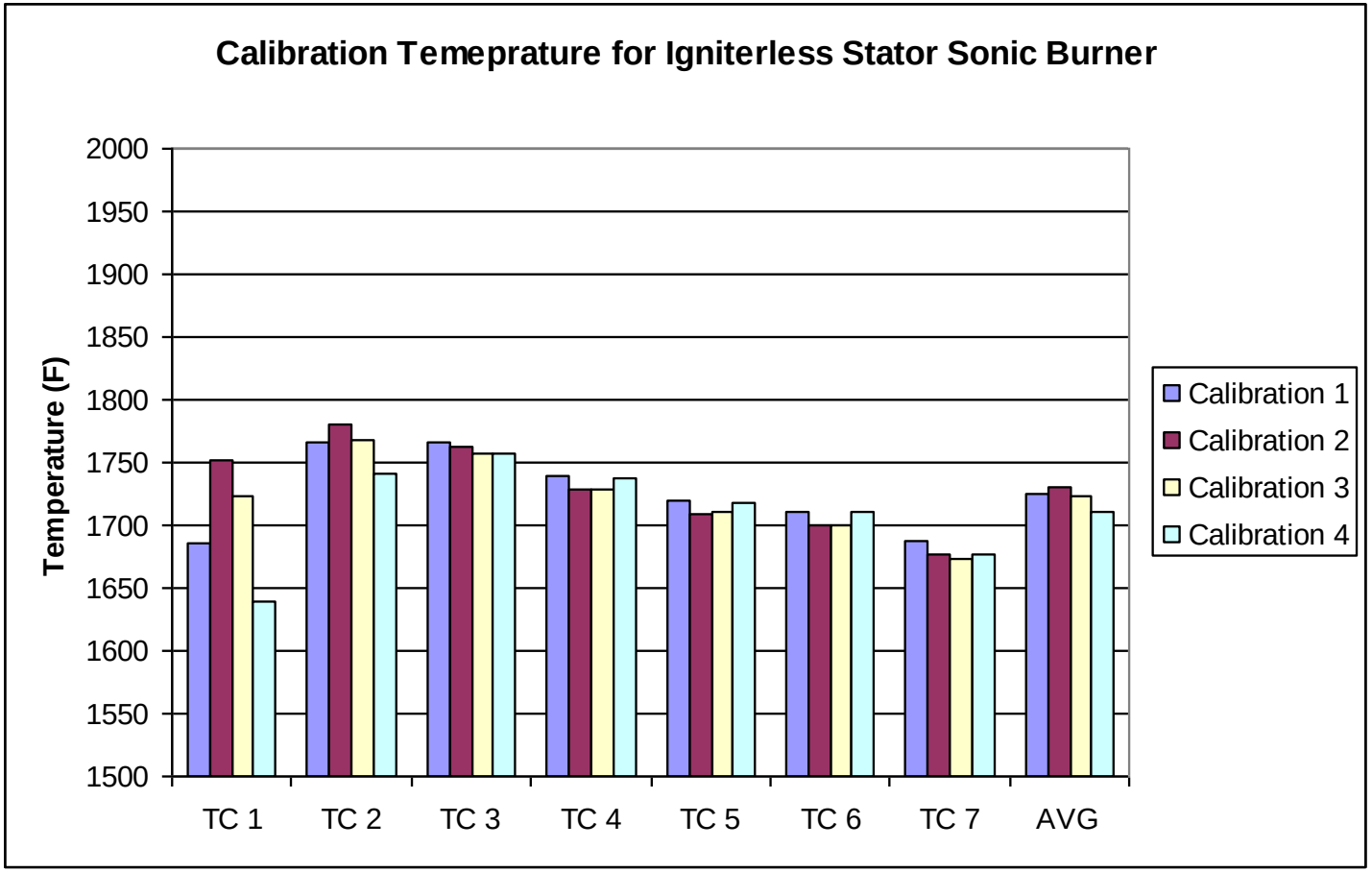
- **3 of each cushion type tested per trial**

Revised Stator

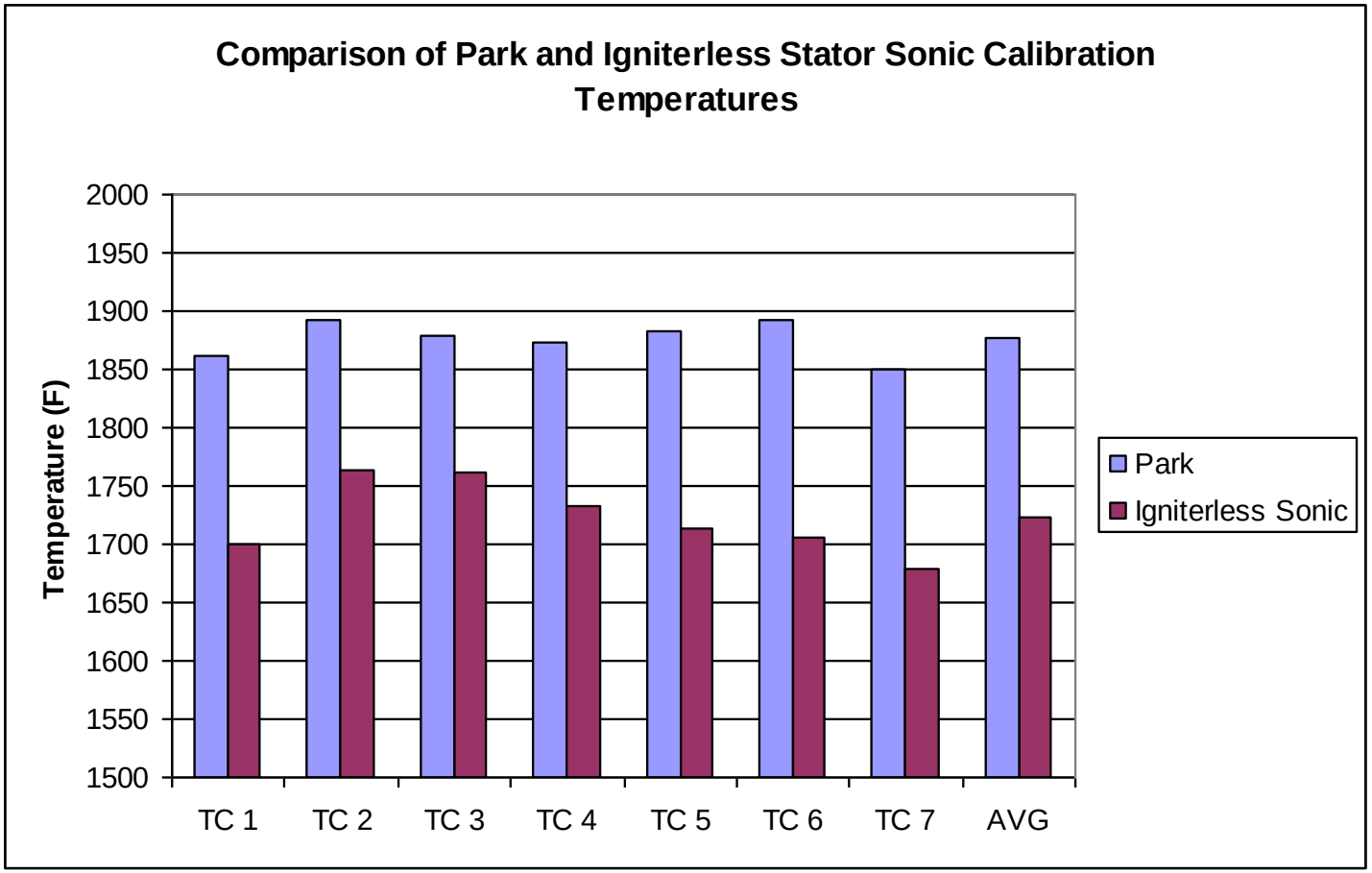
- New stator eliminates igniters and ignition wires in draft tube
- Intended to simplify burner settings and setup
- Attempt to reduce non-symetrical airflow in burner draft tube, and increase test result consistency



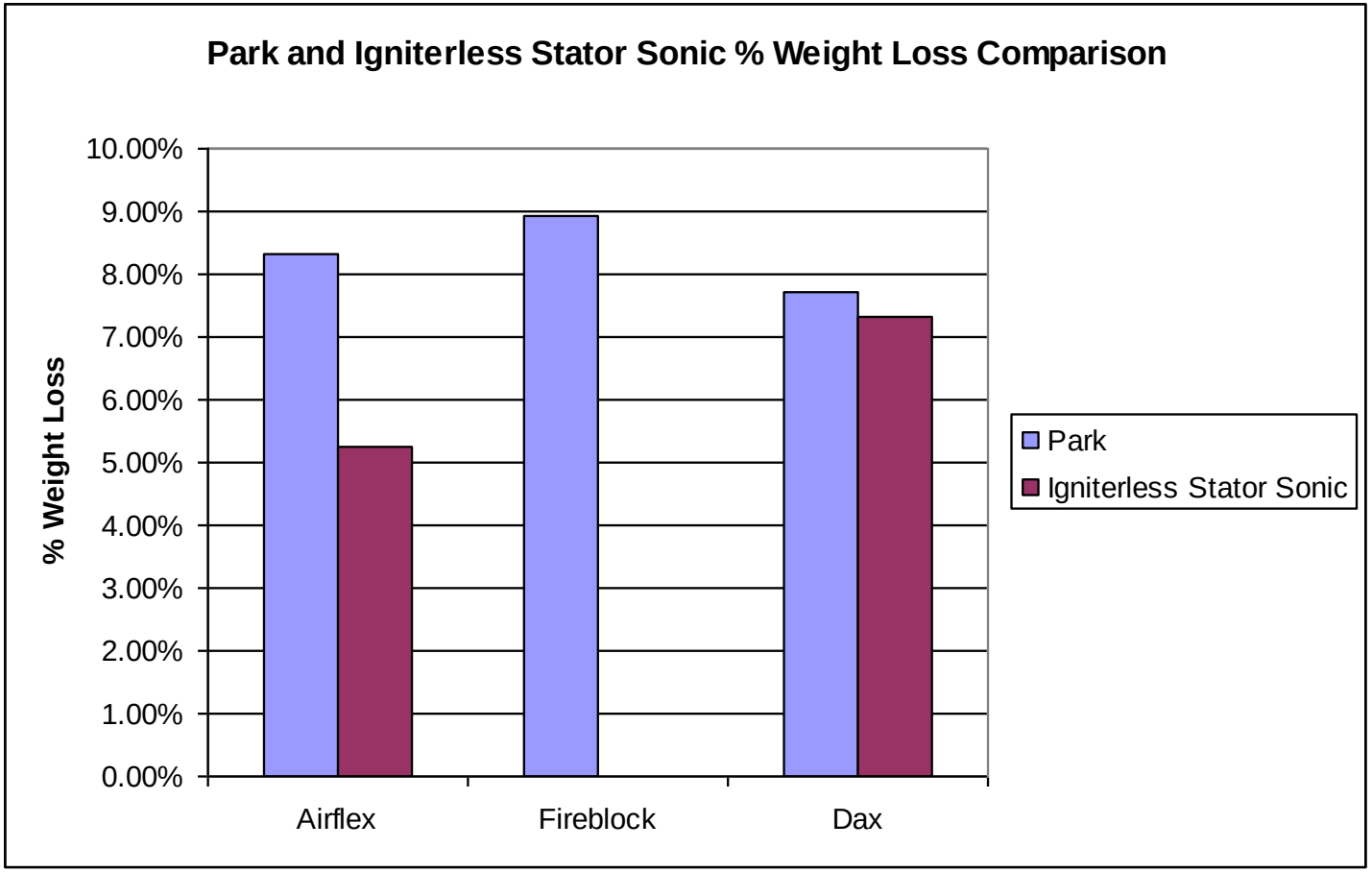
Revised Stator



Revised Stator



Revised Stator



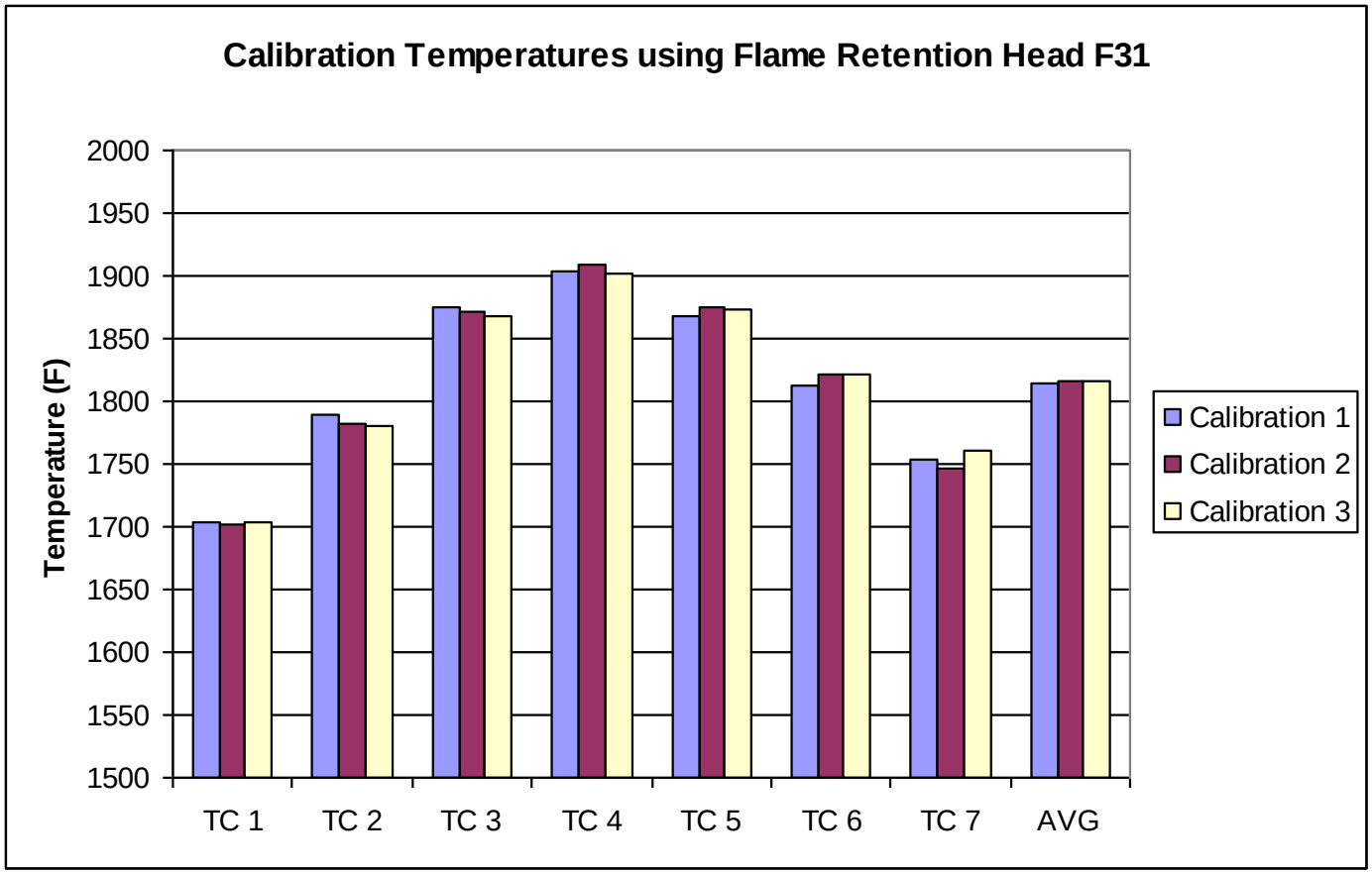
Revised Stator

- **Test results did not correlate well with Park test results**
- **Dax foam weight loss % seemed to line-up, but Airflex weight loss was significantly less than Park results**
- **Igniterless stator also requires external ignition source**
- **No further testing was pursued**

Flame Retention Head

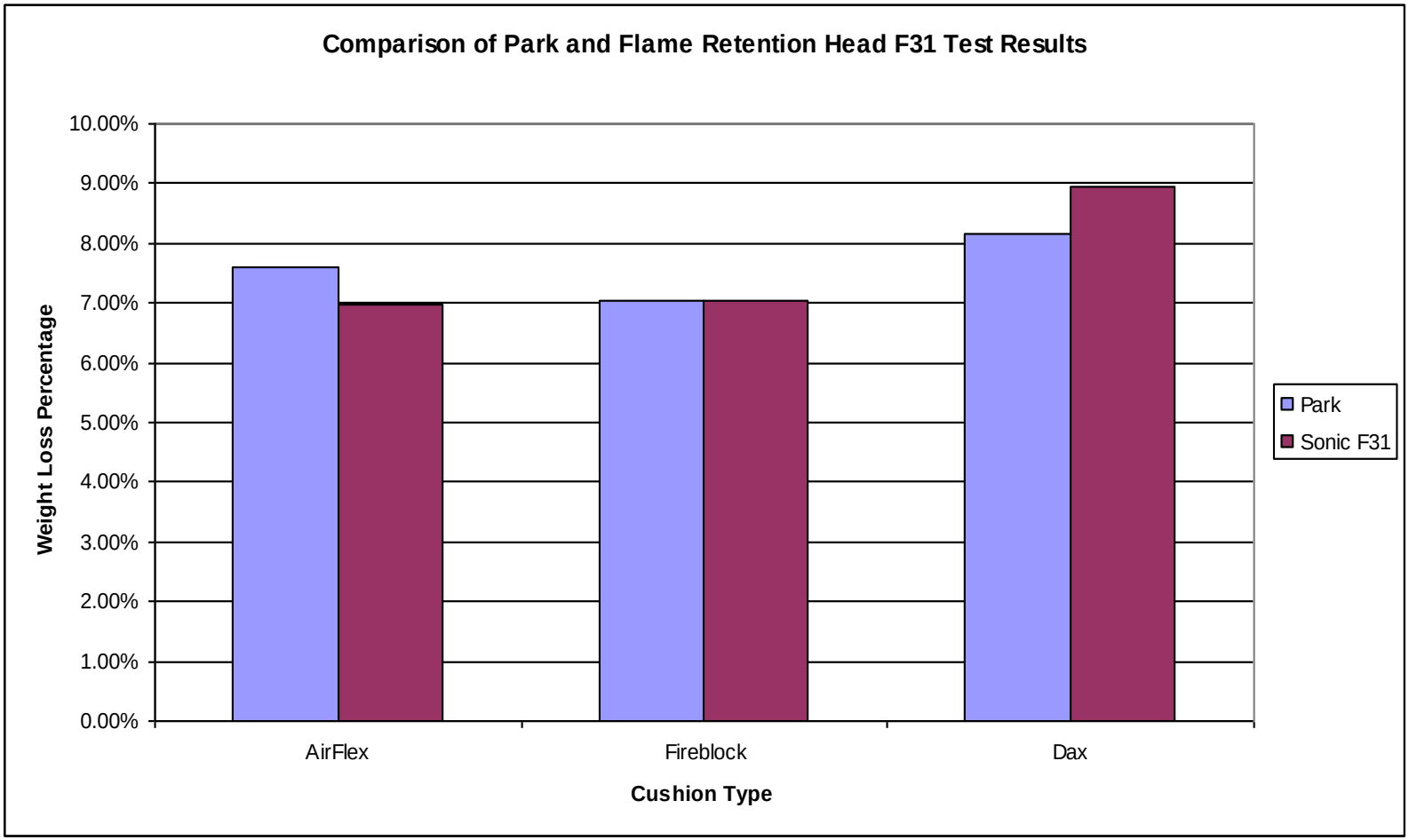
- **Eliminates the need for a stator and turbulator**
- **Fits on end of sonic burner draft tube**
- **Initial testing shows good potential**

Flame Retention Head



- **Extremely low variation of temperature**
- **Less than 1°F variation of averaged temperatures**

Flame Retention Head



Round Robin

- 4 Labs are currently participating
- Other labs may still participate
- Each lab was shipped a Delevan 80°B 2.0 gph fuel nozzle to use for testing
- Labs asked to setup burners using new standardized settings
- Asked that all labs calibrate using new 1/8” thermocouples
- Each lab will receive cushions for testing when the FAA recieves calibration data

Future Items

- **Compare round robin results**
  - Round robin is currently underway
  - 4 labs currently participating
  - Have calibration data back from 2 labs
  - Some labs currently waiting on burner parts
- **Flame retention head development**
- **Standardize leather seat cushion restraints**