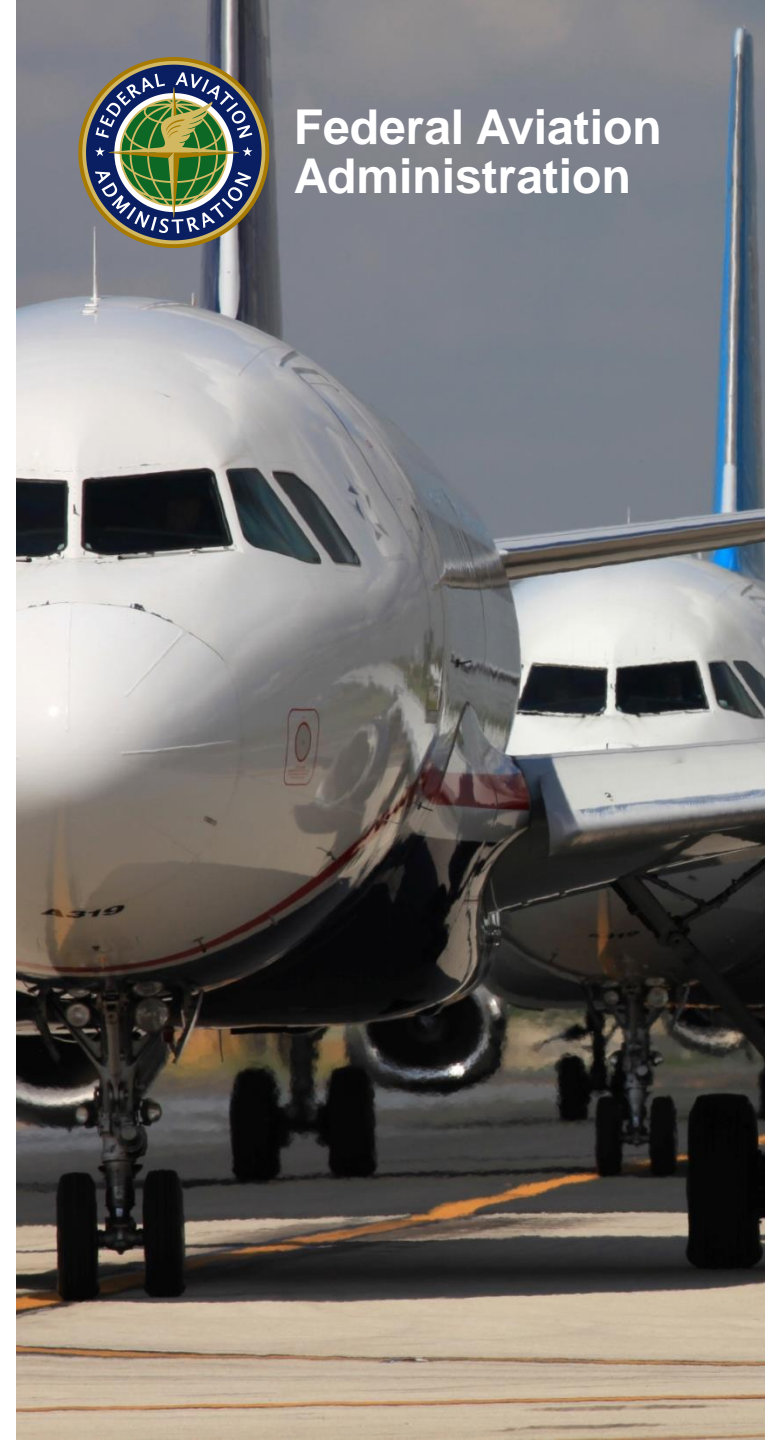


Radiant Panel Update

Presented to: International Aircraft Materials Fire
Test Working Group Meeting
By: Steven Rehn
Date: 3/6/2018



Federal Aviation
Administration



Introduction

- **Handbook update**
 - Updated December 2017
- **Electric Panel aging testing**
 - Panel runs hotter as it ages, can affect test results
- **Future Work**



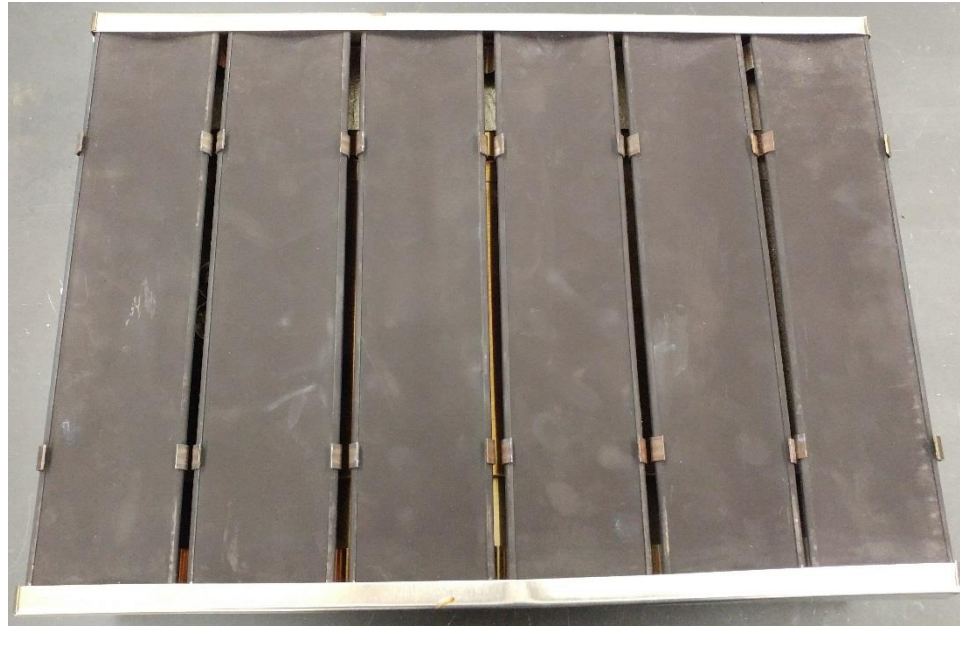
Handbook changes

- **Removed air-propane panel**
- **Replaced Kaowool M with Superwool 607**
- **Removed voltage requirement**
 - Previously said you must use 208V 3-phase or 240V single phase, replaced with 7574 Watt requirement
- **Reduced $\pm 5\%$ error on heat flux to $\pm 1\%$ on Zero Position (P1 and P2 remain $\pm 5\%$)**
- **5 minute average on heat flux measurement**

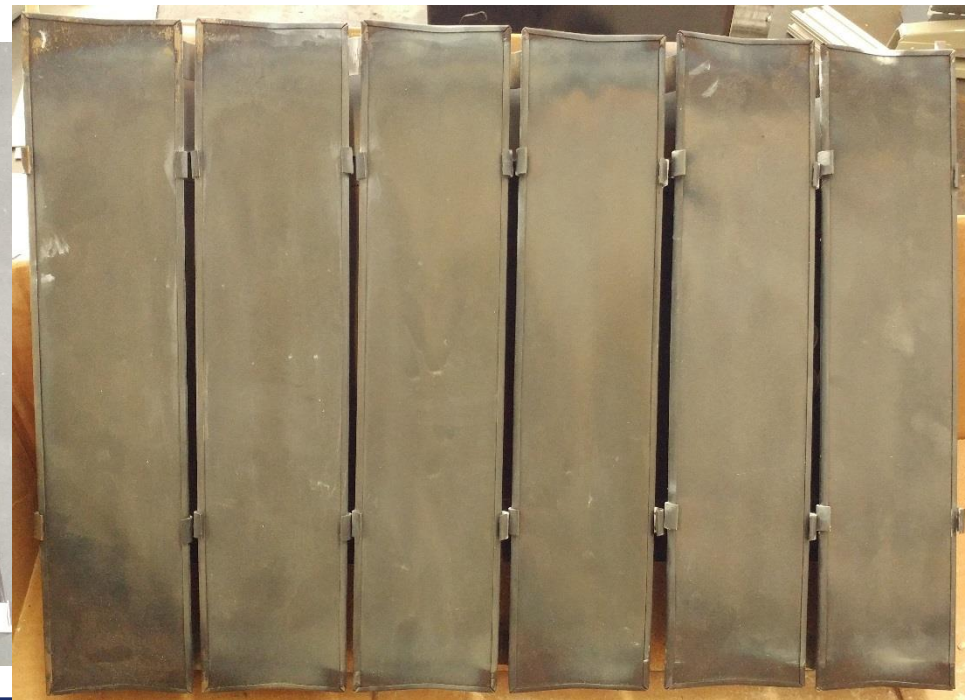
Radiant Panel Aging

- Temperature set point steadily increases to obtain same heat flux as panel ages – eventually leads to more material failures
- Biggest difference seems to be black paint on surface
- Need to add guidance about when to replace electric panel

New Panel



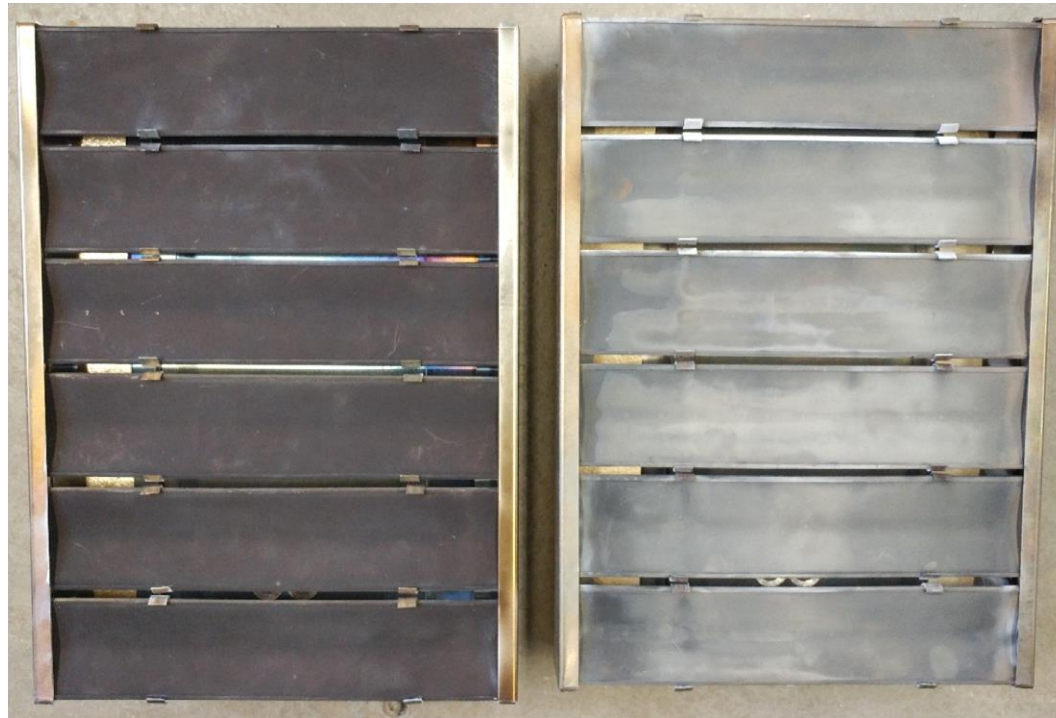
Old Panel



Radiant Panel Aging Test

- **Planned to test if old panels can be refurbished by repainting the surface**
- **Run calibrations and material tests with new panel, old panel, and repainted old panel**
- **Test 15 samples with each panel setup – 5 Polyimide, 10 Metalized PEEK**
- **Determine if repainted panel performs as well as a new panel**

Radiant Panel Aging Test



New Panel

Set Point: 1073°F

Heat Flux: P0: 1.502 Btu/ft²s

P1: 1.473 Btu/ft²s

P2: 1.398 Btu/ft²s

Old Panel

Set Point: 1121°F

Heat Flux: P0: 1.503 Btu/ft²s

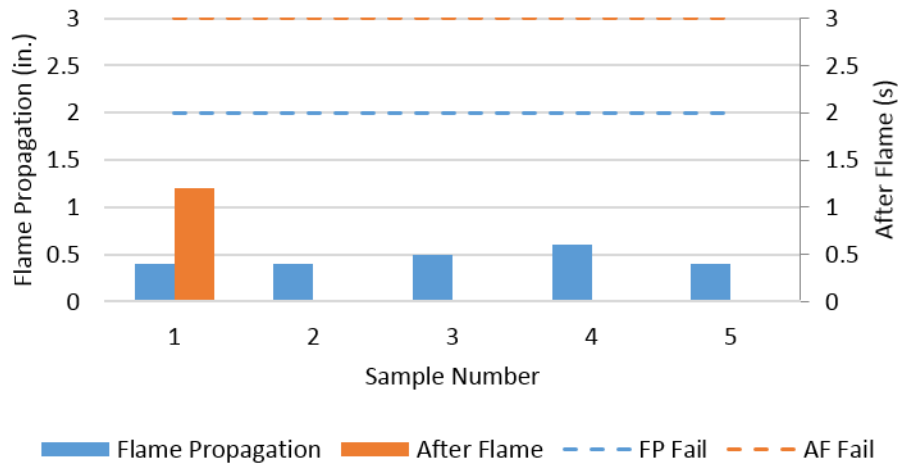
P1: 1.493 Btu/ft²s

P2: 1.408 Btu/ft²s

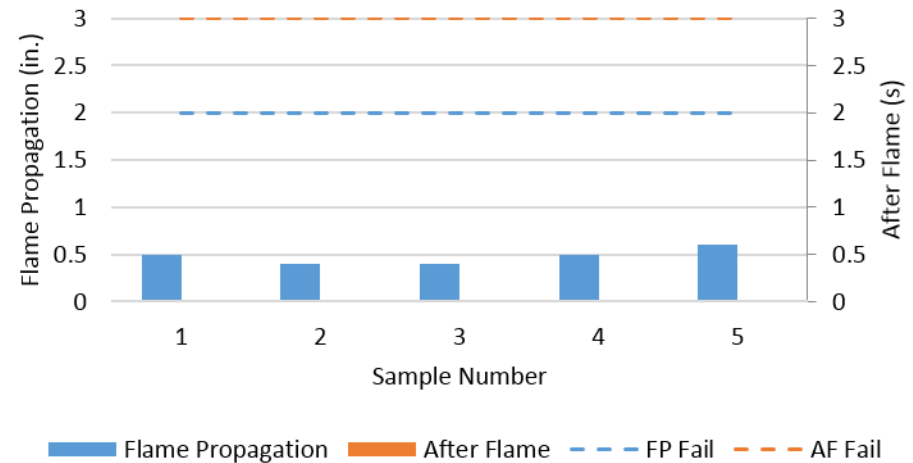
Radiant Panel Aging Test

- Polyimide material – 5 each

New Panel - Polyimide



Old Panel - Polyimide

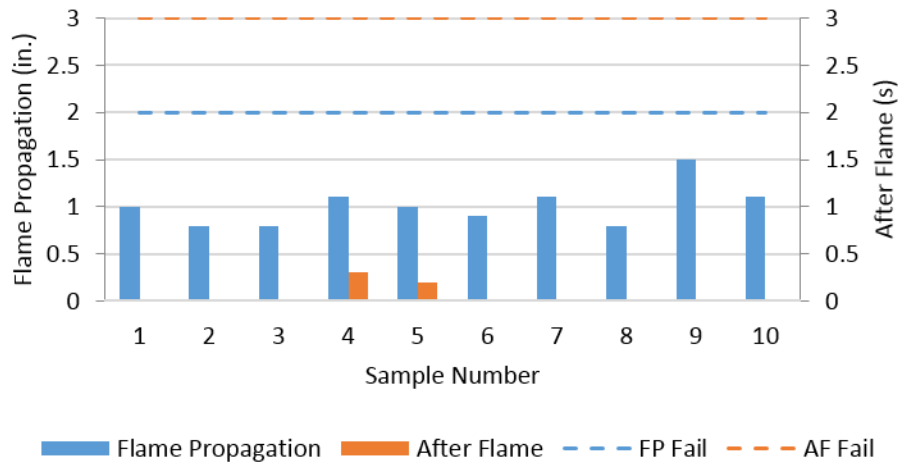


- Old panel did not perform worse than new panel

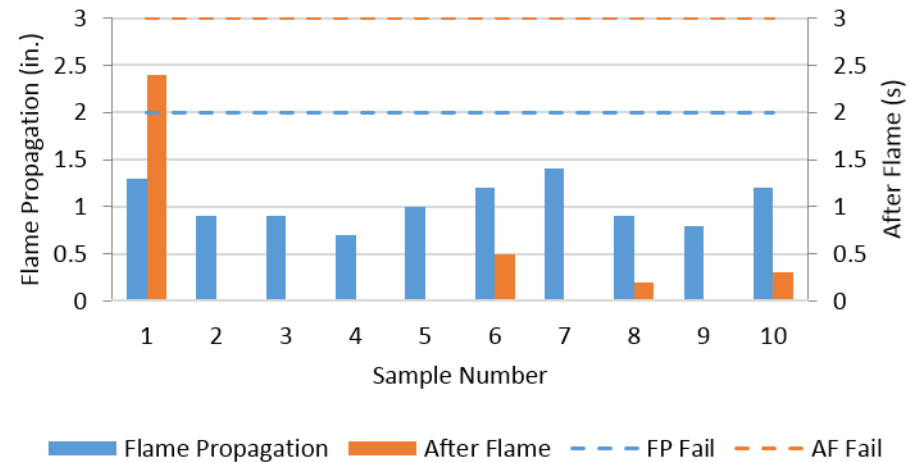
Radiant Panel Aging Test

- Metalized PEEK material – 10 each

New Panel - Metalized PEEK



Old Panel - Metalized PEEK



- Old panel did not perform worse than new panel

Radiant Panel Aging Test

- **Did not attempt to repaint panel because it already performed as well as a new panel**
- **Possible Problems:**
 - Panel is not as worn as it looks
 - Metalized PEEK is not as sensitive as previous material used
- **Also haven't been able to acquire the same paint used on the panel surface when new**

Previous Testing

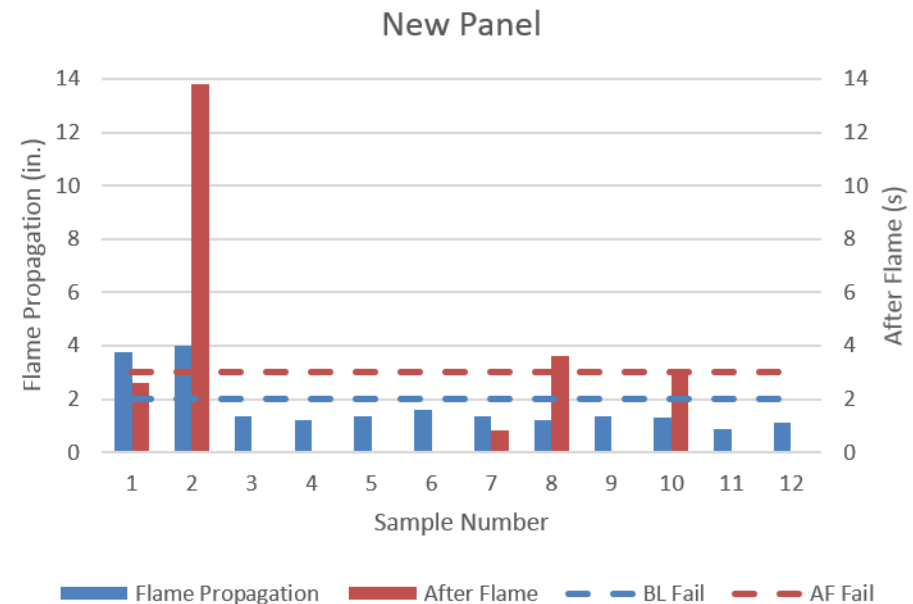
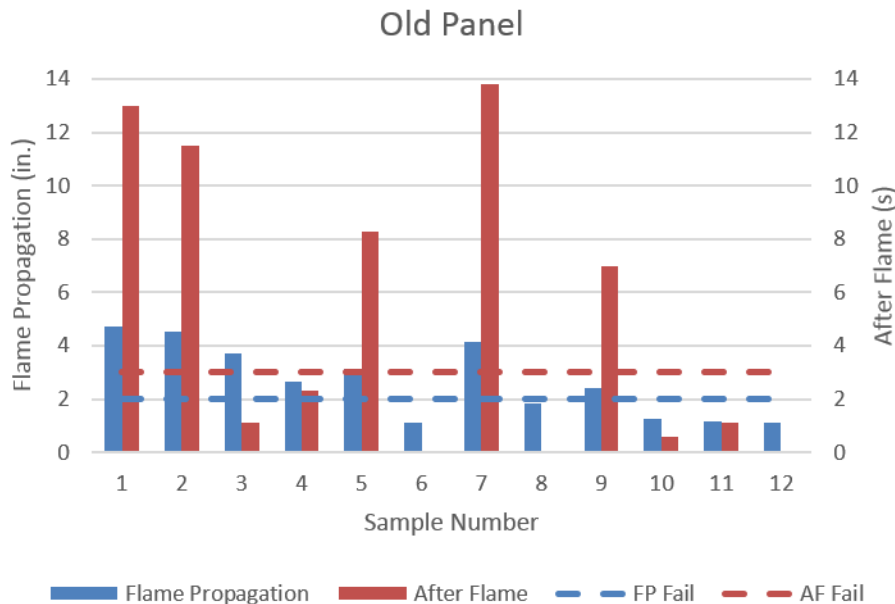
- During 2015 round robin, the lab with the most test failures replaced their (over 10 year-old) panel and repeated their test

Old Panel:

Set Point: 1211°F
Heat Flux: 1.501 Btu/ft²s
7 material failures

New Panel:

Set Point: 1105°F
Heat Flux: 1.501 Btu/ft²s
4 material failures



Previous Testing

- **Polyimide comparison**

Old Panel

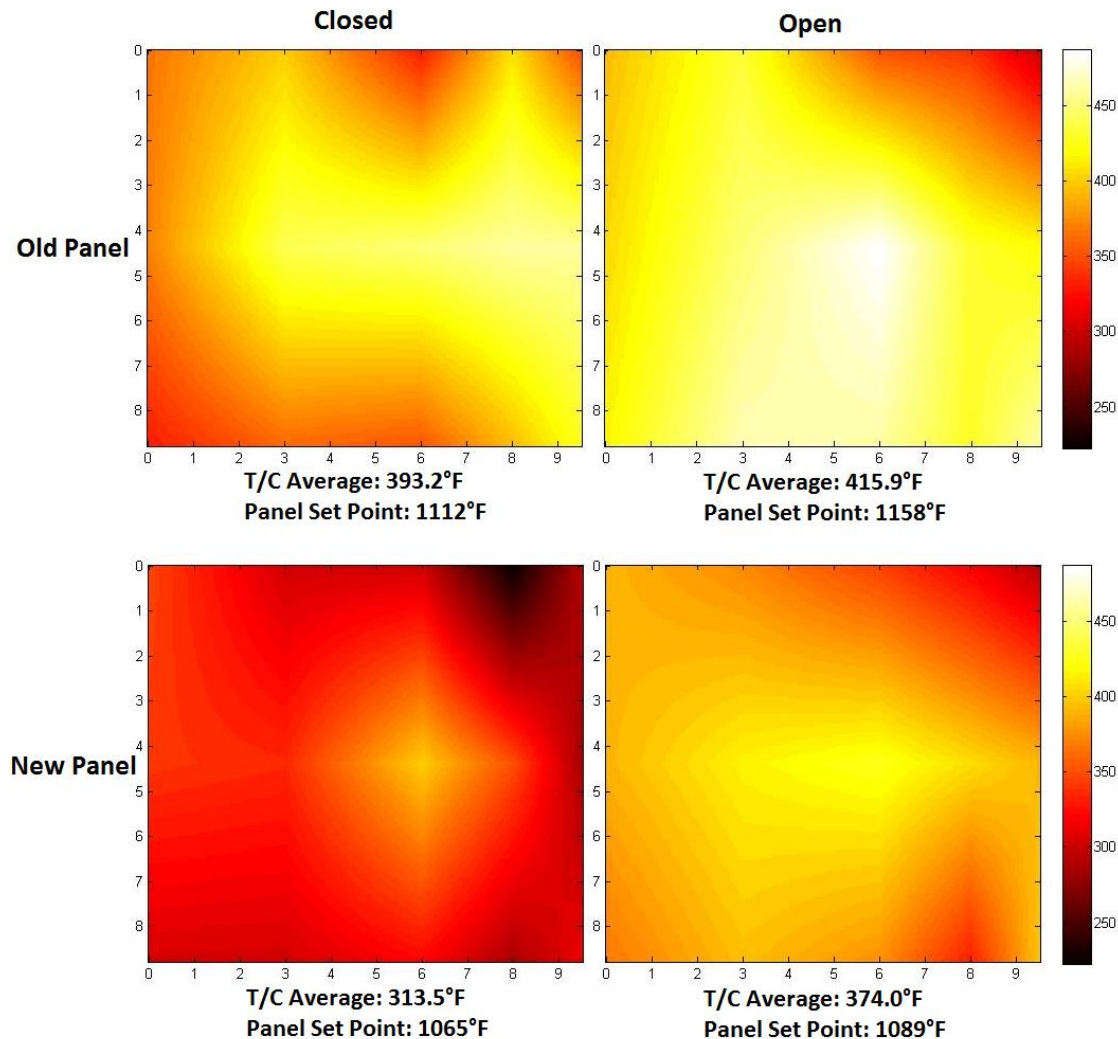


New Panel



Previous Testing

- 15 Thermocouple array at test sample surface
- Measured surface temperatures with old panel, new panel, and at two different air gap configurations around the sliding platform
- In the open configuration:
 - Old panel had higher set point, 1158°F to 1089°F
 - Old panel had higher average surface temperature, 416°F to 374°F



Future Work



- **Now have 4 old panels from 3 different labs**
 - One panel is 12 years old!
- **Also received new metalized PEEK material**

Future Work

- **Need to determine parameters of when a panel needs to be replaced**
 - Measure emissivity of paint
 - Measure resistance of emitter strips
 - Set point increase compared to when panel was new
- **Test 4 old panels and compare with new panels to determine which ones are out of spec and how do we know**
- **Discuss test plans in task group**
- **Refurbishing panel is secondary goal**

Questions?

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