# International Aircraft Materials Fire Test Working Group Meeting

## Development of New Flammability Test for Magnesium-Alloy Cabin Components

Presented to: International Aircraft Materials Fire Test Working Group, Montargis, France

By: Tim Marker, FAA Technical Center

Date: June 6-7, 2018

Federal Aviation Administration

# Summary, Future Work

(*from previous meeting*)

Finalize test parameters and pass/fail criteria for magnesium alloy components located in inaccessible areas:

- *Radiant Panel Apparatus, 3- by 6-inch sample size, 0.025-inch thickness*
- *2-minute pilot ignition*
- *4-minute exposure to radiant heat*
- *Maximum weight loss of 30% (proposed)*

*…Insert Test Method as Chapter 26 in current Fire Test Handbook*

*…(Once the interlab study is completed)*

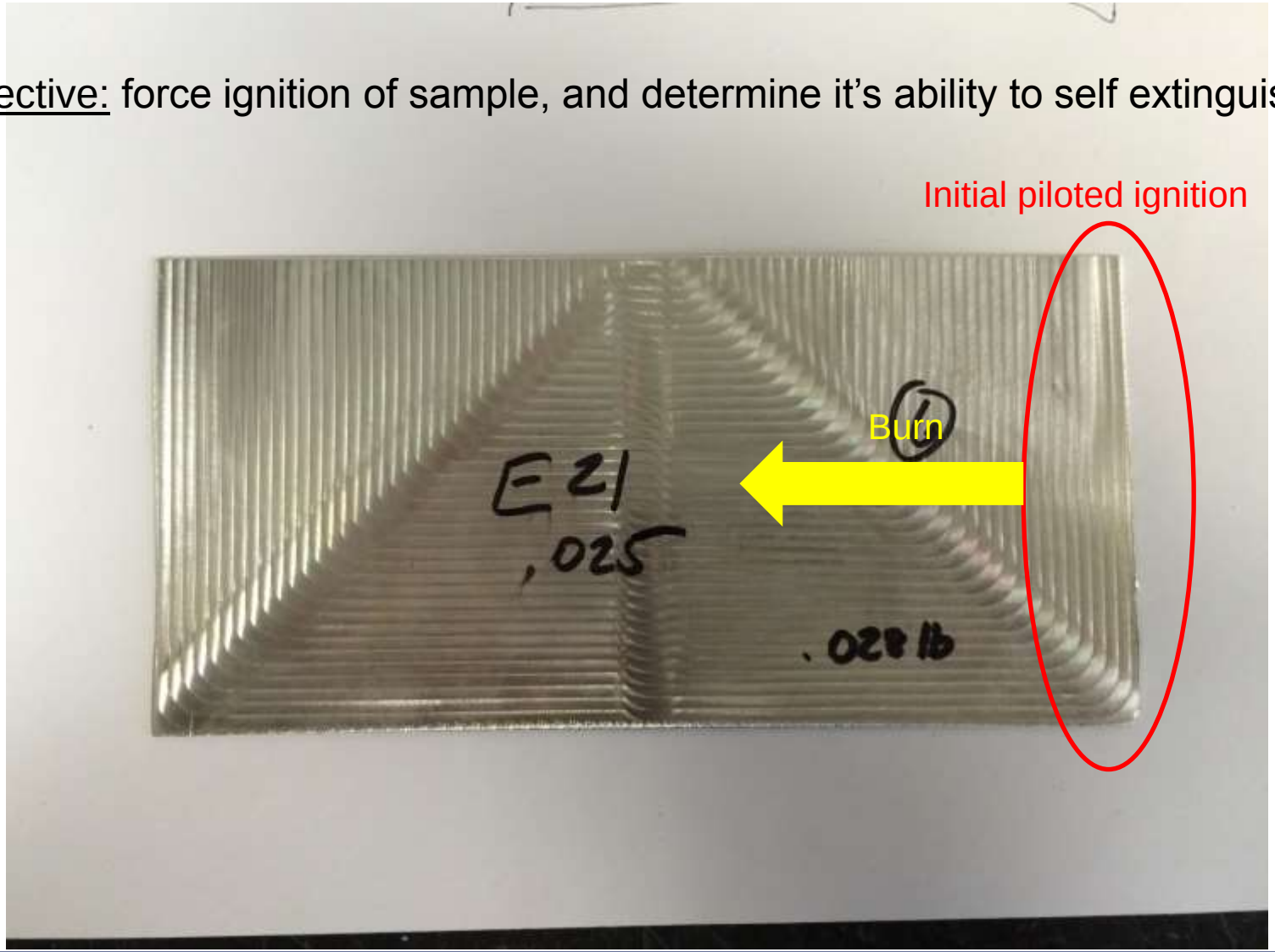
# Interlab Study

Prepare identical samples for participating laboratories, to determine lab-to-lab reproducibility:

- *6 laboratories (FAA, Accufleet, Boeing, CEAT, Airbus, Govmark)*
- *3 types magnesium alloy (EL43, EL21, ZE41)*
- *20 samples of each (60 tests) per lab*
- *Test results compiled by FAA*
- *Proposal by Luxfer MEL recently obtained; purchase order by FAA initiated*
- *Samples manufactured to 0.125-inch thickness, will then need to be milled down to 0.025-inch thickness by FAA for testing*

# 3- by 6-inch Thin Magnesium Sample

Objective: force ignition of sample, and determine it's ability to self extinguish



# Truncated Perimeter Sample Holder

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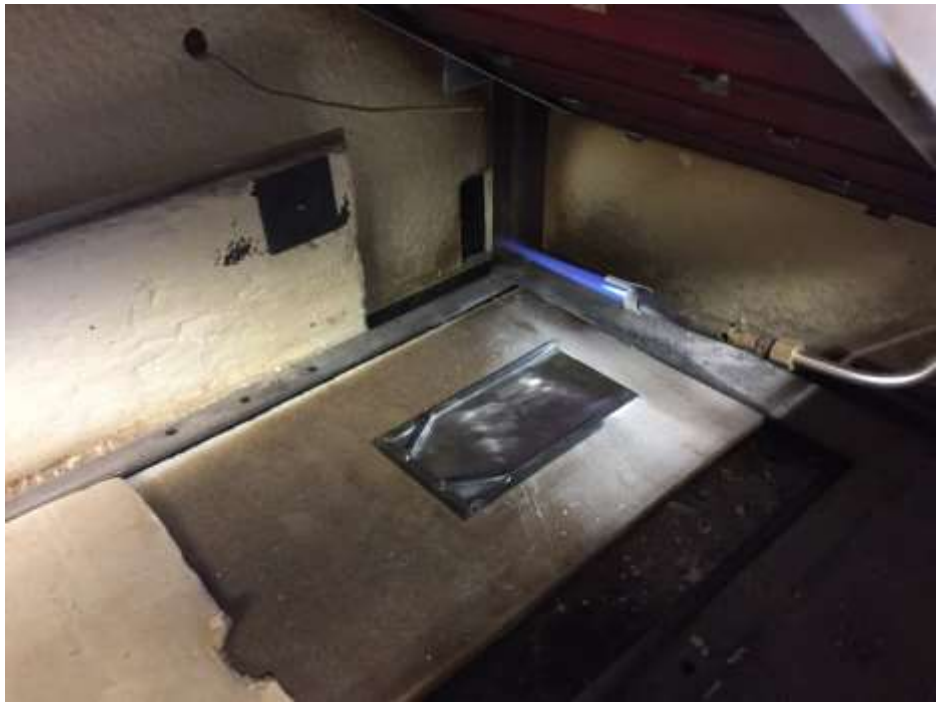

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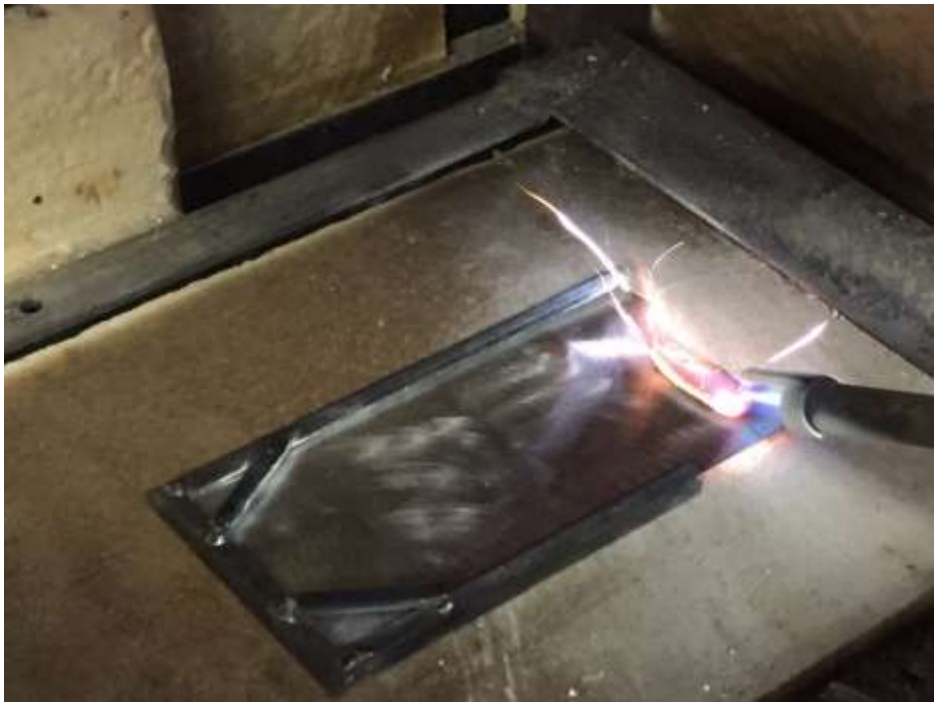

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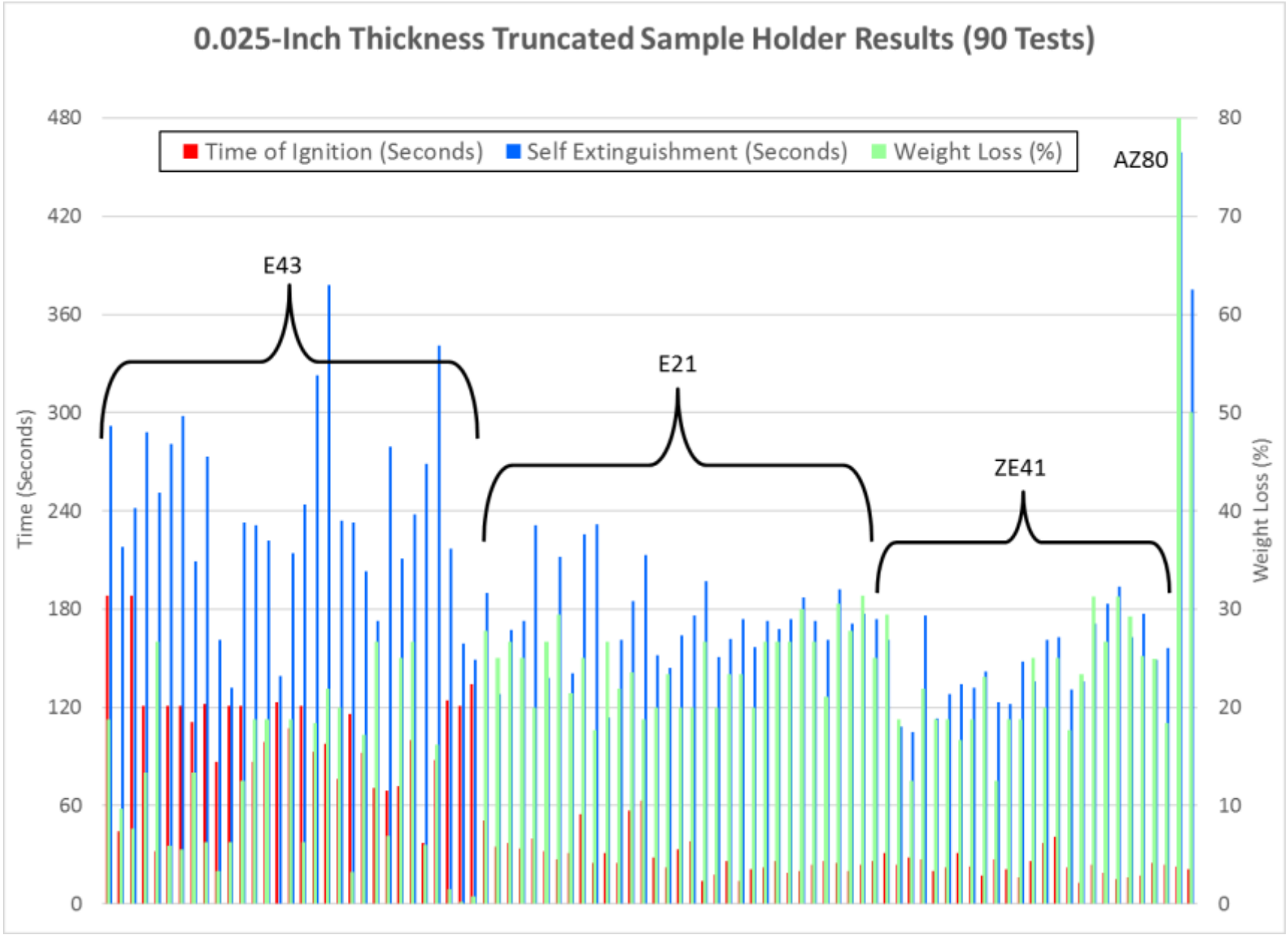
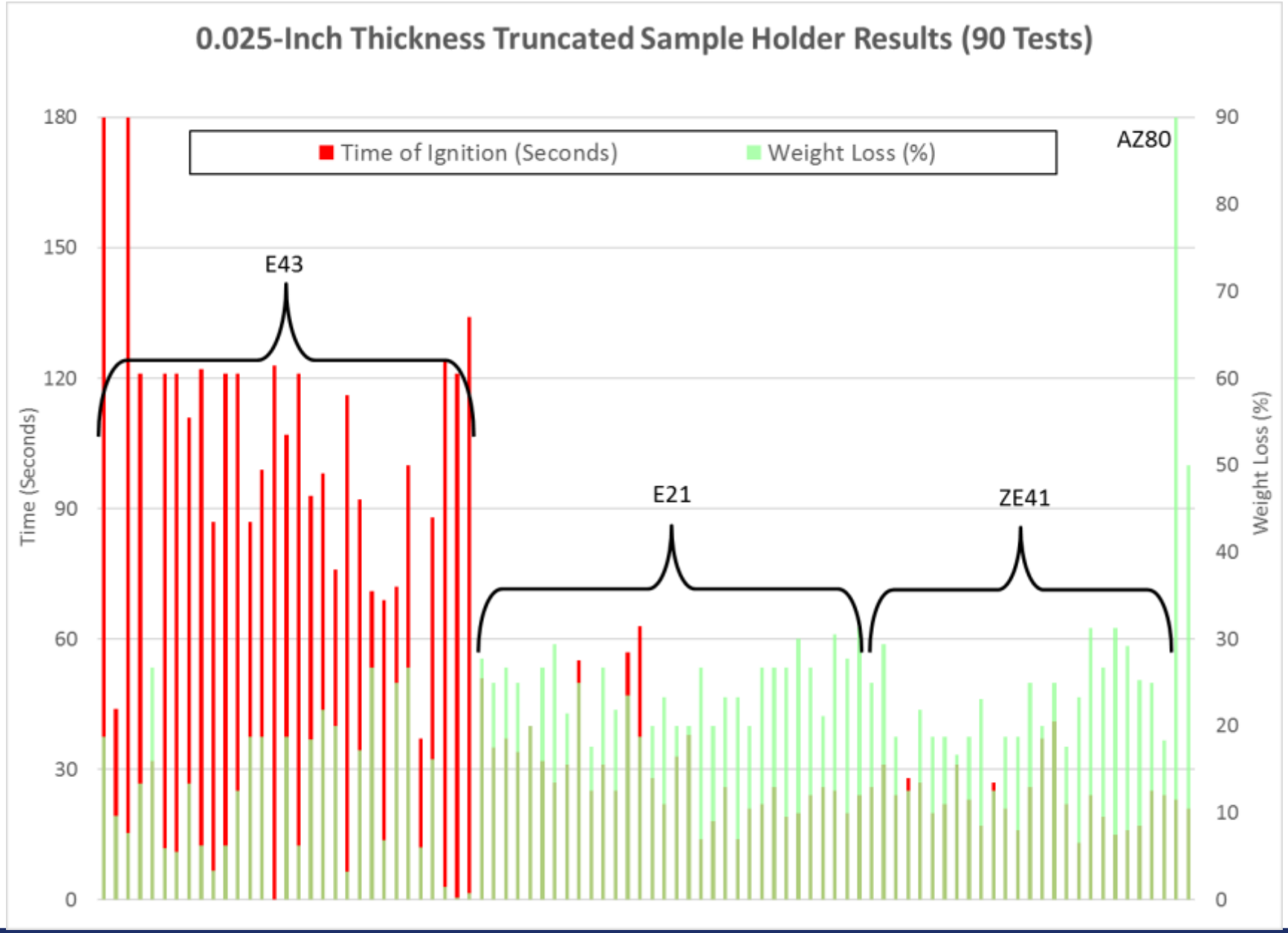
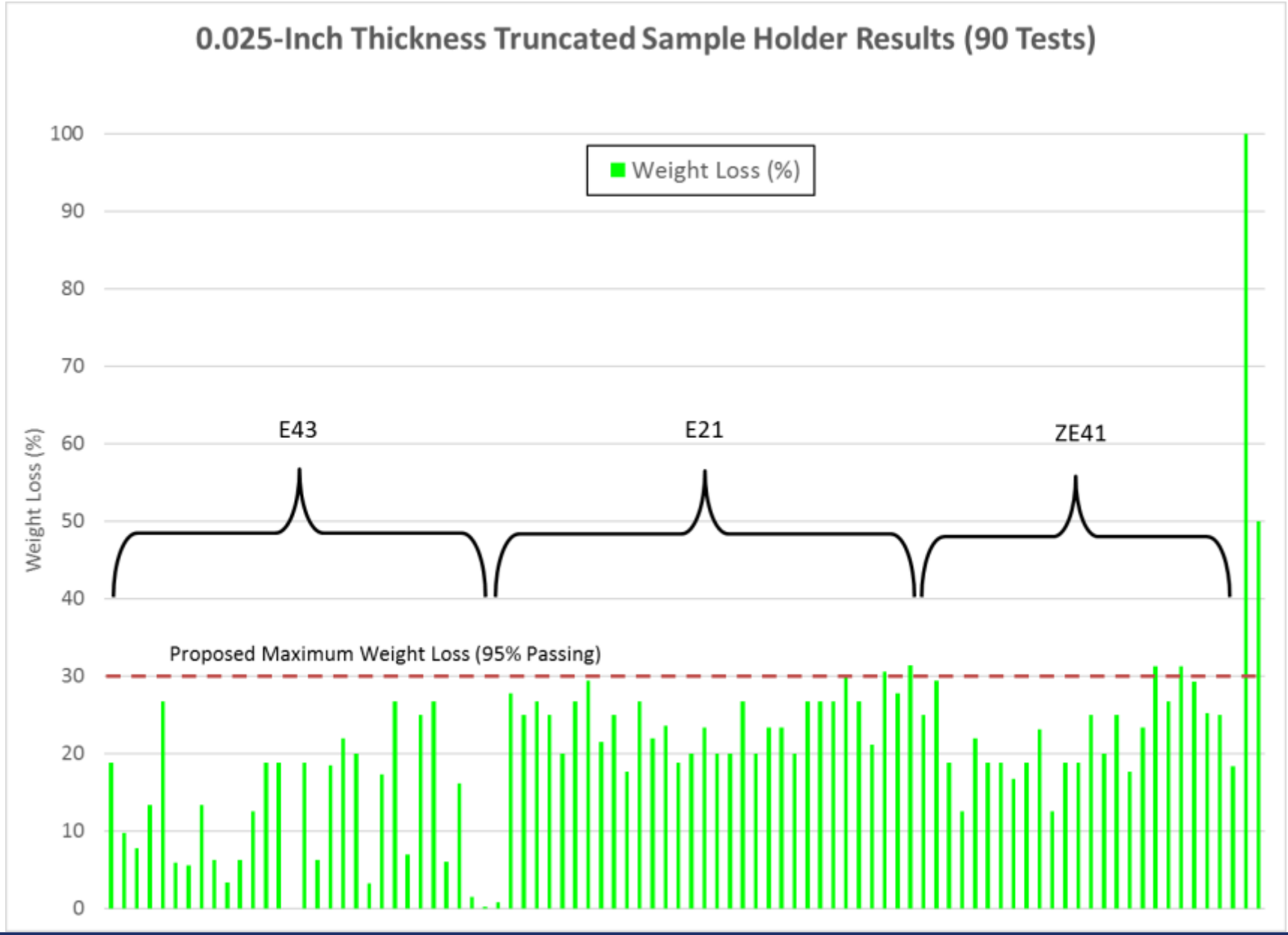
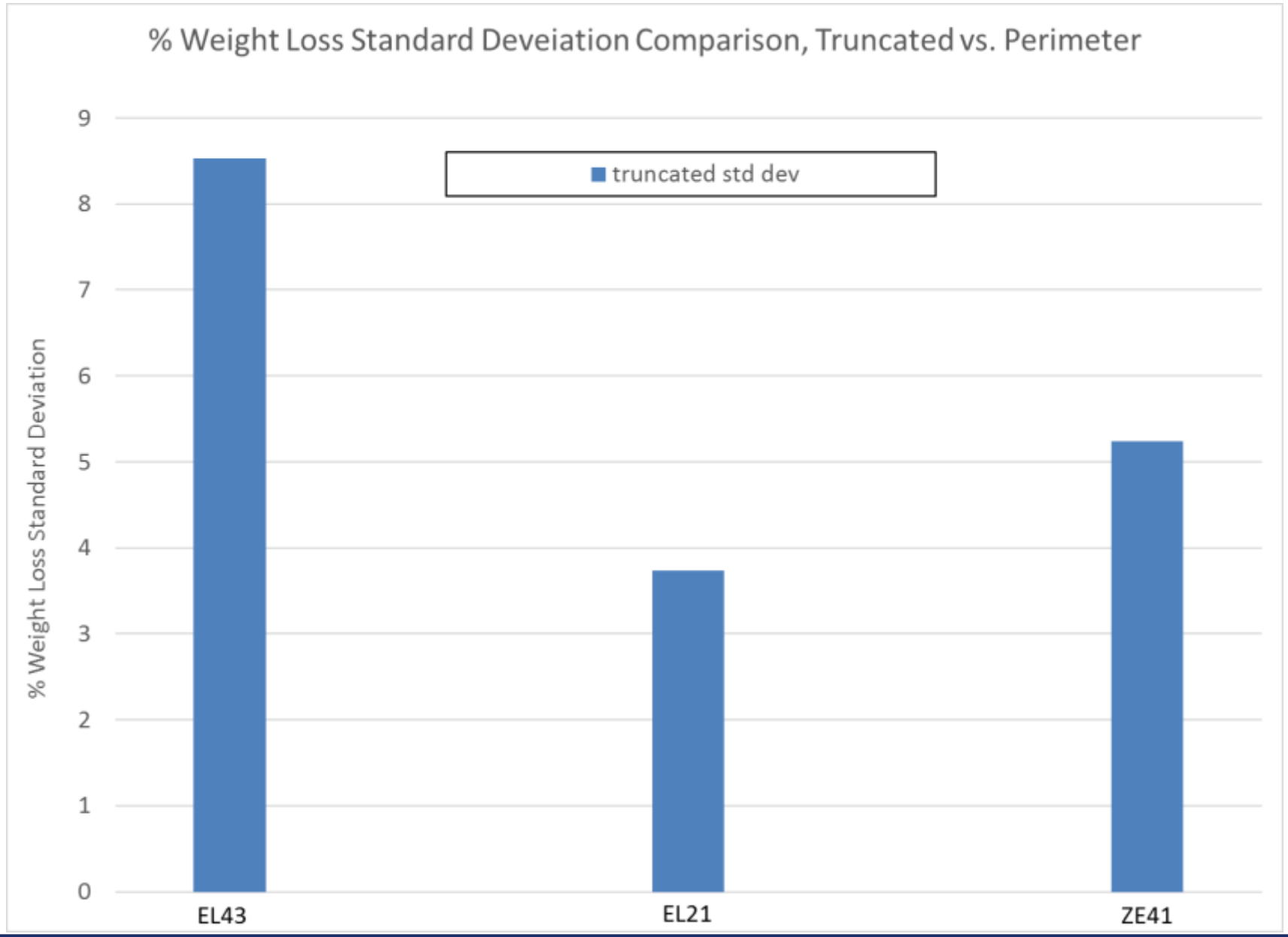
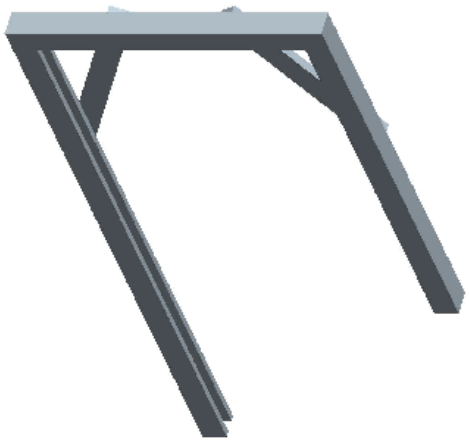

0.025-Inch Thickness Truncated Sample Holder Results (90 Tests)
Time of Ignition (Seconds)
Self Extinguishment (Seconds)
Weight Loss (%)
AZ80
E43
E21
ZE41
Time (Seconds)
Weight Loss (%)
480
420
360
300
240
180
120
60
0
80
70
60
50
40
30
20
10
0

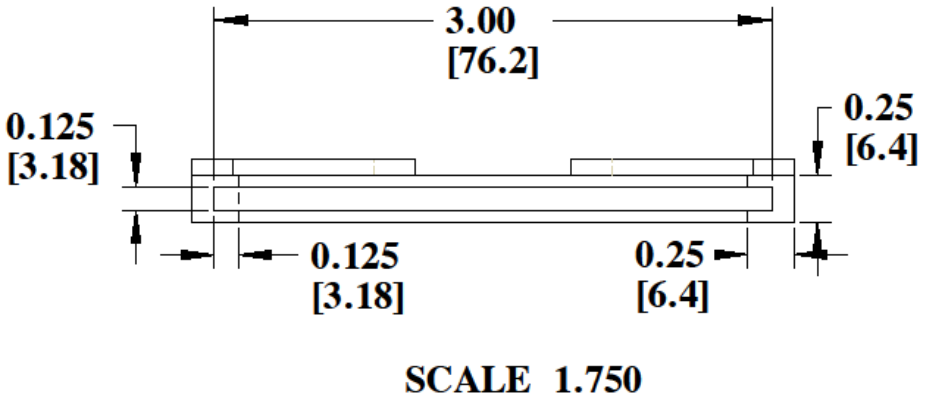

0.025-Inch Thickness Truncated Sample Holder Results (90 Tests)
Time of Ignition (Seconds)
Weight Loss (%)
AZ80
E43
E21
ZE41
Time (Seconds)
Weight Loss (%)
180
150
120
90
60
30
0
90
80
70
60
50
40
30
20
10
0


0.025-Inch Thickness Truncated Sample Holder Results (90 Tests)
Weight Loss (%)
100
90
80
70
60
50
40
30
20
10
0
Weight Loss (%)
E43
E21
ZE41
Proposed Maximum Weight Loss (95% Passing)


% Weight Loss Standard Deveiation Comparison, Truncated vs. Perimeter
truncated std dev
% Weight Loss Standard Deviation
0
1
2
3
4
5
6
7
8
9
EL43
EL21
ZE41

# Drawings of Sample Holder



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# The Use of Magnesium Alloy in Cabin Areas

*What is the appropriate method of test?*

**Use in 5 primary seat components**

Oil Burner ✓

**Use in other non-primary seat components**

Oil Burner ✓

SAV ratio req ✓

**Use in other cabin components**

**Accessible Below seat height**

Oil Burner ✓

SAV ratio req ✓

**Accessible Above seat height**

Oil Burner ?

SAV ratio req ?

Run full-scale test ?

**Inaccessible**

Ignition/Self Extinguishment ✓

# Discussion Items for Task Group

Discuss test method for magnesium alloy components located in inaccessible areas:

- Conduct Interlab study (Round Robin)?
- Develop detailed instructions on how to run tests

Discuss the key elements that need to be included in an Advisory Circular

- What is the appropriate method of test for each application?

Discuss any other items related to the use of magnesium alloy in either seats or other cabin components

# Questions?