International Aircraft Materials Fire Test Forum Meeting

Development of New Flammability Test for Magnesium-Alloy Cabin Components

Presented to: International Aircraft Materials Fire Test Forum, Mobile, Alabama

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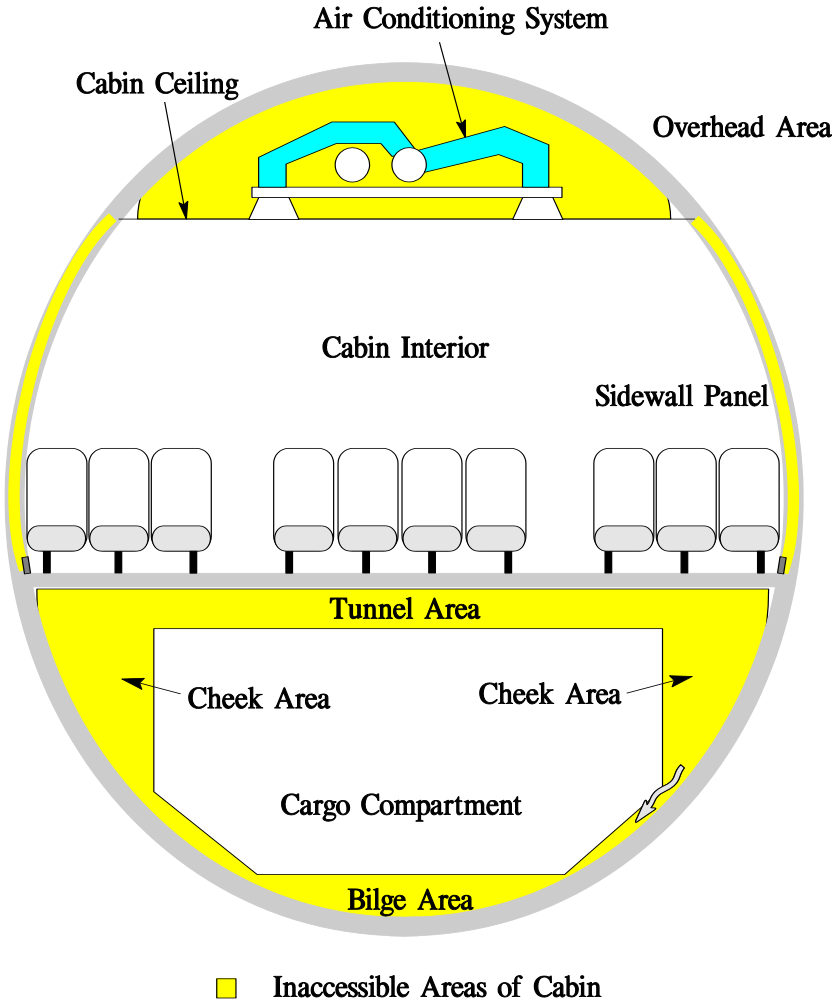
Federal Aviation Administration

Objective: Develop a flammability test for magnesium alloy components located in inaccessible areas of the cabin

- *Representative*
- *Repeatable*
- *Reproducible*

Development of Flammability Test for Magnesium Components Used in Inaccessible Areas

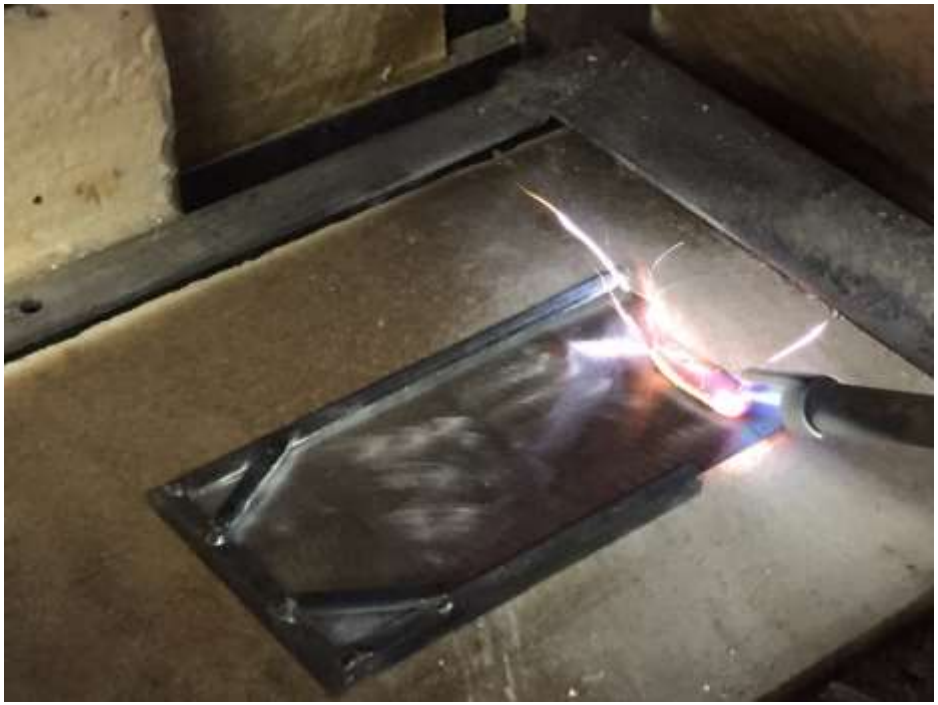


Current Test Parameters

- *Test developed using 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)*

…Test Method inserted as Chapter 26 in current Fire Test Handbook!

Truncated Perimeter Sample Holder



Interlab Study

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

- *Test materials received from Luxfer (Magnesium Elektron) 2019*
- *Materials were manufactured to 0.125-inch thickness, which then need to be milled down to 0.025-inch thickness by FAA for testing*
- *8 laboratories (Airbus, Boeing, Accufleet, DGA, Skandia, FAA, Govmark, Honda)*
- *For first round of testing, 2 types magnesium alloy (EL43, Boeing material "alloy1")*
- *21 samples of EL43, 10 samples alloy1 per lab*
- *Test results compiled by FAA*

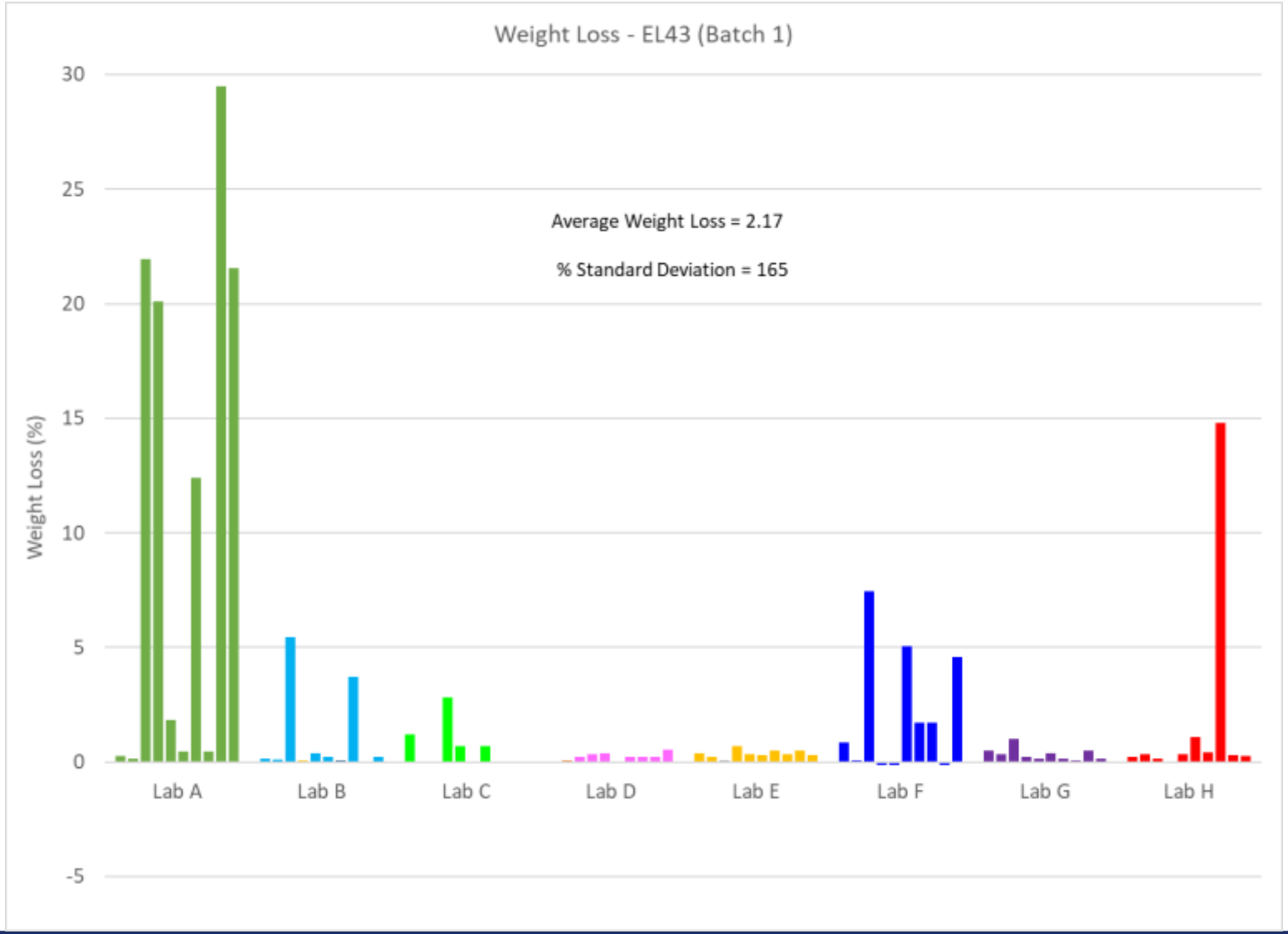
*Refine test parameters and pass/fail criteria based on results of interlab study

EDM Electrical Discharge Machining

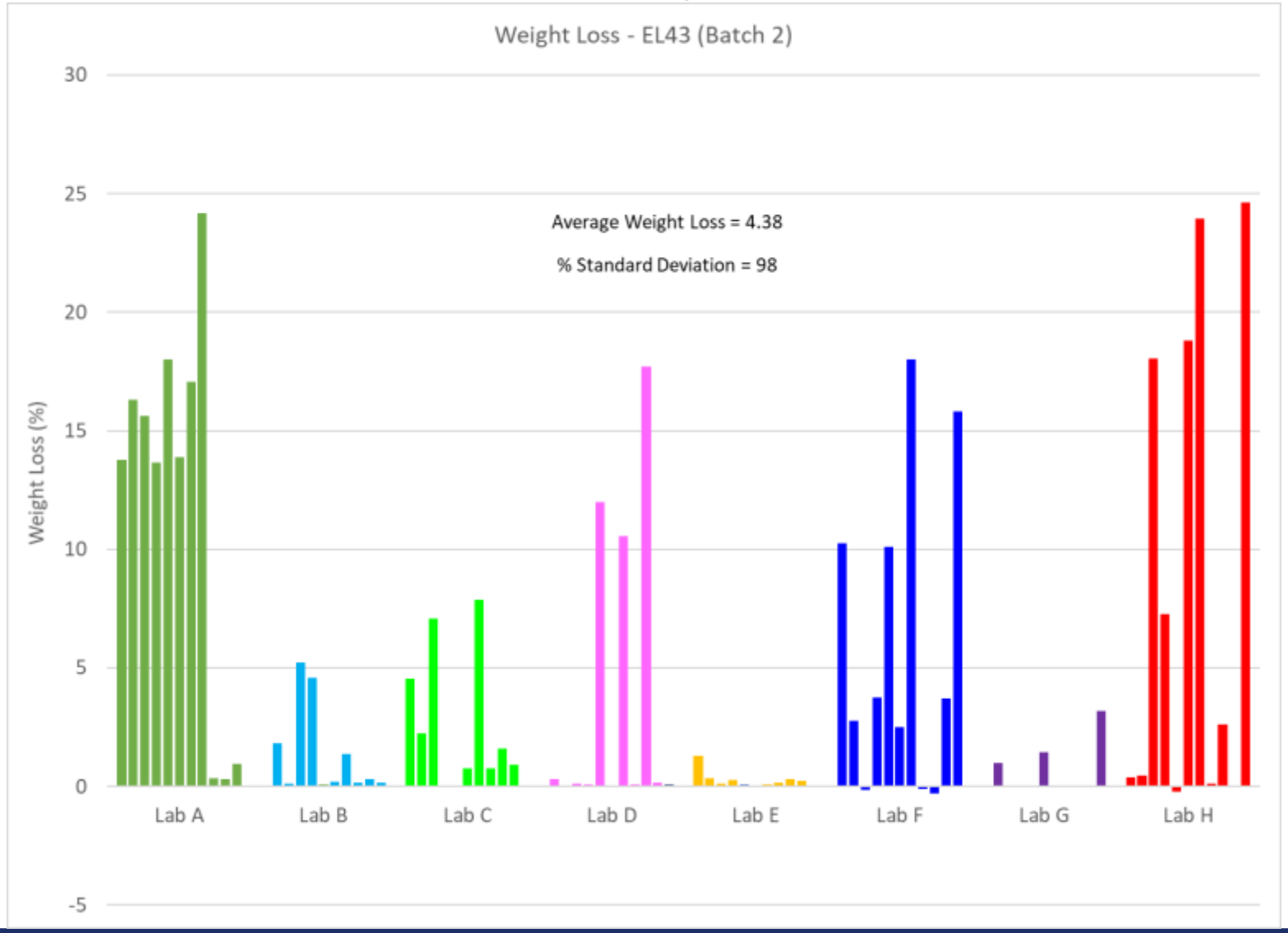
FAA contracted US company to mil samples down from 0.125-inch supplied thickness to specified 0.025-inch thickness for testing.

Wire EDM is an electro thermal manufacturing process where components are made using electrical discharges. A thin strand of metal wire accompanied by de-ionized water allows the wire to cut through metal just from the heat of the sparks.

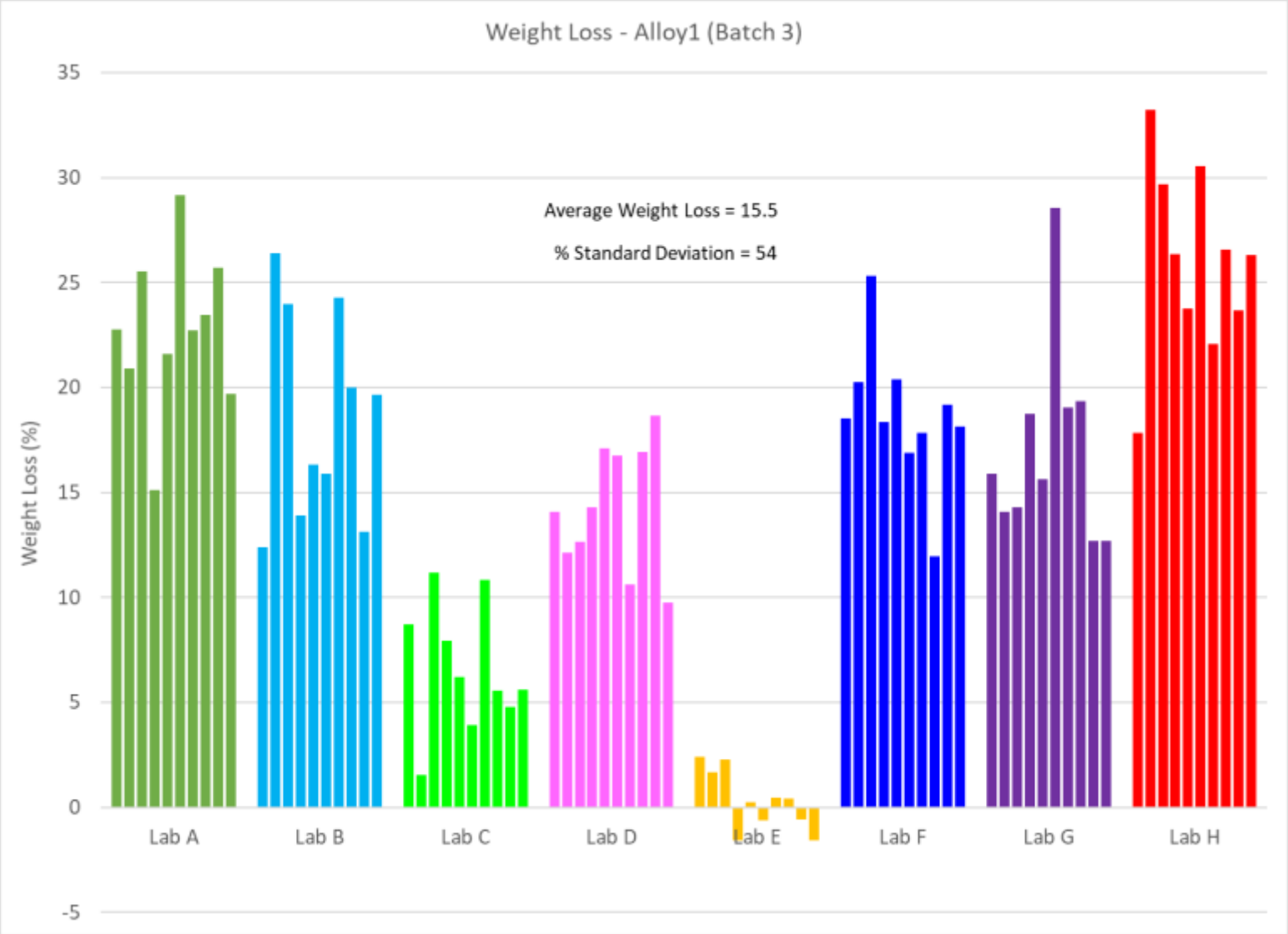
Interlab Study Results



Interlab Study Results



Interlab Study Results



Lab A Test Configuration

Interlab Study Observations

EDM samples in Batch 1 and Batch 2 were very inconsistent in terms of thickness, which likely played a role in the weight loss results.

Pre-heating of samples may produce more consistent results. Update procedure accordingly, conduct additional study.

Lab H Results on Batch I Samples

Lab H Results on Batch II Samples

Lab H Results on Batch III Samples

Discussion Items for Task Group

Discuss the key elements of the new flammability test for components located in inaccessible areas:

- *Time until ignition (cannot be less than 30 seconds)*
- *Should there be a limit on self extinguishment? (currently not required)*
- *Discuss sample milling options for next interlab study*

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

Questions?