# International Aircraft Materials Fire Test and Systems Fire Protection Forum Meeting

## Short Takes and Current Projects

Presented to: IAMFT Forum,
FAA Technical Center, Atlantic City, NJ

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Federal Aviation Administration

# Materials and Systems Forum Meetings

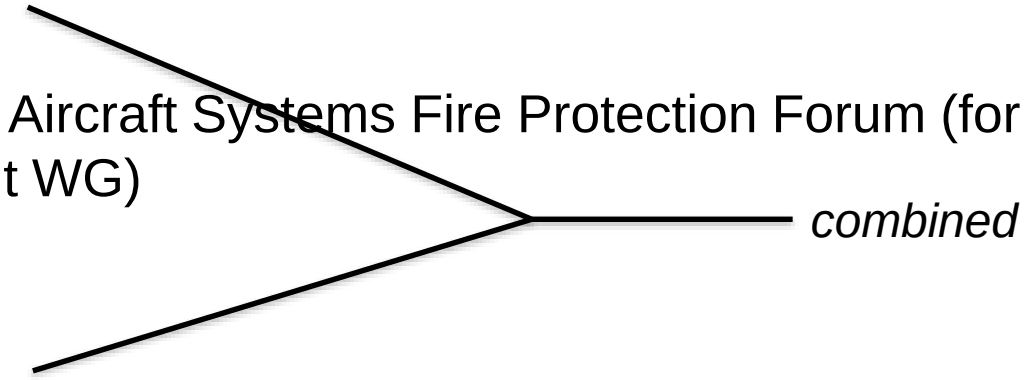
…historically…

International Aircraft Materials Fire Test Forum (formerly IAMFTWG):

March
June
October

International Aircraft Systems Fire Protection Forum (formerly Halon Replacement WG)

May
October



# Materials and Systems Forum Meetings

…way forward…

3-Day Combined Meeting in Europe (March or April)

4-Day Combined Meeting in Atlantic City (October)

~~2-Day Combined Meeting in U.S. (Feb)~~ *

*Reasoning:

- virtual meetings greatly improved during pandemic, which allow greater flexibility for task group meetings.
- hard to justify an abbreviated 2-day meeting in February.

# Materials and Systems Forum Meetings

*3-Day Combined Meeting in March…*

Research Project Areas (RPAs)

Cabin Safety

Long Range Research

Cargo

Hazmat

Powerplants

# Materials and Systems Forum Meetings

*4-Day Combined Meeting in October…*

Day 1 Materials Forum (8am to 5pm)

Day 2 Materials Forum (8am to 5pm)

Day 3 Systems Forum (8am to 5 pm)

Day 4 Systems Forum (8am to 5 pm)

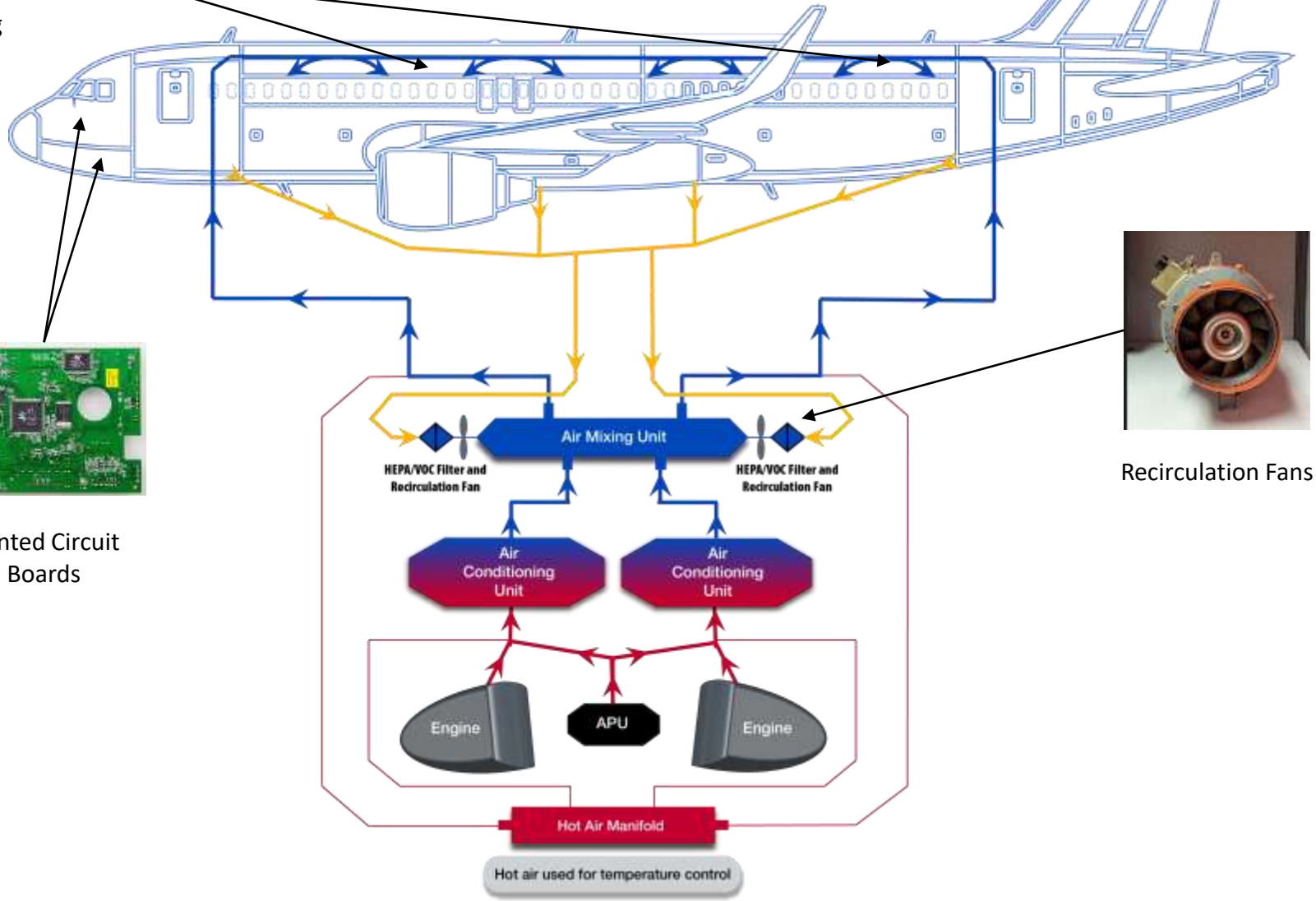
…~~to be~~ *(possibly)* held at the FAA Technical Center, Atlantic City, NJ

# Questions on Meeting Schedule?

# Other Projects

# Internal Contaminant Sources

Wiring






Printed Circuit Boards



Recirculation Fans

## MOTIVATION

From 2002 to 2011, unplanned landings due to fire incidents resulted in notable financial burdens.  More than half of the expenses from fire, smoke, and fume (FSF) incidents were due to these unexpected landings.

# Detection of Signatures from Internal Contaminant Sources (Univ. of MD Grant)

**The results of the project will lead to the identification of technology that can identify indoor contaminants resulting from overheated fans or wiring in the Flight Deck area.**

The project seeks to identify potential sensors that could:

- detect signatures/significant markers (e.g., certain classes of particulates and/or chemical species) from system and/or component failures in the Flight Deck
- identify signatures/markers that could potentially adversely affect (i.e., masking a measurement or triggering a false warn) other airplane systems or sensors (e.g., optical or ionization smoke detectors; cabin air quality or bleed contaminant sensors; etc.)


MSEM 160 E-nose

Bosch BME 688

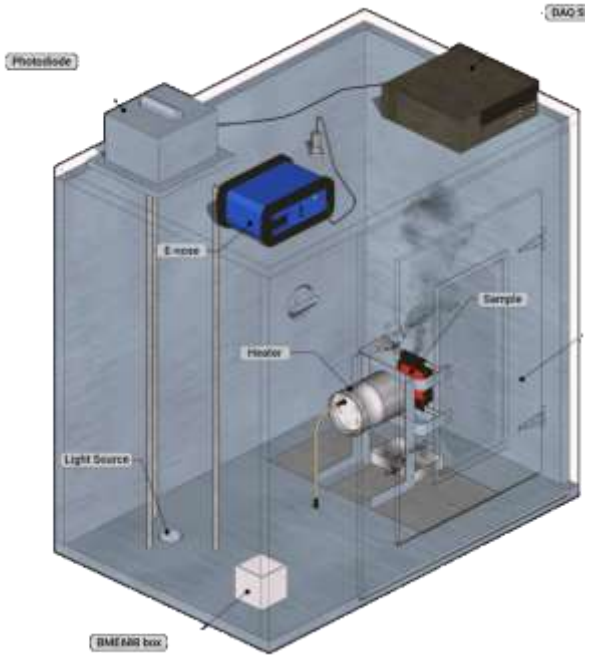
# Detection of Signatures from Internal Contaminant Sources (Univ. of MD Grant)

## TEST COMPONENTS & CHAMBERS

Samples were taken from avionic components, recirculation fans, and aviation cables. Radiant heat, transformer and mechanical resistance was used to induce failures depending on sample.

- NBS Smoke chamber (UMD Lab)
- Large-scale Simulated Flightdeck Testing chamber (FAATC)
- Pressure vessel, where the internal air pressure was maintained at 10.9 psi, replicating the cabin pressure at 8,000 ft. (FAATC)

# Test Chambers & Sensors




NBS Smoke Chamber (UMD)

Outside Simulated Flight Deck



Inside Simulated Flight Deck


MSEM 160 E-nose

Bosch BME 688

# Detection of Signatures from Internal Contaminant Sources (Univ. of MD Grant)

## RESULTS

- Consistent signatures measured from similar components during the smoldering process
- K-means and KNN Algorithms accurately classified the samples under varying conditions
- The BME688 sensor predicted all the PCB samples correctly

## FUTURE WORK

Integrating machine learning and AI capabilities with the sensors enriches the possibilities of early detection and identification. Future endeavors could focus on expanding the training set with even more diverse materials and conditions to enhance detection accuracy.

# Questions?