



Federal Aviation  
Administration

# Intumescent Paint as a Passive Protection Method Against Lithium Battery Fires

Presented to: International Aircraft Systems Fire Protection  
Working Group, Atlantic City, NJ

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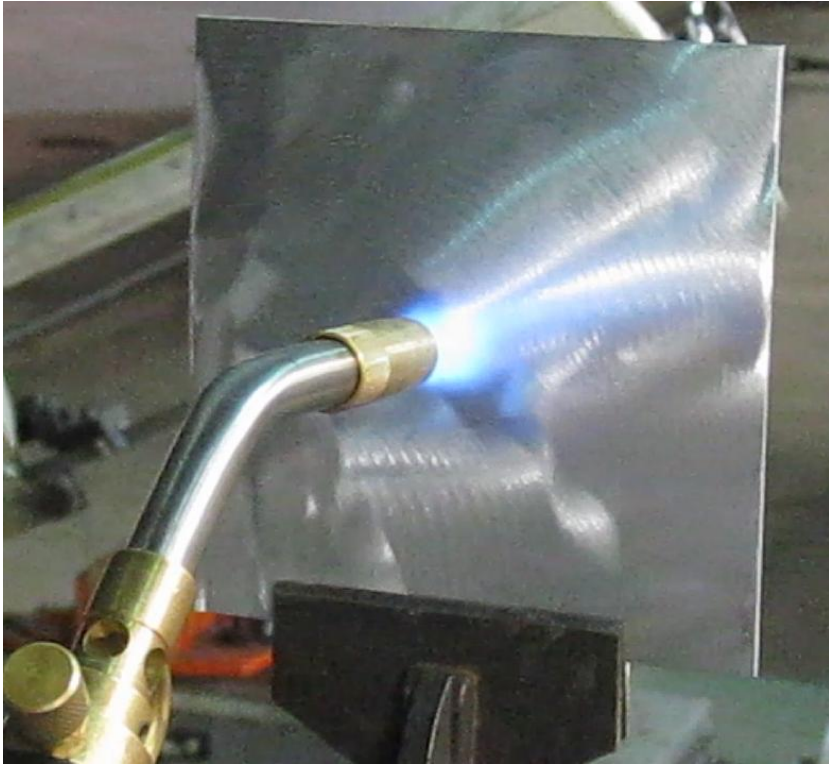
Date: November 16-17, 2011



# Background

- **A very effective fire retardant**
- **Used widely in the construction industry**
- **It reacts to the heat and acts as a thermal barrier**
  - swells up and reflects the heat away from the underlying substance

# Setup



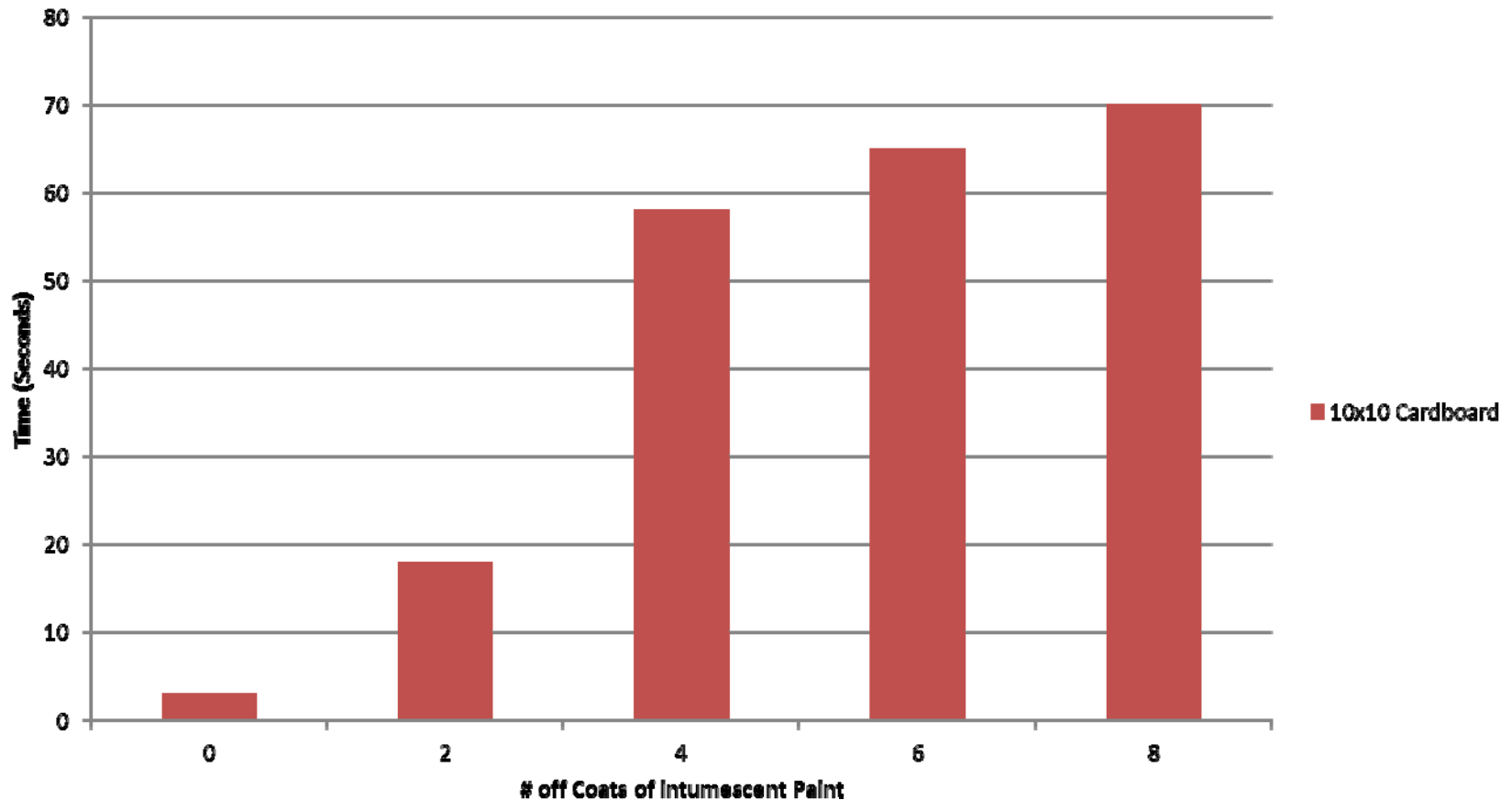
Exposed to an open flame

Coated metals and corrugated cardboard with intumescent paint

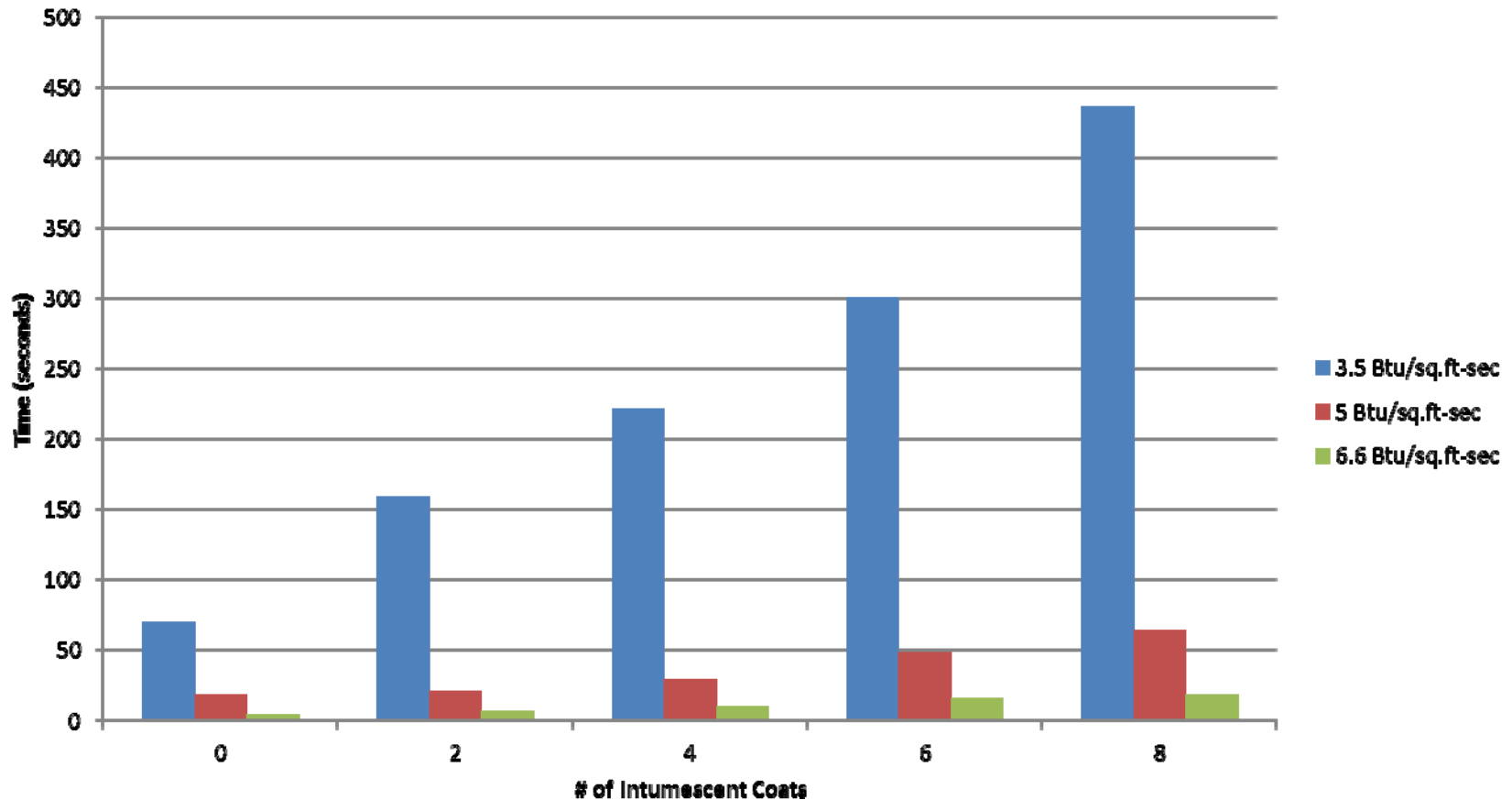


Exposed to radiant  
heat

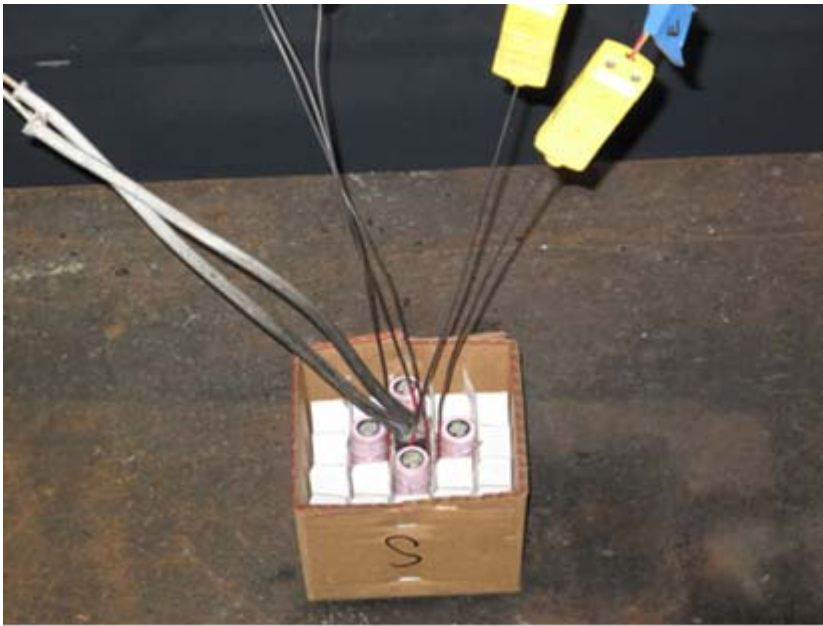
# Results From Open Flame



# Results From Radiant Heater



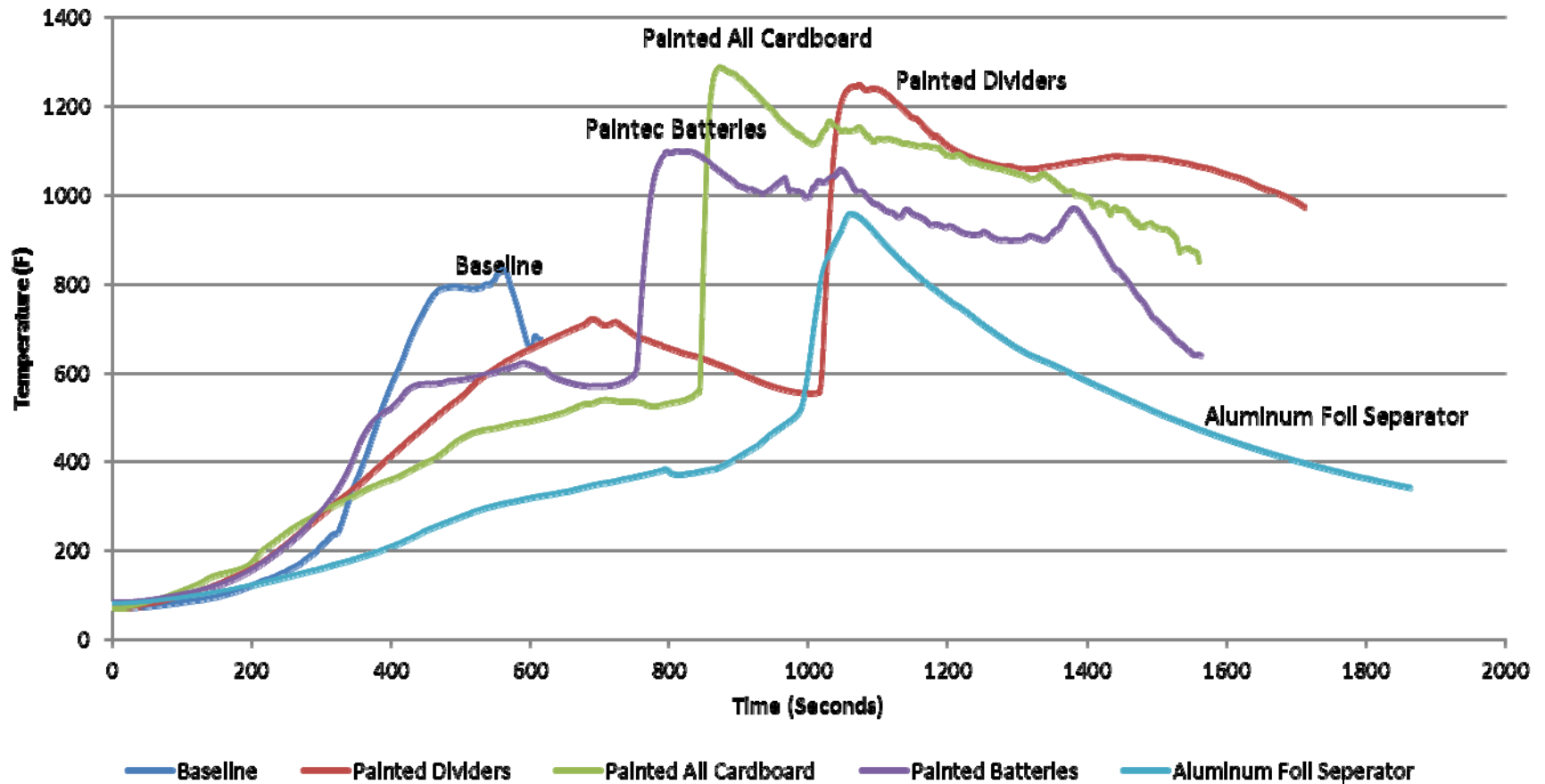
# Future Work



- **Cartridge Heater surrounded by 4 Lithium-ion batteries.**
- **Wired with thermocouples to record the temperature.**
- **Analyzed the propagation of thermal runaway using different materials as separators**

# Results

## Temperature Profile of First Battery in Thermal Runaway.



# Conclusions

- **Effectively reflects the heat with coated metals.**
- **Delays the effects of fire and heat temporarily with coated cellulose based materials.**
- **The intumescent paint only delayed the batteries from going into thermal runaway, as predicted from the tests with the open flame and radiant heat.**

