Integrated Fire Protection Systems – Update
Acknowledgements

We would like to thank

Transport Canada
The U.S. Federal Aviation Administration
The U.K. Civil Aviation Authority

for the collaboration and support given to this project since its conception
Integrated Fire Protection Systems

Overview of Concept
Integrated Fire Protection Systems

CARGO COMPARTMENTS
ICAO: “Industry and the scientific community need to redouble their efforts to find suitable replacement agents for halon in civil aircraft. In particular, a halon replacement for cargo compartments is critical.”

Halon replacement fire suppression system utilising NEA from OBIGGS and a water mist system has been shown to pass the Minimum Performance Standard FAA DOT/FAA/AR-TN05/20
Cargo Compartment
Water
Mist/Inerting System –
Achievements resulting from Transport Canada research

➢ Cargo Compartment Mathematical Model
➢ Feasibility Assessment based on comparative weights
INTEGRATED FIRE PROTECTION SYSTEM
Cargo Compartment Water Mist/NEA System

B767-300ER aft Cargo Compartment 3152 ft³
6 ASMs installed for Fuel Tank Inerting
Achievements resulting from Transport Canada research

- Cargo Compartment Mathematical Model
- Feasibility Assessment based on comparative weights
- Compilation of a Standard addressing
  - Current Relevant Airworthiness Requirements
  - Structural Integrity
  - Fireworthiness & Crashworthiness
  - System Reliability Levels
  - Health & Safety issues
  - Maintenance
Cargo Compartment Water Mist/Inerting System –

Primary Issues resulting from Transport Canada research

- The system has advantages over the current Halon systems including:
  - Environmentally friendly
  - Not time limited – operational throughout the flight but only available on ground whilst engines are running

- To date a total of 11 issues have been identified requiring resolution in order to develop the system further
Integrated Fire Protection Systems

CABIN WATER MIST SYSTEM
Cabin Water Mist System Concept

- Post-crash survivability
- In-flight cabin fire
Cabin Water Mist System Concept

AAIB Recommendation resulting from the Manchester B737 Accident in 1985: “Onboard water spray/mist fire extinguishing systems having the capability of operating both from on-board water and from tender-fed water should be developed as a matter of urgency and introduced at the earliest opportunity on all commercial passenger carrying aircraft.”

Cabin Water Mist Systems may be cost beneficial as part of an Integrated Fire protection System. They will complement fuselage burnthrough protection in accidents where there are fuselage breaks.
Cabin Water Mist System – Achievements resulting from Transport Canada research

- Compilation of a Standard addressing
  - Fireworthiness & Crashworthiness
  - System Reliability Levels
  - System Architecture
  - Maintenance
  - System Performance & Operation
  - Fire Fighting Issues
  - Effects on Occupants & Evacuation
Cabin Water Mist System –

Primary Issues resulting from Transport Canada research

➢ To date a total of 12 issues have been identified requiring resolution in order to develop the system further

➢ Perhaps the most important of which is the need to develop a Minimum Performance Standard for the system
Integrated Fire Protection Systems

HIDDEN AREAS
FIRE SUPPRESSION SYSTEM
Hidden Areas Fire Suppression
System Concept

- Distributing NEA from OBIGGS to extinguish fires in hidden areas

Diagram:
- Thermocouple
- NEA Solenoid
- Vacuum Solenoid
- CONTROL LOGIC
- Vacuum Source
- NEA Source
Hidden Areas Fire Suppression
System Concept

- Primary issue: containing inert condition in the fire area with a high airflow condition
- FAA ongoing research
Hidden Areas Fire Suppression System

Project Achievements

1. Theoretical assessment of system performance
2. System reliability requirements
3. Identification of issues requiring resolution
Hidden Areas Fire Suppression System

CUMULATIVE PROBABILITY DISTRIBUTION OF TIME TO BECOME NON-SURVIVABLE

Cumulative Probability

Time Minutes
## Hidden Areas Fire Suppression System Performance

<table>
<thead>
<tr>
<th>Aircraft Type</th>
<th>Percentage of Hidden Area Free Air Space Volume Inerted within 8 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>B737-800</td>
<td>32%</td>
</tr>
<tr>
<td>B757-300</td>
<td>22%</td>
</tr>
<tr>
<td>B767-300</td>
<td>14%</td>
</tr>
</tbody>
</table>
EQUIPMENT BAY
FIRE
SUPPRESION
SYSTEM
IFP TASK GROUP & COMPENDIUM
Integrated Fire Protection Task Group & Compendium

- An *Integrated Fire Protection System* Task Group has been formed comprising of members from:
  - Transport Canada
  - FAA
  - Boeing
  - Airbus
  - Embraer
  - UK CAA
  - Kidde Aerospace
  - Eaton Aerospace
  - Pacific Scientific
  - Life Mist Technologies
  - Meggitt Aerospace
  - AALPA
Integrated Fire Protection Task Group & Compendium

- A Compendium prepared for Transport Canada summarises:
  - Relevant Airworthiness Requirements
  - Proposed Reliability Targets
  - Proposed Standard Requirements
  - Other Issues – MPS, Crashworthiness, Fireworthiness, Health & Safety, etc
Integrated Fire Protection

➢ Thank you for your time