Lessons Learned: Case Studies of Recent In-flight Battery-related Incidents

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Overview

• Battery incident statistics
• Case study and related incidents
• Future considerations
Battery Fires

• Since February 2007, 37 battery-related incidents*
  – Four incidents since abstracts were submitted

• Location of incidents
  – Passenger cabin
  – Baggage compartment
  – Cargo compartments (cargo-only)

* FAA Battery and Battery-Powered Devices Aviation Incidents database
Battery Fires

• Battery types
  – Lithium (primary)
  – Lithium-ion (secondary)
  – Nickel-Cadmium (NiCad)
  – Others (high energy density)

• Causation of incident
  – Short circuit (internal and external)
  – In-use situations
  – Noncompliance
Battery Fires Case Study

- Jet Blue Flight 721
- Other incidents
Flight 721-Accident Overview

• Fire discovered in-flight after takeoff from JFK
• Passengers reported smoke coming from overhead bin
• Upon opening overhead bin, flight attendant noticed smoke coming from a bag
Flight 721-Crew Response

- Attendant sprayed Halon extinguisher into bin
- Smoldering continued after extinguisher was discharged
- Attendant used bottled water on bag
- Removed bag from overhead bin and stored it in lavatory
- Captain declared an emergency and returned to JFK
Flight 721-Probable Cause

- Contents of the bag
  - Two 14-volt rechargeable batteries with unprotected contacts
  - Various Li-metal batteries-AA and 9-volt
Flight 721 - Probable Cause

- Debris found inside bag determined to be remains of Li-metal 9-volt battery
- Cause determined to be thermal runaway and failure of 9-volt battery
Other Battery Incidents

- Flashlight found on fire in overhead bin of passenger aircraft
- Air purifying unit “exploded” in terminal
- Battery pack within burned package found during unloading
- “e-Cigarettes” found after crew alerted to a fire by warning light
- Flashlight overheated in crew carry-on
Conclusion

- Out of the 34 aircraft-related incidents
  - Passenger-9
  - Baggage-6
  - Cargo-19
- Lithium/Lithium-ion batteries most prevalent type; however all types of high energy density batteries contributed to events
- Poor handling/packaging most prevalent cause
Future Considerations

- NTSB Battery Recommendations
  - Four open recommendations
- New technologies
  - More energy density/smaller package
  - Unidentified failure mechanisms
- Continued Education
  - New rules
  - Passengers and shippers