Considerations for the safe transport of lithium batteries as cargo on passenger aircraft

Transportation of lithium batteries on aircraft

- ICAO banned the bulk shipment of lithium batteries on passenger aircraft in April 2016.
- It is not economically viable to fly freighter aircraft to all locations.

The dangers of lithium batteries

- Lithium battery have a propensity to catch fire and explode in a phenomenon known as thermal runway.
- Thermal runaway can be caused by physical damage, short circuiting, and overheating.
- The fire caused by thermal runaway in lithium batteries can be over 1000°C.
- Thermal runaway in a lithium battery is a self sustaining reaction and cannot be extinguished.
- Current aircraft fire suppression is unsuitable for the suppression of lithium battery fires.

Fire-resistant containers

- Protects batteries from external heat which would potentially cause thermal runaway.
- Sensors which alert flight crew to any dangerous temperature fluctuations.
- Can contain a fire caused by lithium batteries for long enough for the aircraft to land.

Separation and segregation

- Place a quota on the quantity of cells which can be shipped on a single flight.
- Segregate lithium batteries from other cargo to prevent propagation of fire throughout the aircraft hold.

Packaging

- Prevents propagation between packages containing lithium cells.
- Resistant to temperature change, humidity, pressure which cause thermal runaway.
- Prevents internal movement which would cause damage to the batteries.
- Prevents external damage to the batteries.

Research and development

- Lack of research in the dangerous properties of the Lithium ion batteries.
- Lack of funding.
- Lack of research on prevention.
- Solution: percentage of airline profit made on ion batteries will go to research and development

Procedures and training to mitigate risk

- Place restrictions on transporting lithium batteries only on flights which the diversion time is less than the suppression time of containers.
- Training for the correct handling of lithium batteries for all employees.
- Specific training for flight crews for emergency situation caused by lithium batteries.

Conclusion and recommendations

- The safety measures which have been presented allow for an acceptable level of safety when shipping lithium batteries on passenger aircraft.
- These safety measures make the assumption that all lithium batteries cause a potential risk of fire.
- The costs associated with the safe transport of lithium batteries outweigh the reduction in profit it will cause.