Learning from others - an update on the LIBRIS Project

or

When Sparks Fly...

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The PreLIBS/LIBRIS Projects:

- Recognise that the current generations of lithium ion technology is likely to be used in EVs for the next 3-10 years.

- Understand these safety issues.
Thermal Propagation Test

• New developments from the Chinese Standards

• Key Requirement:
  • Alarm of a ‘thermal event’ 5 minutes before the event impacts upon the passenger compartment
Thermal Propagation Test

• Reliable detection of an event

• ‘Managing’ the event for 5 minutes

• Developing a testing strategy to reliably put a pack into thermal propagation, according to the standard specifications
Gas Generated

- Quantity
- Identity (real time)
How to quantify cell failure

- Flame height/duration
- Forces generated
- Pressure
- Outcome on the cell
Four types of cell failure: 1

Smoke and fume, little or no flame
Four types of cell failure: 2

Jet flame
Four types of cell failure: 3

Fireball - jellyroll ejected
Four types of cell failure: 4

Complete can rupture

File: n024 100% soft initiation.mp4  Rate: 1000
Forces generated

Before

After
Forces Generated
Forces Generated
Forces Generated
Damage caused

- 2.5mm Aluminium plate, 9 cells underneath
Projectiles: Type 2 failure
Projectiles: Type 3 failure
“Standard” Fire- Blocks of cells
“Standard” Fire - Blocks of cells
Thanks to

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Conclusions

• Plenty of batteries are out there NOW, and may cause, or be involved in fires

• Fires involving batteries behave differently
  – Non-linear growth
  – Projectiles
  – Just because you see no flames... doesn’t mean the event is finished!
  – Fumes/smoke and residues?
Conclusions

• Lithium ion batteries are here
  but ...More batteries are coming!

• Big lithium batteries are here!
  but ....Even bigger batteries are coming!
For those who vape...
Current Test Facilities

- ‘Abuse test’ chamber
- Cell level charging/cycling
- ARC Calorimetry
- Realtime gas analysis
- Pressure vessel for gas quantification
- HD Video
- High Speed video and Thermography etc
Up and Coming Additional Test Facilities

- A second ‘abuse test’ chamber
- A third bigger ‘abuse test’ chamber for modules

Parts have arrived at HSE, Buxton, but due to Covid-19, they have not yet been assembled/commissioned.
Questions?

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