Sandia National Laboratories

BATTERY ABUSE TEST LAB OPERATIONAL MOTIVATIONS

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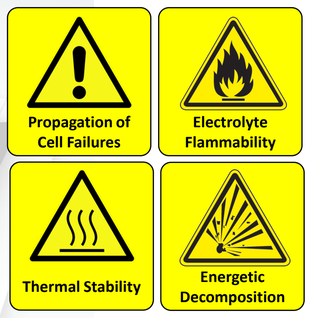
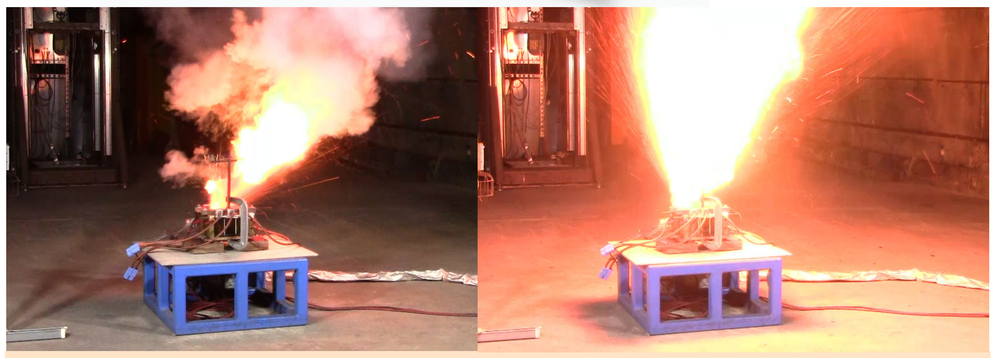
Importance of Safety Testing

All stored energy carries inherent risk. It is critical to understand the safety characteristics to mitigate the risks (likelihood/impact) adequately.



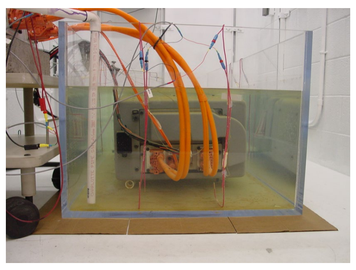


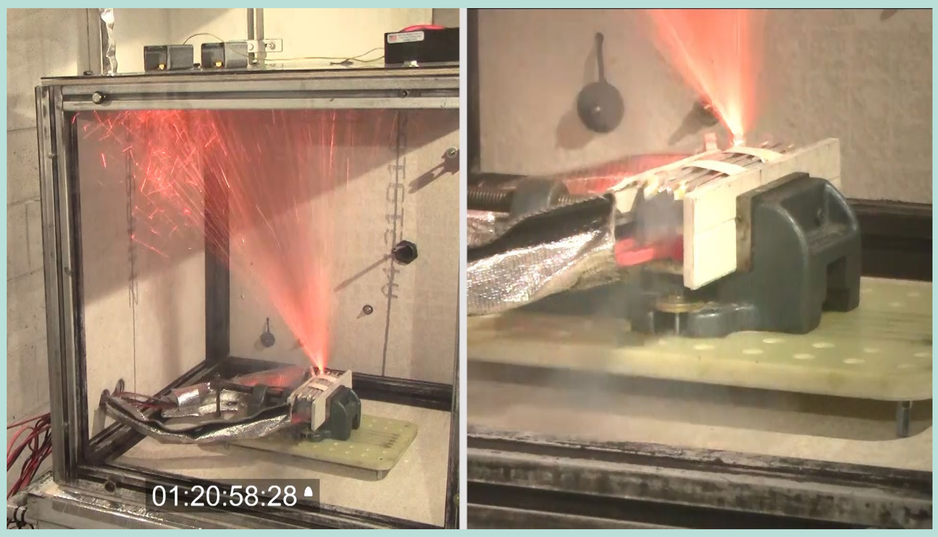
To ensure the safety and reliability of battery systems, components must be stressed to extremes to determine when and how they will fail. A manufacturer can market a product with assurance of safety and reliability only when they know the full performance envelope and failure modes.

Types of Safety Testing

Electrical Abuse

- Overvoltage/overcharge
- External short circuit
- Over-discharge/voltage reversal
- Water submersion

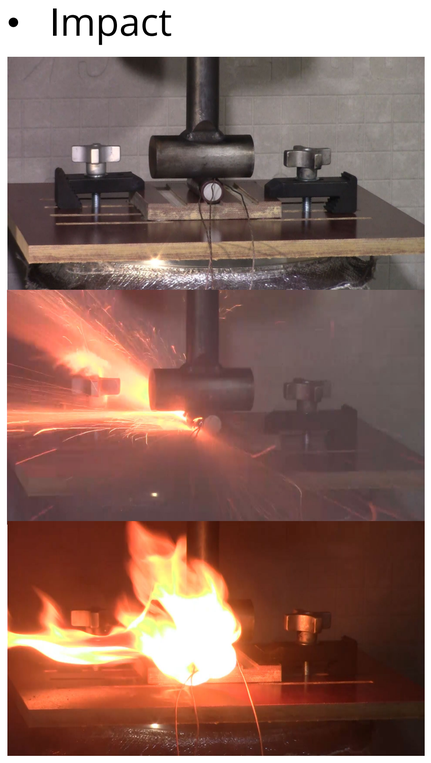




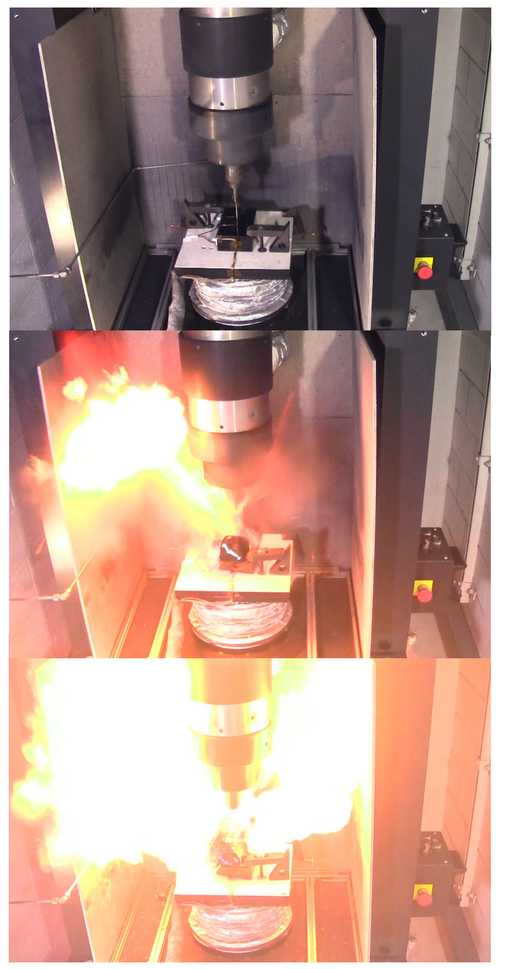
Types of Safety Testing

Mechanical Abuse

- Penetration
- Crush
- Indentation
- Impact

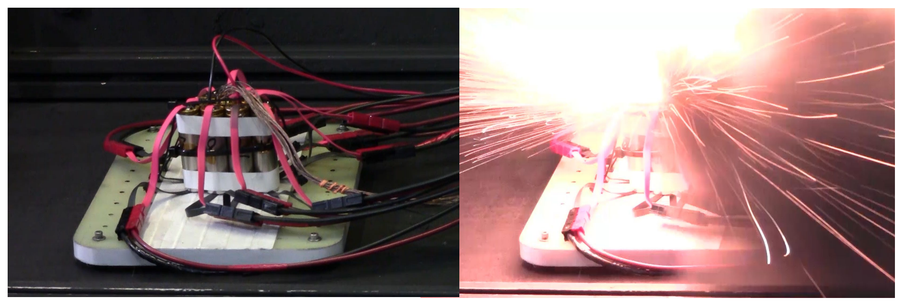


- *Up to 125,000 lbf*
- *Base-mounted actuator*
- *10” stroke*
- *Max speed = 5 mm/sec*



Thermal Abuse

- Over-temperature
- Flammability measurements
- Thermal propagation
- Calorimetry



Accelerating Rate Calorimetry continual heat-wait-seek procedure measures the onset of exothermicity in a semi-adiabatic environment and follows the sample as the temperature increases.

36L stainless steel pressure vessel with custom header and data acquisition feed-throughs for measuring pressure and energy release during thermal runaway.

Large Scale Burnsite

- Facility in remote location in Lurance Canyon
- 20,000 cubic feet of interior space
- Construction and design suitable for large scale battery abuse testing (25kWh Li-ion)
- Currently expanding capabilities for testing capability up to 100kWh

U.S. DEPARTMENT of ENERGY
National Nuclear Security Administration

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