SAND2014-3522P

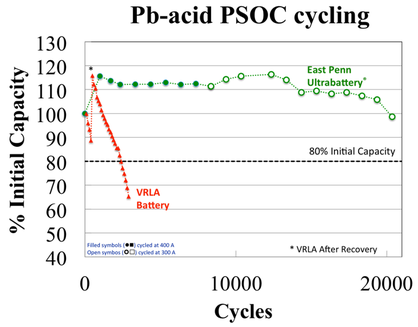
Exceptional service in the national interest

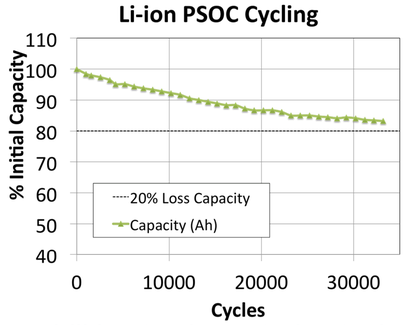
Sandia National Laboratories

Applications to Grid Storage for High Precision Coulombic Efficiency Measurements

Advantage & Differentiation

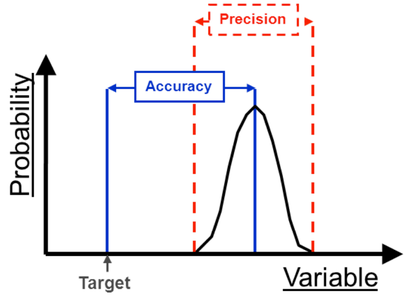
Grid Storage Motivation for High Precision

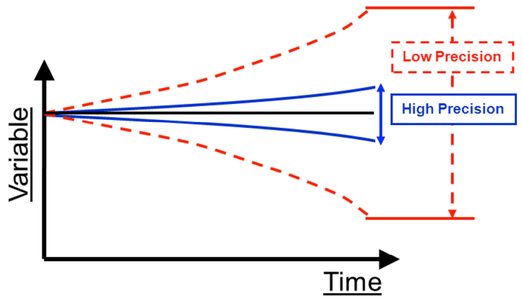




Long cycle life necessitates prognostic capabilities to characterize technologies

Precision vs. Accuracy



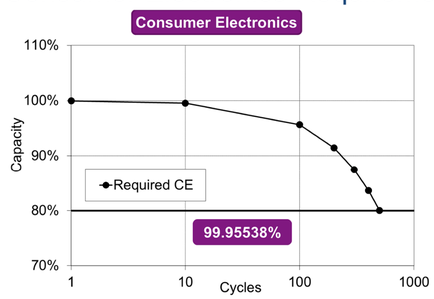


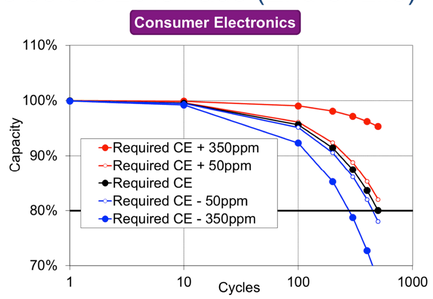
High Precision Example: 200A & 0.04A Precision → 0.02% or 200ppm Precision

Coulombic Efficiency (CE)

$$C.E. = (e\uparrow - \downarrow out\uparrow / e\uparrow - \downarrow in\uparrow) \times 100\%$$

Consumer Electronics Requirement: 500 cycles before 20% Fade (End-of-Life)





Technology

Performance Targets

Metric		Tester Precision		
		SOA	#1 Target	#2 Target
Coulombic Efficiency	*ppm*	349	150	50
Voltage	*ppm*	200	100	25
Current	*ppm*	200	150	50

Project Focused on Automotive & Stationary Relevant Currents of 200A

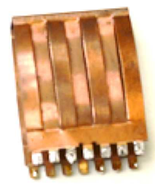
Project Cycle

❶ Design

Specifications
- Voltage
- Current
- Time
- Auxiliaries
- . . .

100mA Prototype

❷ Build

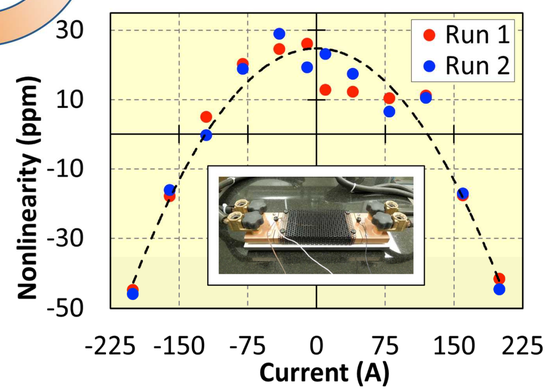


Shunt

Tester #1

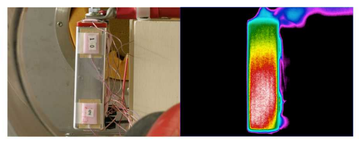
Iteration

❸ Calibrate



❹ Validate

Thermal Study



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National Nuclear Security Administration

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