



***Updates & Capabilities  
2015 Q1***

## Battery Innovation Center Vision

BIC is a non-profit, public-private partnership joining leadership from academia, industry, and government to rapidly develop, test, and commercialize the next generation of safe, reliable, and lightweight energy storage systems.

**Industry Partners:** Duke Energy, UL, Cummins, AeroVironment, Eaton, Eagle Picher, SAIC, TSC, MEGTEC, Stimulus Engineering, Enterscape

**Academia Partners:** Purdue University, Penn State University, Indiana University, IUPUI, Rose-Hulman Technical Institute, Warwick University (UK)

**Government Partners:** Naval Surface Warfare Center (NSWC) Division Crane, Special Operation Forces-Consortium (SOF-C) Indiana Economic Development Corporation (IEDC), US Department of Commerce EDA

## Critical Features

1. Catalyze technologies by reducing long, expensive innovation-to-commercialization development cycle
2. Focus on real technological advancement rather than responding merely to urgent revenue as non-profit
3. Does not hold patent rights, removing barriers on partnership with for-profit, academia, and government
4. Generate reliable data using common techniques & equipment in IP-secure, US-based facility

## Core Offerings

- Low volume cell manufacturing
- Full suite of test & evaluation capabilities
  - Cells
  - Modules
  - Packs
  - Transportation and Stationary Systems
- Certification
- Consulting
  - Pack / System design
  - BMS
  - Competitive analysis

# Advanced Energy Systems Testing and Validation Capabilities



## Cell and Pack Manufacturing

- 1% Humidity Dry Room & 10,000 Class Clean Rooms
- Commercial quality cell manufacturing equipment for multiple cell formats
- Short pulse laser lab for welding, cutting, surface morphology
- Pack design and assembly equipment



## Battery System Testing and Evaluation

- Full spectrum of T&E equipment for up individual cells up to whole systems of 1MW+
- Access to environmental and abuse testing facilities at NSWC Crane that include more than \$150M in hardened test labs



## Microgrid Systems Testing

- Utility scale grid simulator
- Integrated solar and wind renewables on site
- Residential, community, and grid energy storage systems on site
- Facility designed with access to over 6MW of available power with net metering (MISO High Voltage Node)



# Microgrid Capabilities



Solar Array with Integrated EV Charging



Large Grid Storage Device (approx. 1MW)



Low Velocity/High Efficiency Wind Turbines



Facility Designed with Access to over 6 MW's of Available Power (MISO Energy HV Node)



Integrated Power System (IPS) Supporting Solar and Wind Data Collection and Remote Management

# Li Ion Prototype Manufacturing Capability



1 Ton Press

1% Humidity Dry Room & 10,000 Class Clean Room



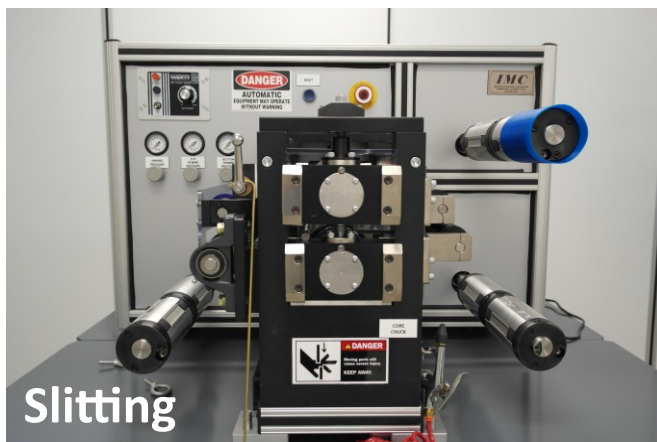
Coating and Drying



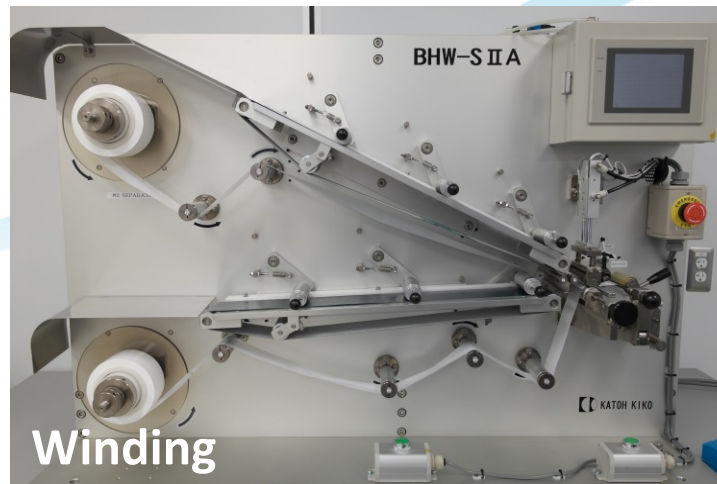
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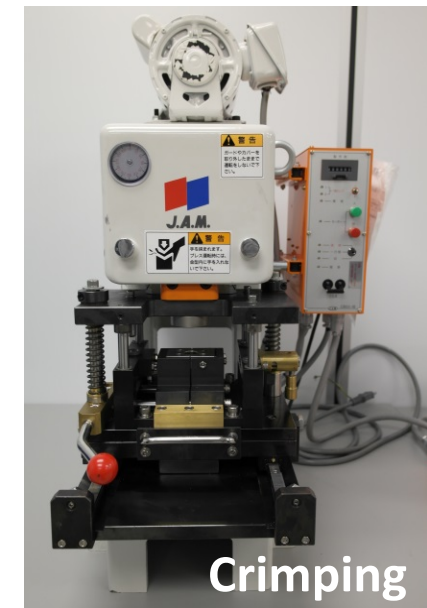
Filling



Slitting



Winding

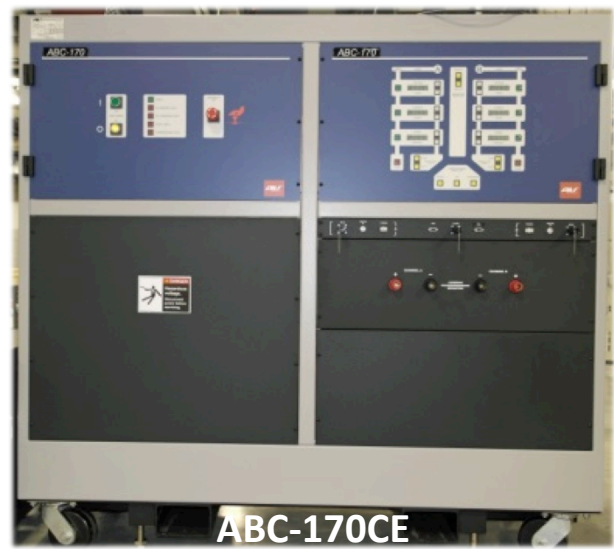


Crimping

# Critical Testing, Evaluation and Consultation for Energy Storage Solutions



**MT-30**  
Module Testing



**ABC-170CE**  
Pack Testing



**AV-900**  
Battery/Array Testing



**Altitude Testing**



**Humidity Testing**



**Thermal Cycling**

# Highlights: A Bright Future



- **Named a US Dept of Commerce Proof of Concept Center**
  - One of 12 in the US and only center focused on energy storage
  - Included a \$1M grant



- **UL agreement** announced in February
  - exclusive test center for all UL's large format testing to BIC
  - quoting work now; implementation anticipated in June
  - Positions BIC as a certification / standards body

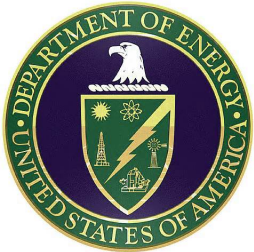


- **Crane proximity:** when combined with Crane's extensive test & evaluation (T&E) capabilities, offers broadest T&E capability in the USA, if not the world

# Highlights: A Bright Future



- **TBA grant** for microgrid simulation
  - signed 2/25; announcement scheduled for week of 3/30
  - will build 5 microgrids; 2 to be located at schools
  - Supplier identification and RFQ in process
- **4 Federal grant applications** recently submitted with Purdue University and private industry partners
- **Reman Bus certification** bid would utilize industry-first test protocol for remanufactured hybrid systems
  - Awaiting final funding source identification





For more information on how BIC can be your trusted partner and resource, please contact:

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