



CONSORTIUM FOR
**BATTERY
INNOVATION**

CENELEC
EUROPEAN COMMITTEE
FOR ELECTROTECHNICAL STANDARDIZATION

**DCA & Heat
goes live again**

Workshop on **Automotive Lead Battery Advancements (ALBA)**

12-13 July 2022

Bergamo, Italy

The *Consortium for Battery Innovation* (CBI) in collaboration with *European Committee for Electrotechnical Standardization* (CENELEC TC21X WG3) are holding a workshop bringing together global technical experts from the advanced lead battery and automotive industries.

Three live editions of “**DCA & Heat**” **workshop series** have enabled technical in-depth discussions about hot research topics among the automotive battery industry, their suppliers and customers, and research institutes (Kloster Eberbach 2017, Alcalá de Henares 2018, Bruges 2019). During the travel-restricted pandemic years, two online editions and several content-related experts working groups have kept this spirit. We are excited to announce a new face-to-face edition of this workshop series – under a new name that reflects the widened scope of topics as it evolved over the past 5 years.

This year’s event will address the following topics:

- New **durability test methods** for shallow-cycle life, high-temperature endurance, and float charging of automotive batteries
- New requirements and test method development for **12V auxiliary** (automotive non-starter) batteries, including pulse power, rechargeability and peak voltage absorption
- **Mechanisms and morphology** limitations for charge acceptance – on time scales ranging from seconds (DCA) to hours
- **Test cells and cell testing** – open exchange about laboratory methods, this year with a special focus on high-temperature tests and truly recombinant AGM cells
- **Functional Safety** – new requirements *versus* state of the art for battery design and process quality, supporting battery diagnostics, commodity and aftermarket concepts
- Inhomogeneous and sudden **failure mechanisms** and their impact on vehicle reliability: cell defects (“shorts”), open connections, icing, etc.

Compact plenary talks will expose up-to-date material on each of the topics to all participants. In subsequent break-out sessions, each participant will have the opportunity to discuss in depth two of the topics (A or B or C) and plan collaborative work streams associated with them.

CBI will also hold a Battery Academy on 11-12 July and the European Technical Workshop on 14 July at the same location. We are looking forward to meeting you in person this summer in Italy!

Tuesday 11:00

Interactive wrap-up of DCA&Heat workshops since 2017, with buffet lunch

Tuesday 12:45 & 15:10

Technical Session 1: plenary talks & break-out discussion

Wednesday 14:40 – Coffee break

| 1A AUX battery requirements & tests | |
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| <ul style="list-style-type: none">➤ Toward a new IEC standard for 12V batteries that are not (only) starter batteries➤ Charge acceptance: Can we accelerate SOC recovery?➤ 12V pulse-power characterization: mapping methods and a new standard test | <p>Luca Brisotto, <i>Exide</i> Stuart McKenzie / Shane Christie, <i>ArcActive</i> Bernd Engwicht, <i>EastPenn Manufacturing</i> Eckhard Karden, <i>Ford</i> Sosuke Fujita, <i>BAJ</i> Roberto Aliberti, <i>Flamm</i></p> <p>moderator: Torsten Hildebrandt, <i>Clarios</i></p> |
| 1B Understanding inhomogeneous and sudden failures | |
| <ul style="list-style-type: none">➤ Real-world statistics: How frequent are non-classical failures?➤ Facts and misperceptions about shorts and cell defects: Only predictable failures?➤ Open connections and broken welds:➤ Electrical investigations during ice-crystal formation | <p>Ian Wolfe / Bernd Engwicht, <i>EastPenn Manufacturing</i> Sylvain Angoujard, <i>Clarios</i> Christian Mondoloni*, <i>Stellantis</i> Helmut Diermaier, <i>Banner</i> Yukiyasu Nagata* / Eckhard Karden, <i>Ford</i> Begüm Bozkaya, <i>CBI</i></p> <p>moderator: Bernd Engwicht, <i>EastPenn Manufacturing</i></p> |
| 1C Test cells and cell testing - best practices | |
| <ul style="list-style-type: none">➤ Key parameters and solutions for representative AGM test cells➤ Experiences with high-temperature cell testing➤ Exhibits of test cell designs➤ Next version of the CBI cell-test manual | <p>Paul Everill, <i>Black Diamond</i> Matt Raiford, <i>CBI</i> Shane Christie, <i>ArcActive</i> Shawn Peng, <i>C&D Trojan</i> Sophia Bauknecht, <i>TU Berlin</i> Nate Leibensperger, <i>EastPenn Manufacturing</i> Daniel Charles, <i>Hollingsworth & Vose</i> Abderrezak Hammouche, <i>Clarios</i></p> <p>moderator: Matt Raiford, <i>CBI</i></p> |

Tuesday 16:30

Automotive Battery Application Trends

- Safety and reliability requirements for 12 V auxiliary batteries
*Christian Mondoloni** and Alexis Riera, *Stellantis*
- Diagnostics for 12 V batteries in ASIL applications: A generic approach for interfaces and verification
*Egbert Lodowicks** and Rolf Naumann, *Audi*
- Suggestions for joint test activities on battery durability in new vehicle architectures
*Yukiyasu Nagata** and Eckhard Karden, *Ford*
- The talks will be followed by a plenary discussion.

* presenting by video link with extended plenary Q&A

Tuesday 18:45 – 20:00

Bergamo tours

BUS

Conveniently Città Alta

- Bus ride (30 min) uphill to Colle Aperto
<https://goo.gl/maps/46e9z3jCsViVy7oEA>
- Historical tour through Bergamo Alta = ancient city centre upon the hill (45 min)
- with professional guides
- Bus ride (1 km) to the restaurant



WALK

Città Bassa & Città Alta

- group walk through Bergamo Bassa = 18th – 21st century downtown, views from Via Sant’Alessandro (30 min, uphill +88 m)
<https://maps.app.goo.gl/D9bfYe7vU8ZNCli6>
- group walk through Bergamo Alta = ancient city centre upon the hill (45 min)
- with local battery experts
- Bus ride (1 km) to the restaurant



Buses and walking groups depart at 18:45 sharp in front of both NH hotel and Best-Western Capella d’Oro. Please arrive a few minutes earlier.

Should you miss the tours, you may

- walk on your own, or
- take city bus line 1 from across each hotel to viale delle Mura 40 / Porta San Giacomo and walk your own way through Bergamo Alta

Buses for all to the restaurant depart at 20:00 from Colle Aperto, <https://goo.gl/maps/46e9z3jCsViVy7oEA>

Tuesday 20:15 – 23:00

Dinner

Restaurant Il Pianone, Via al Pianone 21, Bergamo, <https://goo.gl/maps/EHVrCwhNjNPZS8H2A>

After dinner, buses will be available back to the hotels.

Wednesday 8:30

Report-out from Breakout session 1A,1B, 1C

Wednesday 9:00 & 11:15

Technical Session 2: plenary talks & break-out discussion

Wednesday 10:45 – Coffee break

| 2A | New durability tests |
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| <ul style="list-style-type: none">➤ Shallow-cycling durability: new microhybrid life test (MHT2)➤ High-Temperature Endurance test with improved field correlation (HTE = nKLT)➤ Float life for automotive batteries, charging strategies for 12V batteries in electric vehicles | <p>Torsten Hildebrandt, <i>Clarios</i> Egbert Lodowicks*, <i>Audi</i> Jonathan Wirth, <i>BatterieIngenieure</i> José Otávio Peroba, <i>Moura</i> Eckhard Karden, <i>Ford</i> Thomas Spinks* / Thomas Verghese*, <i>Energys</i> Sylvain Angoujard, <i>Clarios</i></p> <p>moderator: Luca Brisotto, <i>Exide</i></p> |
| 2C | What Functional Safety means for 12V batteries |
| <ul style="list-style-type: none">➤ Safety concepts overview➤ Voltage stabilization: peak current absorption➤ Design and process controls to assure reliability against sudden faults➤ Dynamic performance testing to support robust & generic battery diagnostics | <p>Bernd Engwicht, <i>EastPenn Manufacturing</i> Eckhard Karden, <i>Ford</i> Luca Brisotto, <i>Exide</i> Alexis Riera*, <i>Stellantis</i> Rolf Naumann*, <i>Audi</i></p> <p>moderator: Geoffrey May, <i>Focus Consulting</i></p> |
| 2B | Mechanisms and morphology limiting charge acceptance |
| <ul style="list-style-type: none">➤ NAM-structure characterization with regard to DCA memory effects➤ From seconds (DCA) to minutes – will we need to improve PAM chargeability next?➤ Investigations on oxygen reduction as driver for sulfation | <p>Paul Everill, <i>Black Diamond</i> Ian Wolfe, <i>EastPenn Manufacturing</i> Shane Christie, <i>ArcActive</i> Eberhard Meissner Benjamin Hübner, <i>Moll</i> Begüm Bozkaya, <i>CBI</i></p> <p>mod.: Nadine Dehnert, <i>Clarios</i> & Shawn Peng, <i>C&D Trojan</i></p> |

Wednesday 12:30 – Buffet lunch

Wednesday 13:30 & 14:00

Report-out from Breakout session 2A,2B, 2C

Closing Discussion: Feedback & next steps

Wednesday 14:30 – Coffee break

Wednesday 15:00 – 16:30

Interactive discussion of new test results from CBI members & projects

- In-operando Neutron Diffraction Studies of the Charge/Discharge Processes inside the Positive Electrodes of Commercial Batteries
Angel Larrea, *INMA*, [Jesús Valenciano](#), *Exide*, et al.
- Correlation between EIS parameters and DCA, considering NAM composition and memory effect
[Sophia Bauknecht](#), Julia Kowal, *TU Berlin*

* presenting by video link with extended plenary Q&A