

EUROBAT e-Mobility Battery R&D Roadmap 2030

Battery Technology for Vehicle Applications

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27 October 2015
Press Club Brussels

ADVANCED LEAD-ACID BATTERIES: TECHNICAL ROADMAP

- The European battery industry is the established global leader of advanced lead-based battery technologies (AGM, EFB) for start-stop vehicles
- EUROBAT members sold more than 13.5 million advanced lead-based batteries within the EU in 2014 (25% of the market)
- With the projected mass-market roll-out of start-stop vehicles the global demand will grow up to 59 million units by 2024
- Exports from the EU increased significantly over the last five years



ADVANCED LEAD-ACID BATTERIES: PRIORITY AREAS TO IMPROVE TECHNOLOGICAL PERFORMANCES

Battery chemistry development

- Improving the conductivity with new additives to the active material (carbon nanotechnologies)
- Increase of charge acceptance with high surface doping material
- Low-cost catalysts – to recombine hydrogen and oxygen produced at regenerative brake events

Advanced Battery design

- Lighter-weighting solutions – the use of lighter materials as a conductive substrate (Cu, Al, C, etc.)
- Enhanced energy and power density (e.g. bipolar and spiral wound designs)



ADVANCED LEAD-ACID BATTERIES: PRIORITY AREAS TO LOWER COST

Material

- Use of high-volume cost-optimized carbon materials as additives
- Increased usage of secondary materials (lead and polypropylene)

Process

- Development of fully automated processes for new advanced designs (e.g. bipolar, spiral wound, ultra)

Design

- Optimization of battery design for end-of-life recycling and remanufacturing



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ADVANCED LEAD-ACID BATTERIES: PRIORITY AREAS TO IMPROVE SYSTEM INTEGRATION

Advanced thermal solutions

- Enabling a wider range of operating conditions with constant temperature loads up to 60°C and beyond for the battery, with reduced system complexity

Battery management systems

- Electronic devices to adjust the state of charge to real working conditions



ADVANCED LEAD-ACID BATTERIES: PRIORITY AREAS TO OPTIMISE PRODUCTION PROCESS

Process Optimization:

- Batch-wise paste mixing converted to a continuous process
- Reduction of plate production process time of >24h by using nano-additives to avoid long curing times
- Closed-loop formation with electrolyte recirculation system to reduce the total process time by 2/3



ADVANCED LEAD-ACID BATTERIES: PRIORITY AREAS TO OPTIMISE SAFETY PARAMETERS

- All lead acid batteries are using a non flammable electrolyte
- Further increase of the security level by stronger use of VRLA batteries (AGM, gel):
 - No acid spillage in case of a crash by absorbed liquid in gel or glass mat
 - No oxyhydrogen gas release due to internal recombination



At present VRLA technology introduced mainly in premium vehicles

ADVANCED LEAD-ACID BATTERIES: PRIORITY AREAS TO DEVELOP RECYCLING PROCESSES

- Closed-loop recycling system established in the EU
- Nearly 100% recycling rate, higher than any other mass-market consumer product, leaving virtually no room for improvement.

From an end-of-life perspective, these sophisticated take-back and recycling schemes, as set up by the European lead-based battery industry, dramatically reduce the need for the production of additional primary lead – the most important cause of environmental impact in the life cycle of the product.



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ADVANCED LEAD-ACID BATTERIES: EUROBAT RECOMMENDATIONS

In general, EUROBAT recommends that public research into advanced lead-based batteries should retain a focus on materials research and development.

Demonstration projects for new advanced lead-based battery concepts should continue to be undertaken by the industry, through partnerships between battery manufacturers and European OEMs for commercial and passenger vehicles (as well as for two- and three-wheel vehicles) over the next decade.

As a consequence, research and innovation efforts in the EU are to be focused in order to improve performance and to lower costs for the mass start-stop vehicle market.

- Thank You -

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