

MONICA

Battery health and performance monitoring

Batteries lose inevitably capacity over time.

This phenomenon is not straightforward, many parameters are at stake and can be quite different in the field from what has been estimated at project design.

ENGIE Laborelec now offers an innovative multi-level battery service. It allows to monitor remaining capacity, evaluate performance against the supplier warranty, early detect faults, anticipate remaining useful lifetime, and take action to reduce battery degradation and improve reliability.

RAPID DEGRADATION: THE BATTERY OPERATOR'S NIGHTMARE

Rapid degradation leads to unplanned operational costs, while battery system failures could even induce safety hazards. For battery owners and operators, it's crucial that capacity degrades no faster than expected or promised by the supplier.

While it is customary to perform an offline capacity test each year, this hardly puts operators at ease. They would always prefer to systematically and constantly monitor batteries, so that action can be taken before problems occur.

MONITORING BATTERY HEALTH AND PERFORMANCE

ENGIE Laborelec has developed a service called MoniCa, which can continuously evaluate battery health, remaining capacity and performance. Assessment is based on automated analysis of the battery's operational data involving the calculation of a set of primary KPIs for each of the battery system's banks. Deeper analysis at string or module level is also offered as an option, along with advice on how to reduce performance degradation.

BENEFITS

- **Preventing failures and unplanned maintenance**
Systematic monitoring allows faults to be detected at an early stage, preventing costly battery system trips and unplanned maintenance interventions.
- **Claim warranty service**
Systematic vendor-independent monitoring and analysis allows actual battery capacity and performance to be assessed over time and checked against the warranty provided by the supplier.
- **Extending lifetime**
Smart analysis of operational data permits targeted action to reduce battery degradation and extend its lifetime.

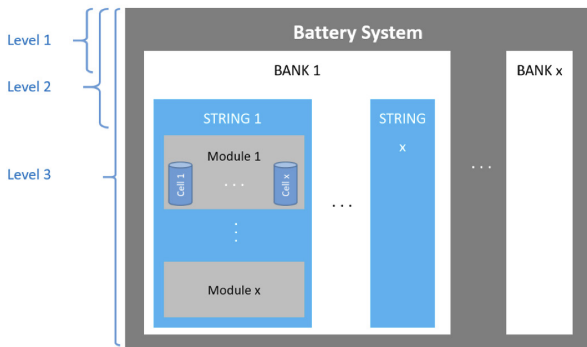


HOW IT WORKS

THREE-LEVEL SERVICE

The MoniCa service comes in three different levels with an incremental degree of detail.

- LEVEL 1 - Capacity alert**
 An automated monthly health and performance report for each battery bank is generated. The report, with KPIs, includes the battery's actual remaining capacity (Ah), its energy level (Wh) and its state-of-health.
- LEVEL 2 - Smart operation**
 An automated operational data analysis is carried out on each battery bank and string. Analysis at string level allows early fault detection, preventing battery trips. It also identifies possible homogeneity issues, allowing targeted action such as adjusting operating parameters.
- LEVEL 3 - Lifetime watch**
 An automated operational data analysis is carried out on every battery bank, string and module. Analysis at module level means that future capacity degradation can be anticipated and allows operating conditions to be optimized leading to increased battery lifetime.



MONICA



CAPACITY ALERT

SMART OPERATION

LIFETIME WATCH

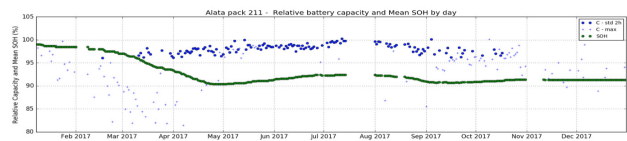
Operator concern	Is the battery within warranty?	Is the battery performing as expected?	What are the optimal operating conditions?
Monitor degradation without system stop	✓	✓	✓
Capacity warranty check	✓	✓	✓
Monitor performance deviation	✗	✓	✓
Early fault detection	✗	✓	✓
Increase operational life	✗	✗	✓
Reporting interval	Monthly	Continuously	Continuously
Historic trends	none	of all KPIs	of all KPIs
Minimal monitoring granularity	System Bank	System Bank String	System Bank String Module

HOW IS MONICA IMPLEMENTED?

Before implementing MoniCa, we look at the battery's operational data, ensuring all the required data are available and useable. Then we define whether data will be extracted periodically or continually and transfer them to the ENGIE Laborelec MoniCa platform.

With the data in place, MoniCa carries out the analysis, selecting appropriate time intervals and identifying relevant events to derive accurate operating and ageing information.

The MoniCa reports are made available for the battery operator via a web portal or API. ENGIE Laborelec will provide advice on how to optimize the battery operating conditions within the limits of freedom offered by the battery system.



The graph above shows the evolution of the capacity and the SOH determined by MONICA during 1 year.

WOULD YOU LIKE TO KNOW MORE?

Please feel free to e-mail us.

ENGIE LABORELEC

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ADDED VALUE

- A user-friendly web portal**
 KPIs and monitoring results are displayed via a user-friendly web portal or API.
- Valuable multidisciplinary experience**
 ENGIE Laborelec has extensive field experience in implementing and monitoring battery solutions from a wide range of vendors and cell manufacturers. Specialized lab equipment and an expert electrochemical and electrotechnical team are on hand.