MUNICH BATTERY LAB

a joint project by

VISPIRON SYSTEMS

TWAICE

YOUR TEST LABORATORY FOR BATTERY CELLS

PRODUCT CATALOGUE

TESTING INNOVATIVE BATTERY TECHNOLOGIES

Through the rapid electrification of items in our everyday lives, the storage capacity of batteries as well as their behavior during lifetime is becoming the center of attention.

With the MUNICH BATTERY LAB (MBL), VISPIRON SYSTEMS and TWAICE offer a way to test and verify battery cell technologies for their intended use case scenario. Our laboratory infrastructure is suited for testing lead-acid, nickel-metal hydride, lithium-ion and solid-state cells of any type.

The testing of electronic components as part of the product development process has been part of the VISPIRON SYSTEMS portfolio for many years. Based on these experiences and in cooperation with TWAICE, the MBL was planned and built from scratch which guarantees an ideal test setup. All the tests will be performed within the given operating specifications to ensure the safety of materials and employees.

We pursue an agile project management approach to offer maximum transparency and a quick response time to changes or deviations. From individually defined test specifications and short feedback loops to a comprehensible final report, we always think solution oriented to achieve the highest customer satisfaction.

Dr. Jan Singer
Engineering Manager
TWAICE Battery Research Center

Manuel Kroh
Business Development Manager
VISPIRON SYSTEMS GmbH

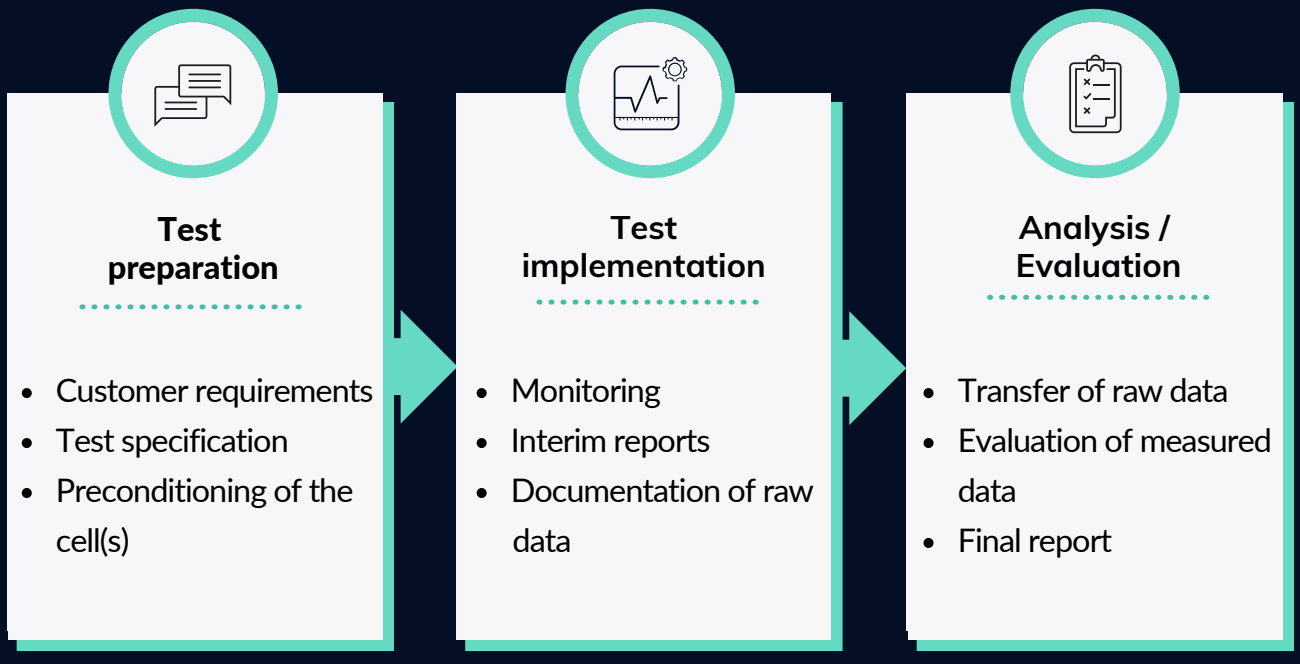
PRODUCT CATALOGUE

Consulting and preparation

Depending on the customers' requirements, a suitable test methodology and test environment conditions are derived. Regarding test case definitions, we can take over existing test specifications or elaborate them in cooperation with the customer. The tests will be carried out in accordnance to industry standards and fully automated. As VISPIRON SYSTEMS we can guide you through the entire process, if desired from the preparation of the test specification to the interpretation of the test results.

Test planning and execution

Before starting a test, each cell is preconditioned and the relevant measurement parameters are defined, such as current dynamics, temperatures, etc. Furthermore, after translating the chosen charge and discharge profiles into our SW, they will be simulated with a very high accuracy. During the test run, the global safety limits and the test progress are permanently monitored.



Examples of test areas:

- Cyclic / calendar service life qualification
- Performance and power tests
- Resistance (surface / contact)

PRODUCT CATALOG

Testing and analysis from a single source

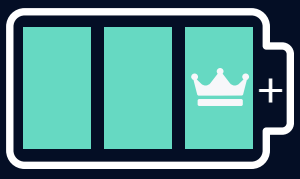
In addition to testing battery cells, we also offer the evaluation of the measured data:

Battery testing in three variants

In general we provide three solutions for testing batteries. Depending on your scope, we are able to test already defined test specifications, provide support in developing the test specifications, or take over the entire test planning. Transparency is ensured at all times for all variants.

Basic
We perform tests according to defined test specifications.

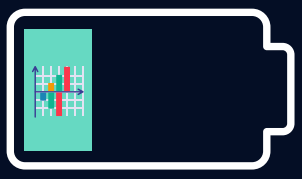
Premium
Already defined test specifications are checked by our experts in order to identify optimization potentials.



Premium Plus
Based on customer requirements, we develop test specifications.

Analysis for simple and clear statements

Besides gathering measurement data, we also offer to take over the data evaluation for you - either partial or completely. For the latter, our experts interpret the data with regard to your individual testing scope and provide a visual overview.



Basic
You receive raw data from us, irrelevant measurement data is removed.

Premium
The raw data is also prepared visually.

Premium Plus
We evaluate your data with regard to individual questions and provide a detailed report.

TECHNICAL SPECIFICATION

Available channels and specifications

Cell test systems used:
2 x Keysight / Scienlab SL 1007 A, 100 A

- 1 x Keysight / Scienlab SL 1007 A, 300 A

Number of channels	Max. Current per channel [A]	Max. Voltage per channel [V]
80	100	6
12	300	6

The measuring channels listed above can be parallelized to provide higher currents. When parallelizing two channels, the maximum current is doubled.

Existing air conditioning and specifications

Climate chambers used:

- 10 x Binder MK 720

Temperature ranges	- 40 °C bis + 120 °C
Spatial temperature deviation depending on set point [+- K]	0,3 - 2
Temporal temperature deviation depending on set point [+- K]	0,1 - 0,5
Mean heating rate according to IEC 60068-3-5 [K/min]	4
Mean cooling rate according to IEC 60068-3-5 [K/min]	4,5

TECHNICAL SPECIFICATION

Information on the existing sensor technology

Measured variable	Accuracy	Measurement type / information	Sampling-frequency
Temperature	+- 1 K	4-wire, PT1000	10 Hz
Voltage	<+- 1 mV (typ. 0,5 mV)	4-wire, DC	TBD
Current and Current dynamics	+- 0.05 % (measured value) +- 0.01 % (full scale offset), depending on measuring range	Dynamic: 3 ms (10 % - 90 % of the total current)	1 kHz
Voltage, redundant	+- 0.001 % to +- 0.006 %, depending on measuring range	4-wire, DC	TBD
Temperature, additionally	+- 1 K	4-wire, PT100 / PT 1000	TBD
Resistance	+- 0.002 % to +- 2 %, depending on measuring range	2-wire/ 4-wire	TBD

TECHNICAL SPECIFICATION

Information on the existing sensor technology

Measured variable	Accuracy	Measurement type / information	Sampling - frequenc y
Capacity	0,01 % - 0,05 %, depending on measuring range	DAQ 970 A	TBD
Pressure	+- 1 kPa / 0.5 %, depending on measuring range	TBD, as required	TBD
Strain	2 % - 5 %, depending on the measuring range	TBD, as required	TBD
Electrochemical impedance spectroscopy	Cell impedance: 10 µΩ- 1 Ω Excitation amplitude: < 10 A and 1 V Absolute error |Z|: (200 µΩ) Relative error |Z|: 1 Absolute error |Phi|: 2 degrees	Galvanostatic, potentiostatic, multisinus for frequencies <= 1 Hz AC current amplitude: max. 0.5 A, Parallel connection of several channels also possible with EIS.	1 mHz - 10 kHz

YOUR CONTACT PERSON

MANUEL KROH

Business Development Manager
MUNICH BATTERY LAB

E-Mail:
Manuel.Kroh@vispiron.de

Telefon:
+49 (0) 176 15 29 70 08

VISIT US

You would like to visit our battery laboratory on site?
No problem.

In compliance with the currently valid COVID hygiene and visit regulations, we look forward to welcoming you to our site.

Here you will find the directions.

www.vispiron.systems/munich-battery-lab