CRITT M2A

NEWSLETTER NR.37

MAY 2022

IN THIS ISSUE

Get to know our new R&D Manager

We are very pleased to introduce **Clément Vandingenen**, who joined **CRITT M2A** as **R&D Manager.**

Its mission is to ensure technological watch, coordination and monitoring of R&D subjects, finance file building, external communication and R&D team management.

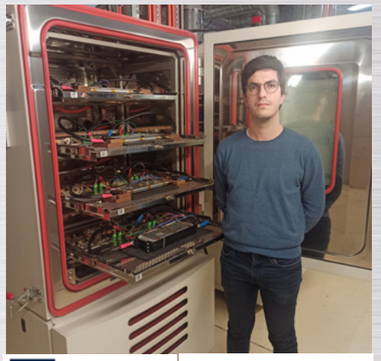
"*I joined CRITT M2A as R&D manager in order to continue current research topics and develop new ones using the company's many resources and skills. The numerous test facilities available, the teams expertise as well as their ability to innovate and adapt to changing mobility are strong assets that led me to join CRITT M2A".*

Energy transition being one of the major challenges for the years to come, R&D and innovation is at the heart of CRITT M2A's strategy.

CRITT M2A will continue invest in R&D with new projects to ready to start.

Ph.D. Battery thesis

We are pleased to present the Ph.D. thesis led by **Sylvain Cailliez,** since October 2019 in partnership with **LHEAA lab. (Centrale Nantes), Gamma Technologies and A2Mac1** to develop a standard methodology for testing lithium-ion (Li-ion) batteries and calibrating a battery model.



The AutoLion model, developed by Gamma technologies, is used.

It is an electrochemical Li-ion battery model that can be coupled with powertrain and cooling libraries to create a complete vehicle model.

This model can be then used to optimize the energy management of battery packs in order to improve the autonomy and lifespan of battery electric vehicles.

The battery global behavior involves three different physical phenomena that interact with each other:

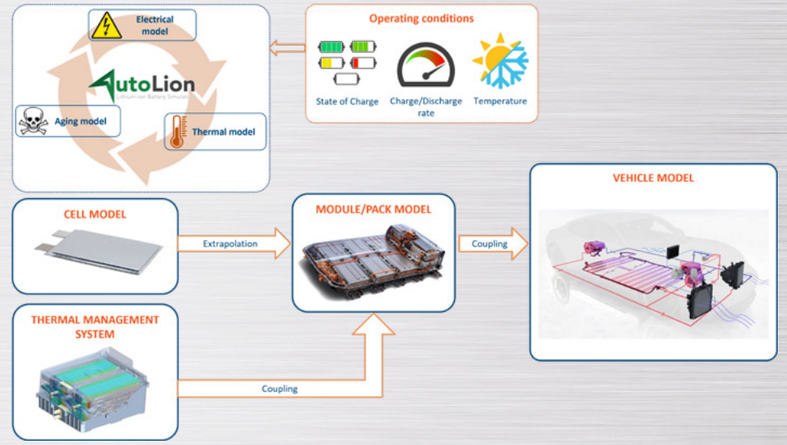
- **Electrical**: based on three standard tests: open circuit voltage, constant current discharges and HPPC (Hybrid Pulse Power Characterization). Voltage and temperature are recorded to calibrate the AutoLion model.

- **Thermal**: involves identifying the battery thermal parameters (heat capacity and anisotropic thermal conductivities) by calibrating a thermal model with the experimental temperature data.

- **Aging** : The battery suffers from multiple aging mechanisms throughout its use. They can be classified into two categories: calendar aging (rest condition) and cycling aging (active use). The calendar aging depends on the battery SoC and temperature.
The cycling aging is characterized by successively discharging the battery. Hot and cold cycling are considered, as they involve different aging phenomena. Regular check-ups record the evolution of the battery capacity and electrical resistance to calibrate the aging models.

Each behavior is separately investigated with a specific test campaign and Several operating conditions are considered (State of Charge (SoC), charge/discharge rate,temperature.

Batteries require a significant development period to fulfil the requirements from EV manufacturers and **CRITT M2A** has skills and high tech test means to meet them.



Oecte project

Fully invested in new developments of the electric powertrain, **CRITT M2A** has been involved in the **OECTE project** for more than a year as part of **France Relance program**.

CRITT M2A set up a methodology for modeling and tests to optimize the energy management and reliability of electric traction chains.

A 320kW inverter bench is being finalized and is already operational in its standard configuration. A climatic chamber was added to put an inverter in hygrometry and temperature conditions.

Development:

- The modeling of electric motor failures applied to real-time simulation is being developed.
- The first model concerning the electrical failures of the permanent magnet induction machine is validated experimentally
- The modeling of the battery suitable for HIL simulation is being developed
- The methodology for calibrating the electrochemical and thermal models is currently being finalized.
- The communication between the test bench, provided by AVL SET, and the real-time simulation platform, provided by Opal RT, is being finalized.

Second half 2022

- Implementation of these models in the real-time simulation platform OPAL RT
- Validation on the inverter bench
- Implementation of a real-time li-ion battery model
- Development of an universal three-phase inverter based on a wide band gap component (SiC) supporting 850Vdc and up to 800A.

This inverter will be used for the development of control laws for induction machines or permanent magnet synchronous machines.

New partnership

CRITT M2A is entering into a strategic partnership with **EIT InnoEnergy.**

CRITT M2A has signed a Memorandum of Understanding with EIT InnoEnergy France under the framework of the **EBA Academy,** a training program created by EIT InnoEnergy to accelerate the training in the battery field.

CRITT M2A, recognized as major player in battery testing, is consolidating its development in electric mobility with new projects and investments.

Strong of several years through teaching & internships with local partners, CRITT M2A is proud to announce to be a part of national and European training programs.

Training remains a strategic challenge to develop and increase battery skills for the entire industry to continue creating talents, especially for young people.

By joining the **EBA Academy, CRITT M2A** will be able to expand its training offer through e-learning platform in several sectors of activity such as:

- Calibration
- Quality
- Maintenance
- Batteries
- Etc...

For **CRITT M2A**, joining **EBA Academy** represents a huge milestone for our roadmap to increase our support for every company involved in the energy transition.

This is another step to support future gigafactories which will emerged in the close future and it consolidates our position in the battery manufacturing industry, locally with futures ACC - Automotive Cells Company and Envision AESC, and beyond.

CRITT M2A is committed to biodiversity

CRITT M2A gets a beehive! A strong act shared by the CRITT M2A teams which reinforces our CSR approach.

CRITT M2A is committed to a long-term approach to preserve **biodiversity** and be part in **protecting endangered bees**, but also to unite our teams and carry out an ambitious CSR project.

The hive was installed by the company OVA for a period of 3 years to allow bee colonies to develop.

The honey will be potted and labeled with the colors of our company. We are proud to contribute to this ecological approach and look forward to sharing our harvest with you!

Forthcoming events

08-09 June 2022: **CRITT M2A** will attend the **IBD Le Mans business convention.**

15-16 June 2022: **CRITT M2A** will attend the **SIA Powertrain & Energy congress in Rouen.**

21-23 June 2022 : **CRITT M2A** will attend the **Automotive Testing Expo,** in Stuttgart.

28-30 June 2022: **CRITT M2A** will attend the **Battery Show Europe,** in Stuttgart.

7-8 September 2022: **CRITT M2A** will attend the **LCV Conference**, in Bedfordshire

20-21 September 2022: **CRITT M2A** will attend the **Supercharging Conference**,in Dresden

18-21 October 2022: **CRITT M2A** will attend the **Batteries Event**, in Lyon

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Our subsidiaries