



## Newsletter nr.32- may 2020

### In this issue:

New skills at CRITT M2A

Innovation:  
Powering development at  
CRITT M2A

Improvements at  
the Turbocharger

Visit CRITT M2A

AGENDA

*Aware of the exceptional period we are living in and of the impact that its consequences may have on the industry, we are entering a time when confidence and solidarity must allow us to grow out.*

*Thanks to its recent or older strategic choices, the companies of **CRITT M2A** group continue their policy of partnership, development and R&D to offer new and reliable service to the various industrial sectors.*

*Although slowed down during this period, we were able to adapt set up the necessary means to guarantee our customers the minimum continuity of our services as well as a peaceful recovery for all our employees.*

*Today, we are ready to take up the new challenges imposed by this crisis. Discover in this newsletter the latest news from **CRITT M2A**, and above all, take care of yourself!*

## New skills at CRITT M2A

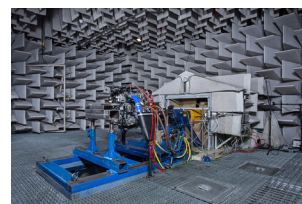
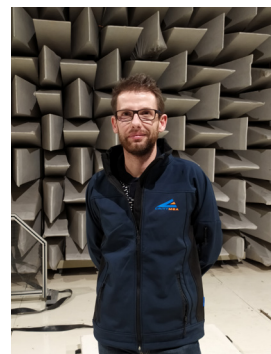
**CRITT M2A** has strengthened its team and welcomes Arnaud Plessy, the new NVH expert who joined in February. He is in charge of developing the Centre's NVH expertise.

Arnaud has more than 15 years experience in the NVH activity.

With a PhD in Mechanics specialized in NVH, he started his career in 2005 at the Mechanics and Acoustics Research Laboratory working on Airbus programs.

Then, he joined ARCELLE SAFRAN, manufacturer of aeronautical nacelles, as Structural Calculation Engineer. He was later NVH Validation Engineer at Novares, Tier-1 supplier in the automotive industry.

«I joined **CRITT M2A** on February 24, 2020 as Manager of the NVH department. The purpose is to pursue NVH expertise development by using the various energy/vehicle powertrain oriented test benches of the **CRITT M2A**, as well as more diverse issues related to acoustics and vibration».





## Improvements at the Turbocharger Department

### Electrification of turbocharger benches

For the e-turbo tests, the turbocharger test center benches have AVL e-Storage High Voltage battery simulators.

These devices simulate batteries up to 500kW, 1200V and 1200A, in the 2 operating modes, power supply and energy recovery.

**CRITT M2A** supports its customers in the development of electrified turbos, a technology likely to spread in the coming years on passenger car engines.



## Innovation : powering development at CRITT M2A

In terms of innovation, **CRITT M2A** is constantly renewing itself and now has 4 doctoral students in order to widen the field of its R&D. They play a key role and their skills open up new perspectives for research projects. During our last edition, we presented the research topics in acoustics and turbocharger. We present here the subjects of electrical and motor theses.

### Electrical thesis

The Research program **PEGAS<sup>2</sup>E** (Energy Performance, Management and Autonomy of Electrical Storage Systems) started on October 1st 2019 for four years.

This program aims to remove scientific obstacles linked to the energy optimization of batteries used for automotive propulsion.

This thesis started at the end of 2019 and is being undertaken in partnership with the **Ecole Centrale de Nantes** (through Centrale Innovation) and **Gamma Technologies**.

More specifically, the thesis aims to develop an electrothermal model of an electric vehicle traction battery from test results obtained on a Li-ion battery technology.

The electrothermal model developed should be of low complexity, with a target of integration into a bms (battery management system), while maintaining a strong link with the physico-chemical phenomena governing the behavior of the electrochemical cell.

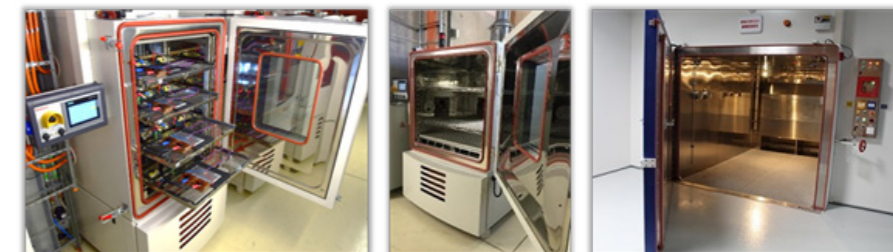


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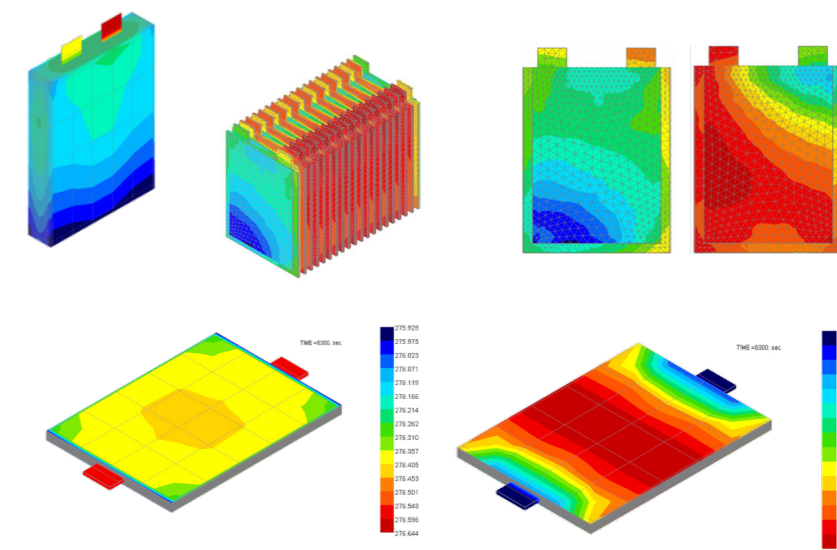
To this end, the research work will be based on an innovative work methodology and will benefit from the latest generation of battery test benches (2kW/4kW cells and 50kW modules, 250/750kW pack benches, EIS (Electrochemical Impedance Spectroscopy) as well as high-performance simulation tools.



The model will deal with managing battery pack cooling in any use case scenario of the electric vehicle. This entails understanding and optimizing the physical phenomena linked to the thermal management of the «propulsion battery» energy storage system.

From a more general point of view, it will be necessary to overcome scientific and technological challenges to improve the life of the propulsion system and the vehicle's range.

The innovation of the thesis work will be to couple this battery modeling with an energy optimization of the complete vehicle system.



### Engine thesis

Works of this PhD subject directed by the **Ecole Centrale de Nantes** are part of the context of depollution norms evolution coupled to the vehicle consumption lowering requirements.

Dynamic engine calibration remains a very important task and methods used continue to evolve so as to respond with an efficient industrial process regarding Real Driving Emissions (RDE) requirements.

Centrale Innovation



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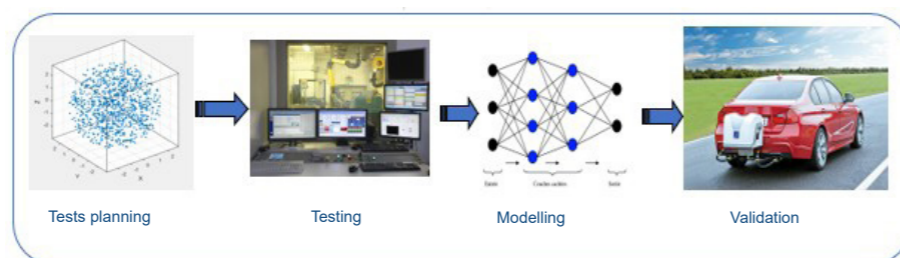




The methodology developed within this framework is based on dynamical design of experiments techniques (DoE): models take in account engine maps at the considered instant but also those of the precedent ones in order to consider past behaviour.

The model is then used to feed a technique for optimizing or fine-tuning the engine settings in order to obtain the results in the form of maps of the engine control parameters serving as a database for the control strategy loaded into the engine computer (ECU).

Ultimately, this technique should allow **CRITT M2A** to acquire additional know-how in terms of engine development in order to respond to market developments.

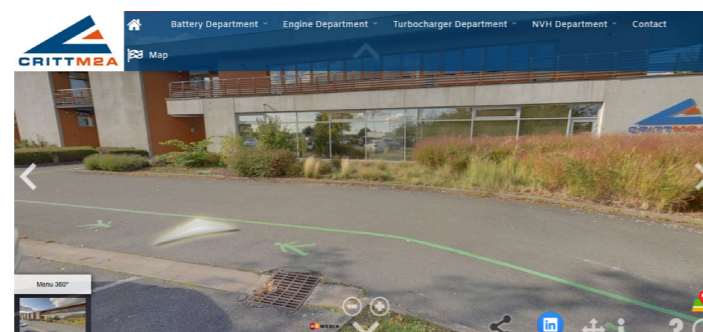


Work is focused on the activation phase, which is between the time the engine starts and the time when the aftertreatment system is primed, i.e. when the catalyst has reached temperature allowing it to be effective.

This phase is crucial because it concentrates most of the emissions during an approval cycle: the duration of this phase must therefore be constantly reduced to meet new regulatory constraints. Thus, it constitutes a coherent and interesting field of application of the methodology.

## Visit CRITT M2A

Discover the interactive visit of the **CRITT M2A**. In a total immersion at 360 °, browse our different departments and testing facilities.



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## Agenda 2020

9-10 September 2020 : CRITT M2A will hold the **LCV (Low Carbon Vehicle)** conference in Bedfordshire.

15-17 October 2020 : Le CRITT M2A sera présent au salon **Electric & Hybrid technology expo** à Stuttgart.

3-4 November 2020 : CRITT M2A will hold the **SIA Powertrain & Energy** in Rouen.

5-6 November 2020 : CRITT M2A will hold the conference on **turbocharger (ATK)** in Dresde.



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