CRITTINFO'

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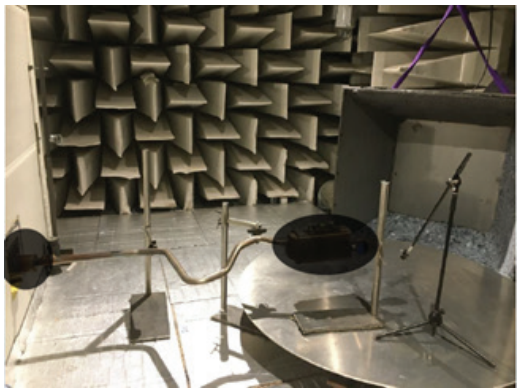
Acoustic tests on exhaust line

To meet customer demand, the CRITT M2A has modified its installation on its drivetrain acoustic bench. This will allow measurement of noise from the exhaust system, whilst avoiding the acoustic radiation of the GMP.

Initially, this engine bench is used to test an engine and its gearbox in a complete anechoic environment. To allow the measurement of the exhaust noise in representative operating conditions, the exhaust line is in vehicle configuration and the engine is acoustically encapsulated.

Improvements made to the engine bench:

- Addition of reflective flooring
- Acoustic walls around the engine
- Modification of the exhaust extraction (background noise / safety / extraction flow)
- Reflective table at the exhaust zone



This facility allows the management and reduction of residual noise from the GMP to ensure an emergence of at least 15 dB of exhaust noise (typical background noise interval), relative to this residual noise.

New cooling tower at CRITT M2A

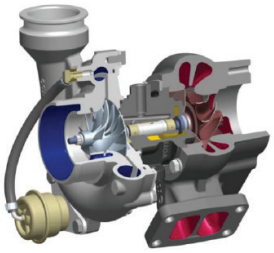
With the continuous increase in engine power, the CRITT M2A has equipped a new cooling tower with a power of 3MW for a flow rate of 318 m3 / h at a speed of 27-35 ° C.

Implemented in mid-February, this closed circuit tower is used to cool the industrial water supplying the exchangers of the engine benches (water, oil, charge air, etc.). It will also manage the cooling of the new 4-machine bench that will be installed at the electrical test center in September 2019.

In order to obtain increasingly cold exchanger outlet temperatures, the CRITT M2A also has 3 water chillers with a total cooling capacity greater than 1 MW. Ice water is regulated at 8 ° C for engine benches and 4-machine bench.

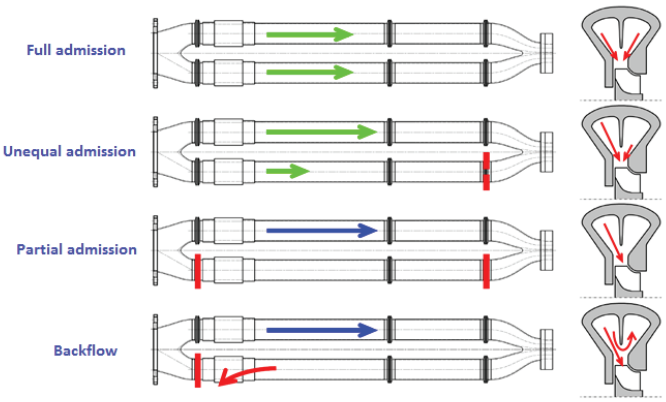
This application is also used at the turbo test center to regulate the compressor inlet air temperature

Tests on Twinscroll turbines in the turbocharger test centre



The use of twin-scroll turbocharger turbines has gained popularity in recent years. The main reason is its capability of isolating and preserving pulsating exhaust flow from two consecutives combustion, what allows to better exploit the energy delivered by the pressure pulses.

The standard procedure to evaluate the performance of a twin scroll turbine consists in 3 mappings: 1 for full admission (both scrolls are fed normally) and 2 for partial admission (only one scroll is fed, the other one is closed).



To improve our capability to characterize twin scroll turbine stage, the R&D team CRITTM2A developed a specific tool.

This one can be added to the combustion chamber to divide the flow and measure and adjust scroll flows by using specific orifice plates.

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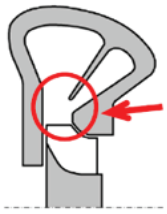
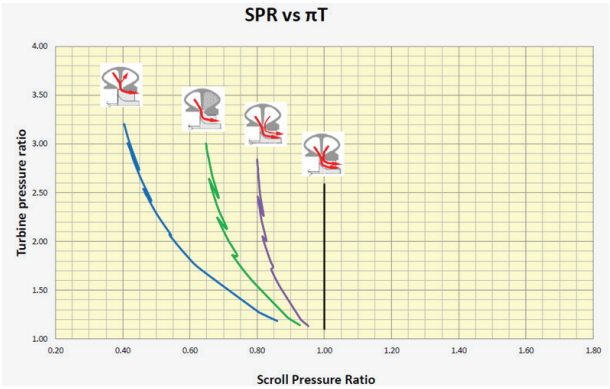
The new methodology allows to characterize the twin scroll turbine with 7 mappings:

- 1 in full admission
- 2 in unequal admission by using an orifice plate smaller than the other one
- 2 partial admission by closing one scroll
- 2 back flow conditions (initiated by the scroll interaction) by opening one scroll at the exhaust while the other one is normally fed

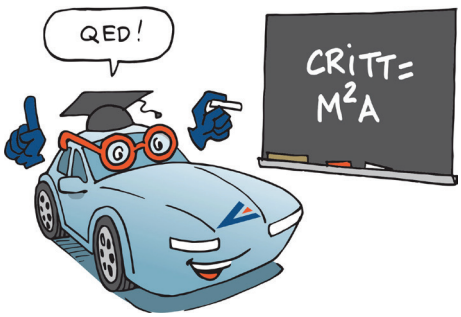
Mass flow, temperature and pressure are measured in both scrolls whatever the configuration, and allow to realize a deeper characterization of turbine stage and building the following graph (example with all configuration for one scroll and standard configuration in full admission).





Beginning of a thesis on Dynamic Design of Experiments in the engine benches

The evolution of the standards of depollution and requirements on the consumption of the modern vehicles forces the motorists to develop more and more complex architectures of powertrains. On the other hand, the new pollutant emission measurement procedures make the transient phases predominant, that is to say when the engine speed and the engine torque change, typically during an acceleration.



The aim of the thesis is to develop a new methodology and related tools to perform transient motor calibration from engine bench tests, based on dynamic experimental designs. Compared to the Design of Experiments process commonly used, the dynamic aspect is to use the parameters of the previous time steps, which requires to lift different scientific locks in terms of planning, modeling and optimization

From an experimental point of view, this methodology requires adapting our test facilities to work at high frequency, at the levels of engine control and the measurement of pollutants.

This CIFRE thesis will begin on May 2019 at CRITT M2A and will be led by the Ecole Centrale of Nantes, with Renault as an industrial partner.

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Implementation of the new electrical test centre

The CRITT M2A electrical test center, operational since 2015, is expanding and investing in new equipment to offer new testing possibilities to its customers. With an extension of 1500 m², the electrical test center will now have 6 battery pack benches and a 4WD powertrain test bench that will complete the cell and module tests on which the CRITT M2A already has recognized skills.

The 6 battery packs 750 kW / 1200 V / 1800 A will allow tests in climatic environment in walk-in chambers, in order to reproduce and accelerate the behavior of the batteries during their use.

They will be equipped with all necessary security systems in case of pack failure.

6 climate chambers up to 19 m3 (length: 4m) :

- BMS Management
- Ripple Simulation

The 4WD powertrain test bench will test all types of thermal powertrain, electric or hybrid. Designed to accommodate standard or competition vehicles, each machine will be able to absorb 500 kW and 2500 Nm at the wheel.

Equipped with a road simulation software, a robot to simulate the driver and a portable emission measurement system (PEMS), this bench will help to support more and more complex developments.

The equipment is scheduled for service in May 2019 for the packs and in September 2019 for the 4WD powertrain bench.

Forthcoming events

7-9 may 2019: CRITT M2A will attend the **Electric & Hybrid technology Expo** trade fair, in Stuttgart.

21-23 may 2019: CRITT M2A will attend the **Automotive Testing Expo Europe** trade fair, in Stuttgart.

12-13 june 2019: CRITT M2A will attend the **SIA Powertrain & Electronics** conference in Port Marly.

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