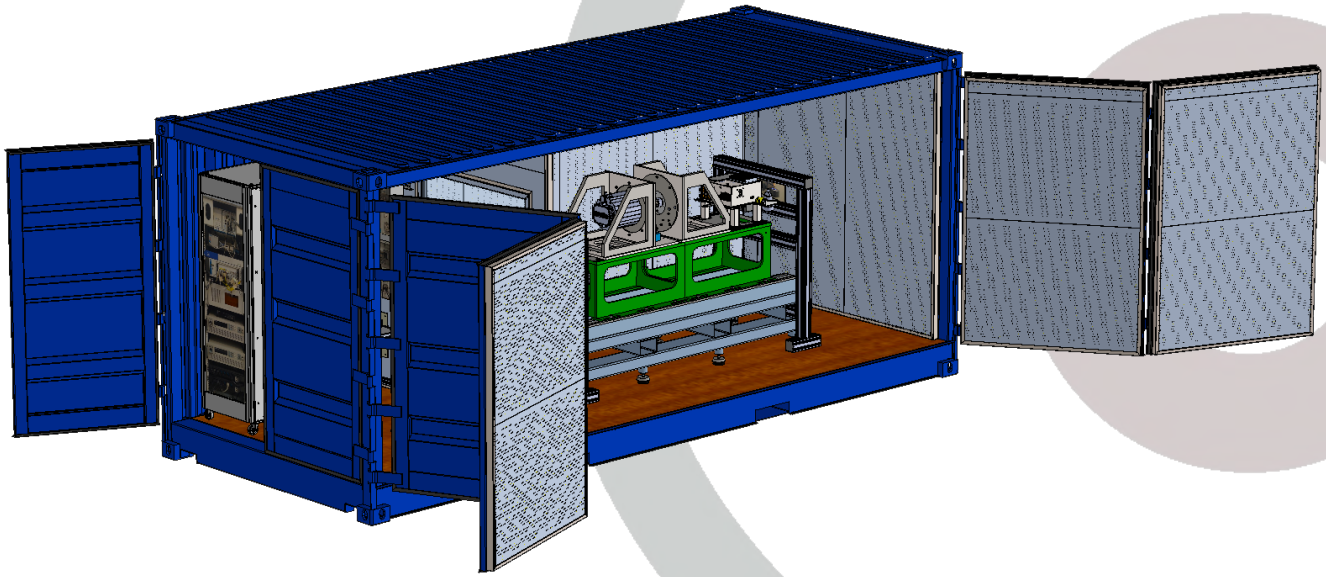
PRODUCT CATALOGUE

EV-SYS: Containerized integrated testing room



Revision log

N. Rev.	Date	Author	Modification	Approved by
01	05/08/2024	F. Ferraris	Prima stesura (draft)	M. Guidetto
02	21/08/2024	F. Ferraris	Integrazioni	M. Guidetto

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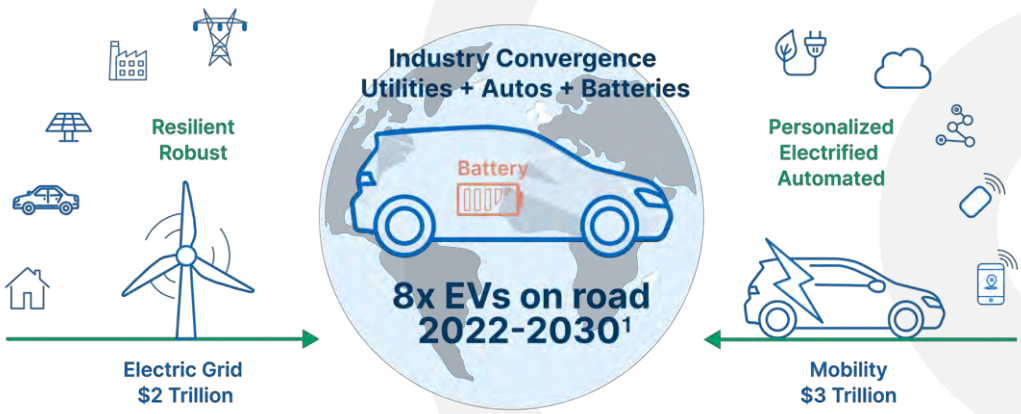
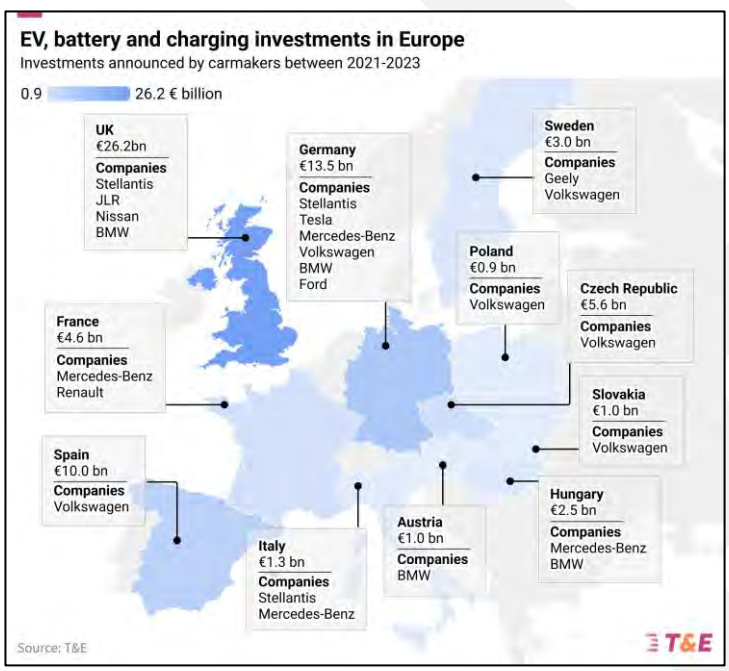
MARKET CONTEXT

The Electric transition of the transportation market has now begun.



$5 Trillion Convergence Creates Unique Opportunities at the Intelligent Edge

Many historical producers are facing the challenge to adapt their products to the new needs of the market and of the world itself.



Many other new companies, start-up and design studios are trying to give a boost to the new technologies and become players in this new technological era.

CUSTOM 2.0 EXPERIENCE

CustoM 2.0 starting from 2015 has increased, together with the customers, its skills and competences in all the key-components of the electrified powertrain and, specially, in the integration of those components.

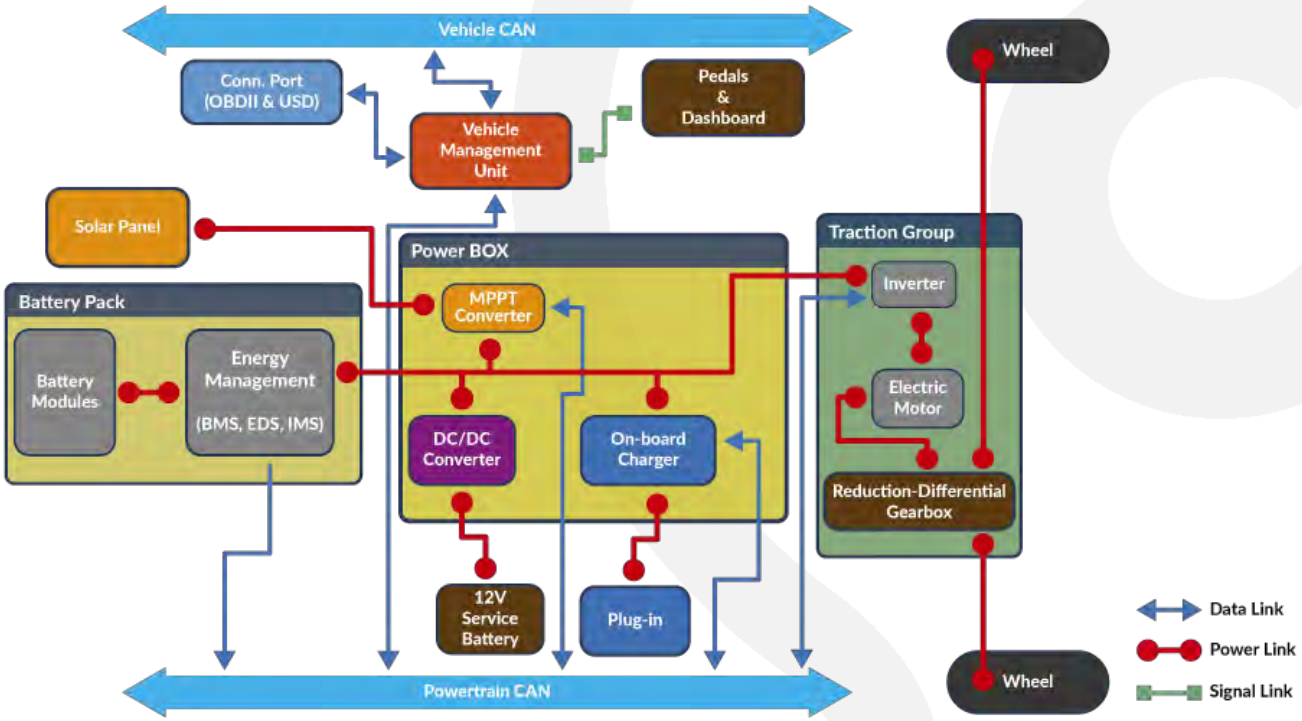
ELECTRIC MOTORS
Testing and validation

BATTERY
End-of-line testing

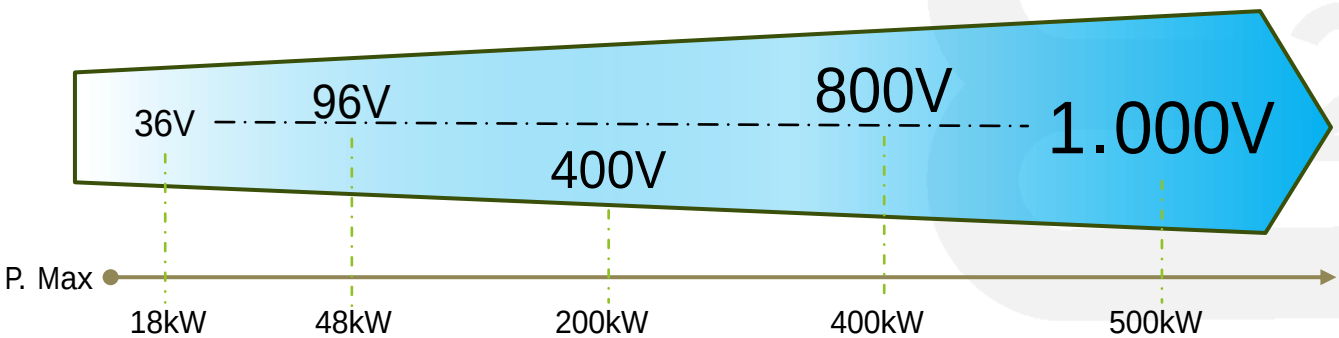
EV CHARGING STATION
Test bench

WHAT IS EV-SYS?

EV-SYS represents a complete, transportable Testing Room to help our customers to develop and test a full or partial Electrified Powertrain.

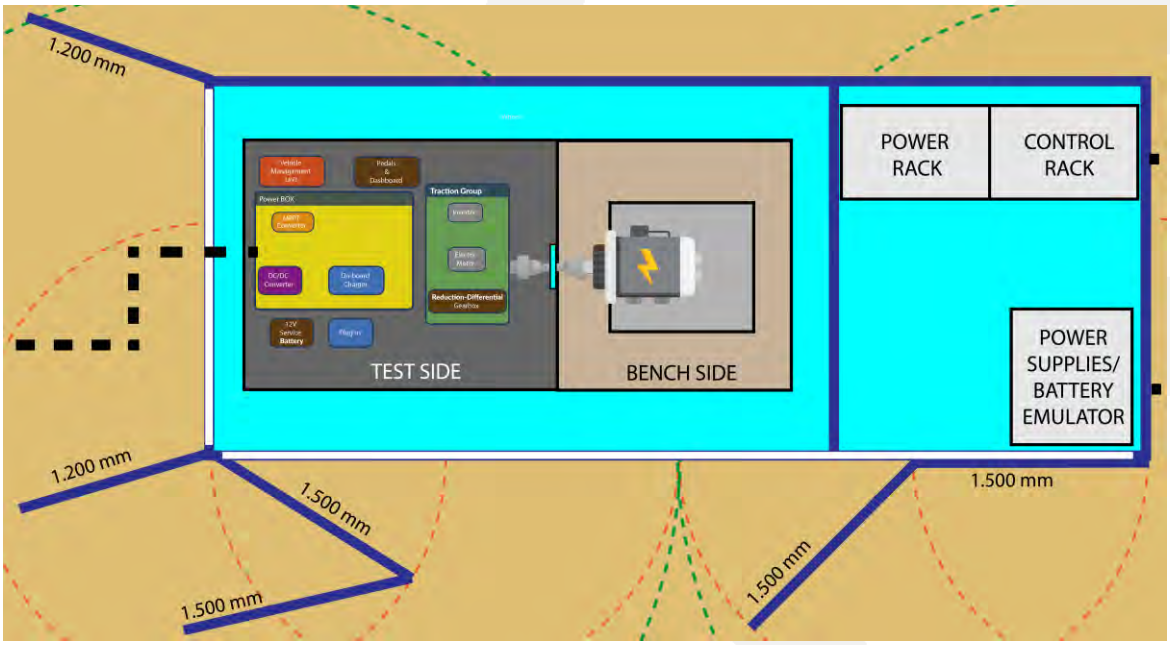


Inside EV-SYS integrated testing room is possible to test Powertrains with different voltages:

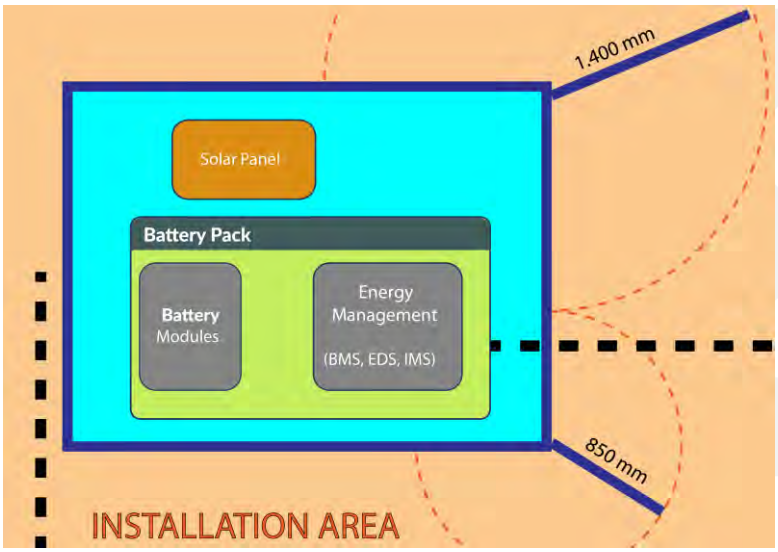


WHAT IS EV-SYS?

The whole ePowertrain can be placed on the mechanical supports inside the container as well as only a part of the Powertrain itself. The ambient temperature inside the testing area is maintained at 25°C while in the power and control racks can be placed inside an isolated cooled section of the container.

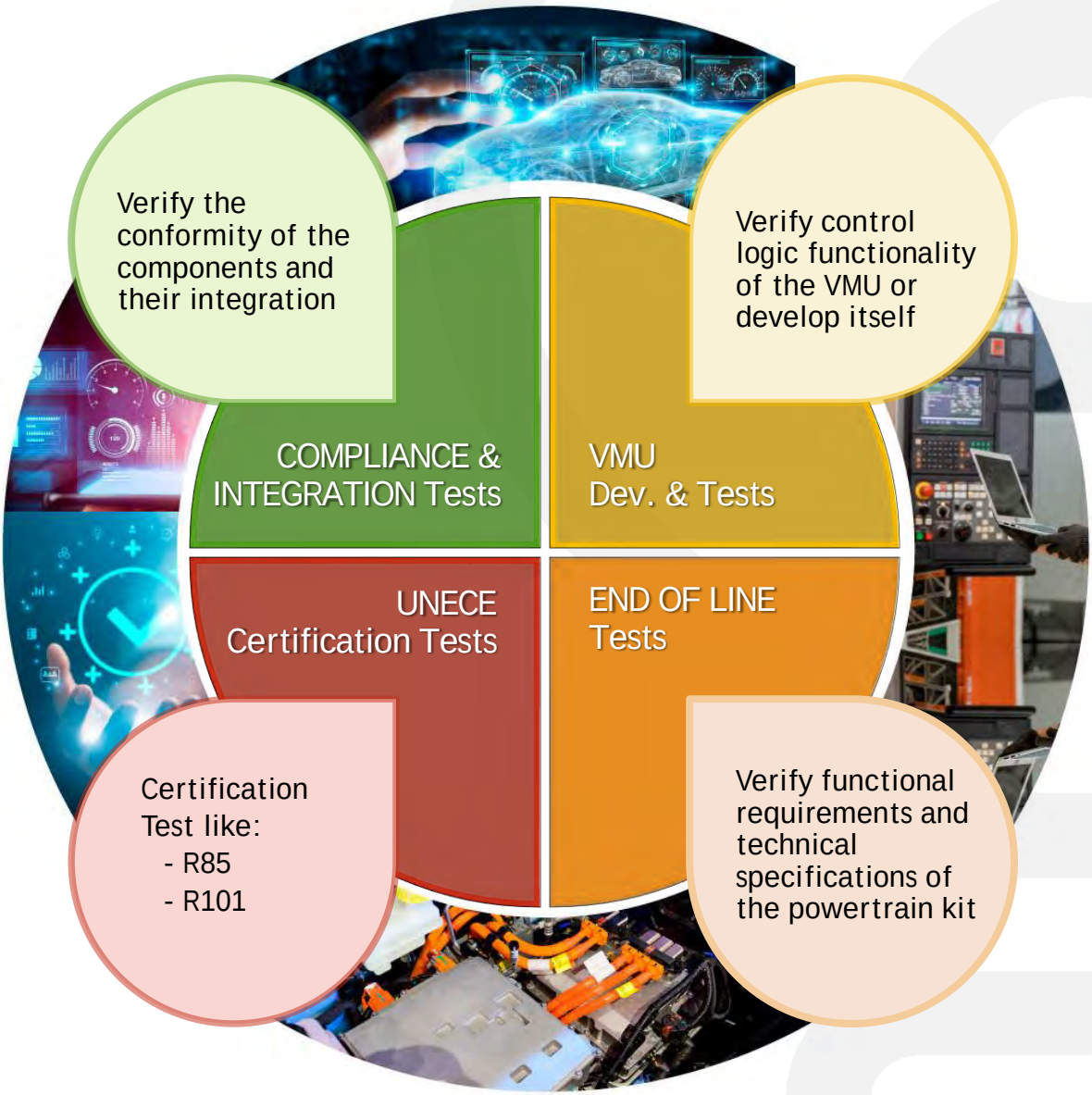


The Battery pack, if present, is normally placed inside a dedicated smaller container connected to the EV-SYS testing room with temperature control (+45°C - 45°C).



WHAT IS EV-SYS?

The architecture and the HW/SW composition of the testing room allows the customer to carry out many activities in different testing categories:



SOLUTION COMPOSITION

The EV-SYS solution is composed by the following macro-components:

ROOM

DYNO

ENERGY

AUTOMATION
SIMULATION
MEASUREMENT

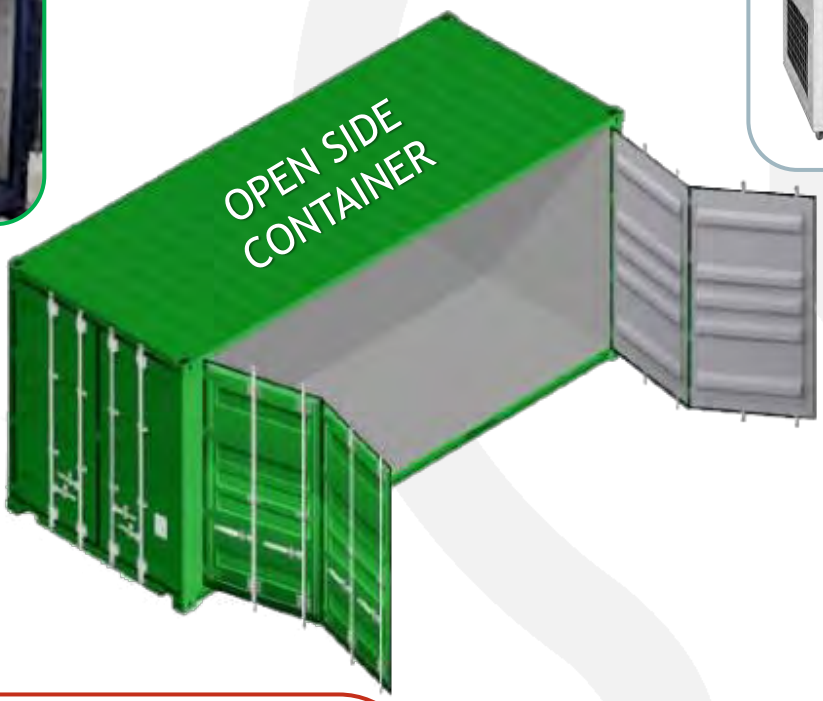
VMU
TESTING

ROOM

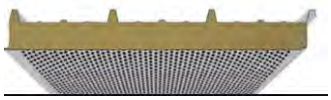
AMBIENT TEMPERATURE CONDITIONING

COMPONENTS COOLING

ROOM CONTROL



Safety PLC



Sound Proofing (REI)

Extinguishing system

Temperature & Smoke notifiers

FIRE PREVENTION

LIGHTING AND CAMERA FOR REMOTE MONITORING

ROOM

Depending on the "size" of the Powertrain components to be tested, CustoM 2.0 offers containerized solutions of different sizes following the market standards.

Container 10 feet (3m)

Container 20 feet (6m)

Container 40 feet (12m)

ROOM

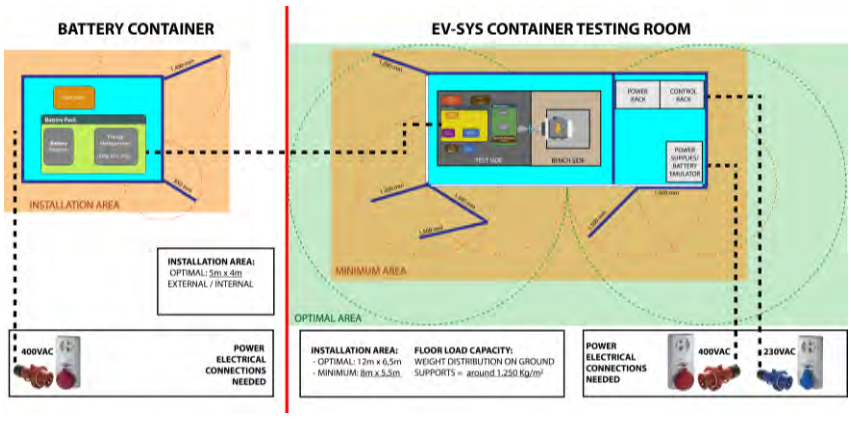
The choice to use the containerized solution is driven by the following benefits:

Easy transportability

Containers are natively designed to be transported on different vehicles

Easy set-up

The 2 open sides allow an easy set-up of the bench with haevy components.



Plug & Play installation

Safety, cooling and temperature conditioning systems are integrated.
The only things necessary for the installation are:

- n. 1 400VAC Electrical socket
- n. 1 230VAC Electrical socket
- Floor bearing capacity of around 1.250 Kg/m^2
- Installation area of 8x6m

DYNO

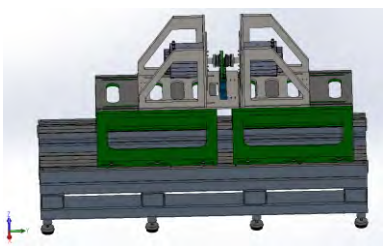
EV-SYS is able to cover applications in a range that goes up to 250 kW of power.

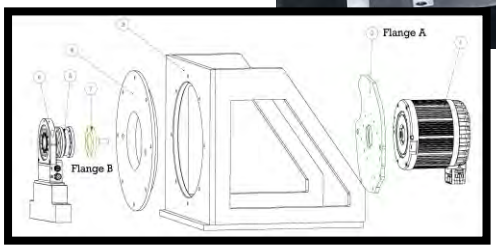
Depending on the following data of the application:

- Power (kWatt)
- Speed (RPM)
- Torque (kN)

CustoM 2.0 carries out the following dimensioning

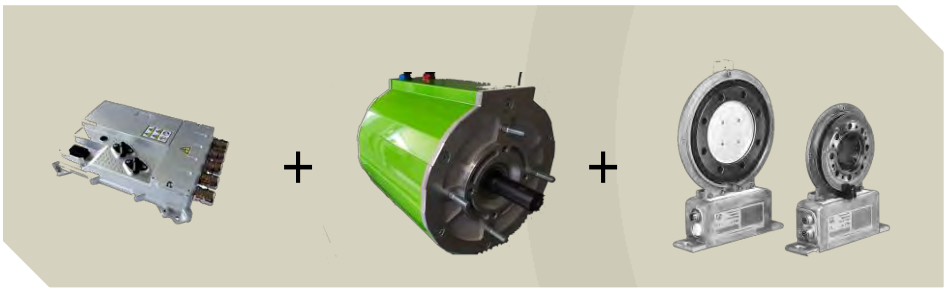
MECHANICS DIMENSIONING

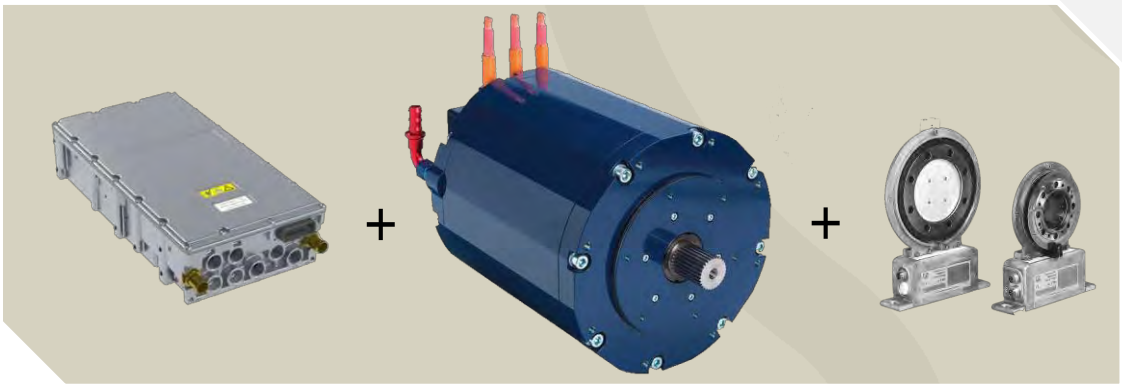




DYNO

BENCH MOTOR, INVERTER AND TORQUEMETER DIMENSIONING





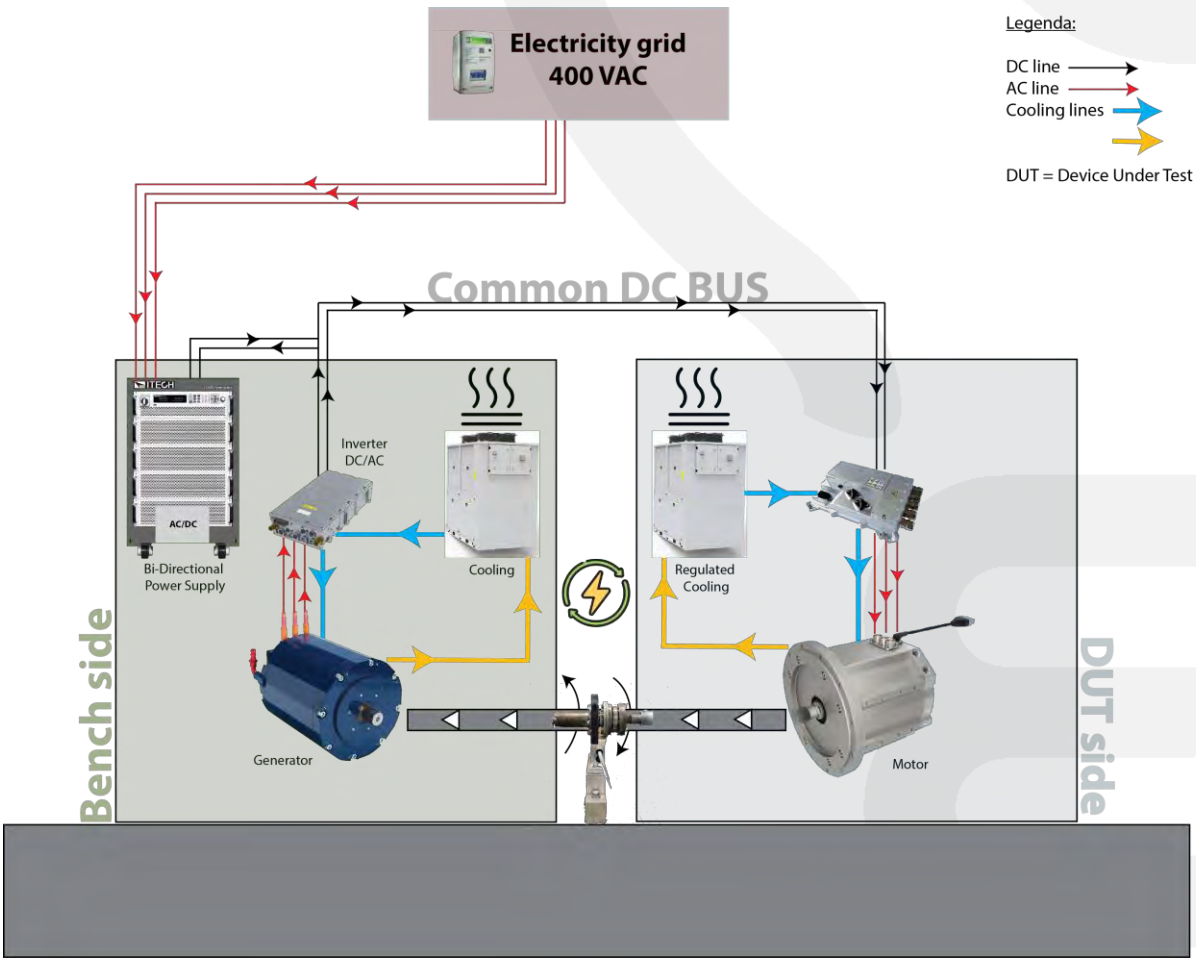
ENERGY

Energy can be supplied to the test room through different electrical architectures.

For all the options described below CustoM 2.0 provides energy recirculation in order to minimize the energy consumption of the room itself.

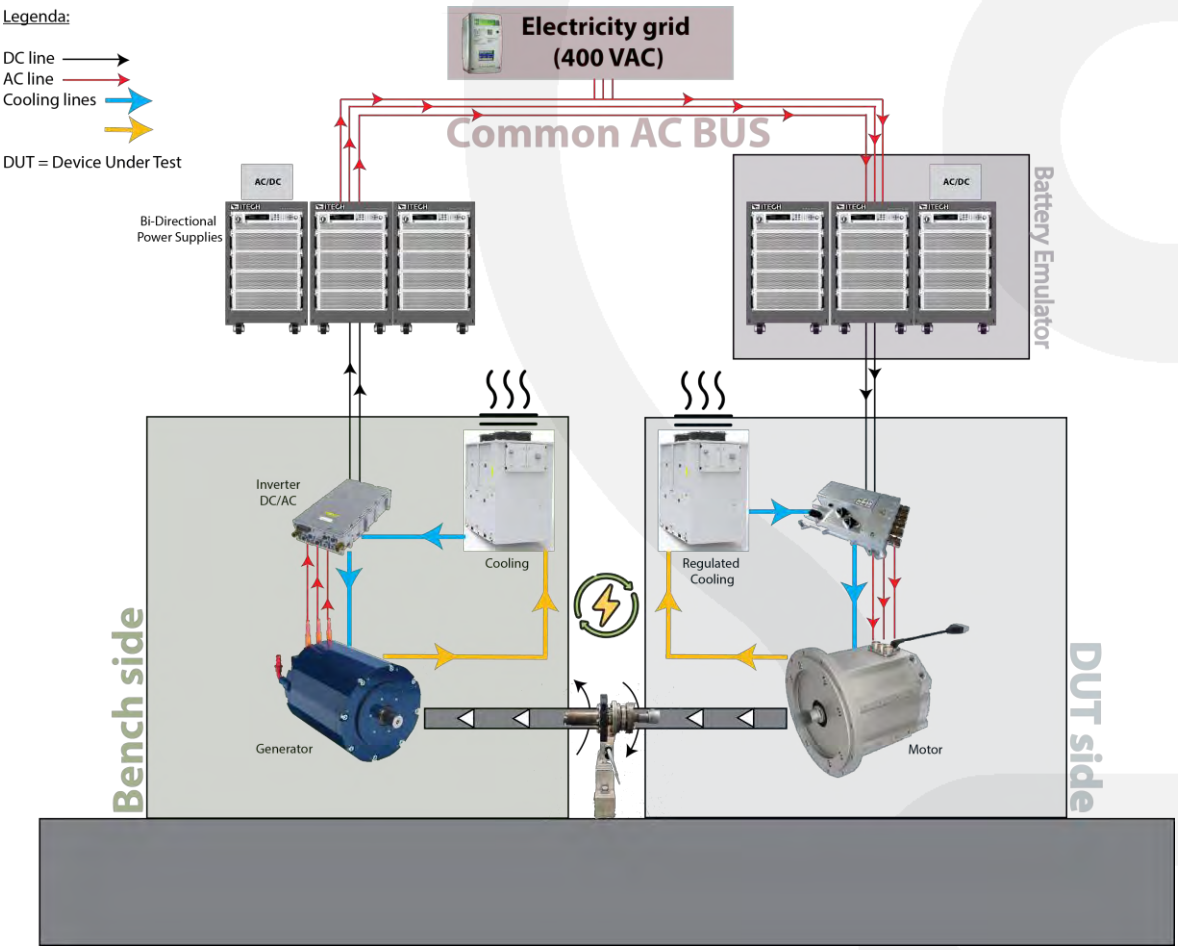
The power from the AC line necessary to supply the test room is dimensioned to cover the energy losses.
For example: if the two drives(motor and generator) have a power of 50KWatt and efficiency of 90%, the power necessary for the powertrain is only 10KWatt.

COMMON DC BUS



ENERGY

COMMON AC BUS



This architecture need more power supplies in order to emulate the complete battery pack all together with the BMS (Battery Management System).

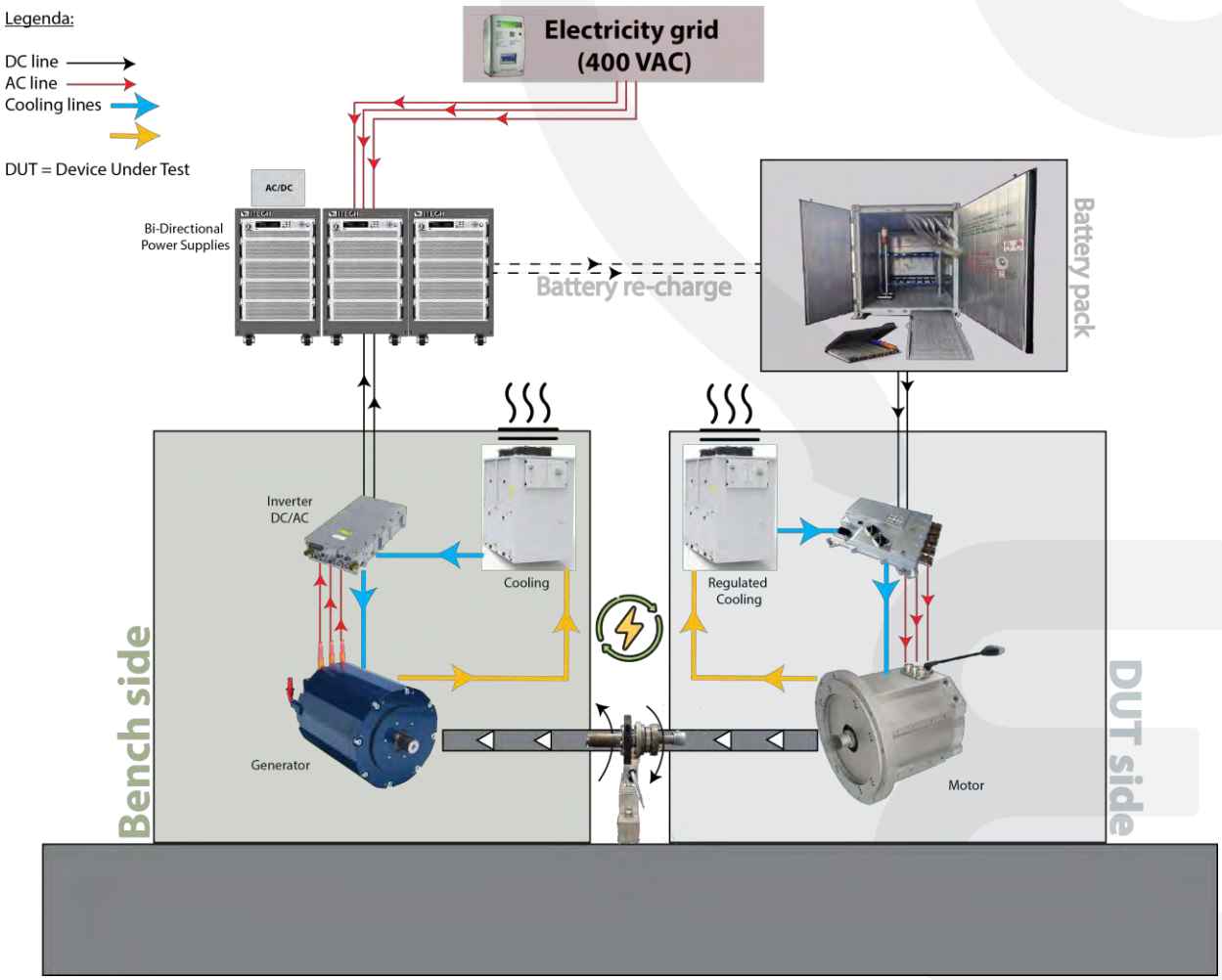
The recirculation of the energy is made on the AC line.

ENERGY

PRESENCE OF THE BATTERY PACK

The presence of the battery pack to be tested together with the rest of the ePowertrain can be managed with two different architecture you can see below:

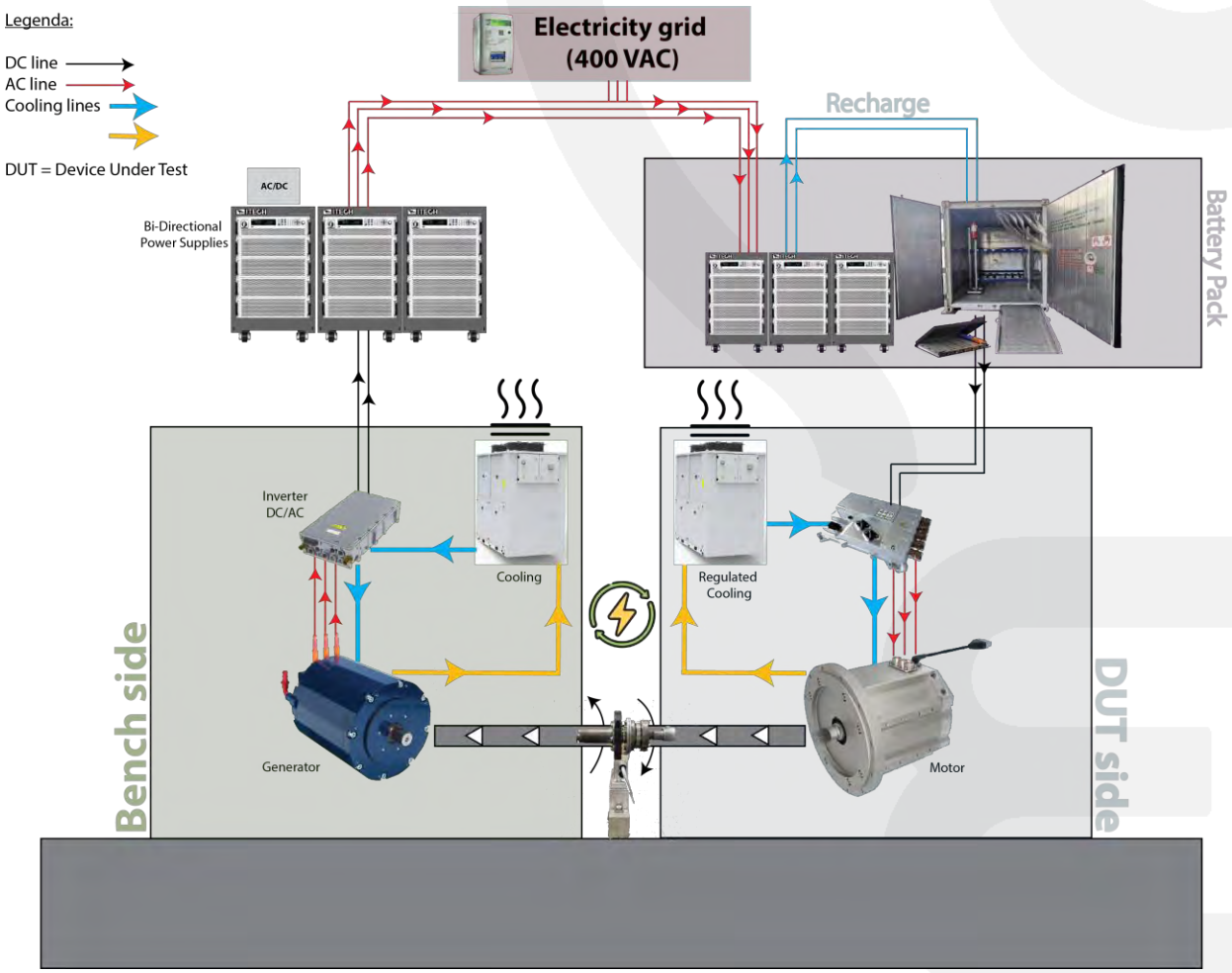
Option 1



ENERGY

PRESENCE OF THE BATTERY PACK

Option 2



AUTOMATION, SIMULATION, MEASUREMENTS

The EV-SYS solution comes together with its Automation, Simulation & Measurements rack cabinet.

Inside the cabinet CustoM 2.0 integrates the control devices of the testing room represented by:

- National Instruments NI-PXIe with the communication and control boards
- Industrial rack PC

Inside the cabinet is also located the Power analyzer for the measurements on the bench represented by:

- HBK Genesis GEN4tB with the acquisition modules and the sensors

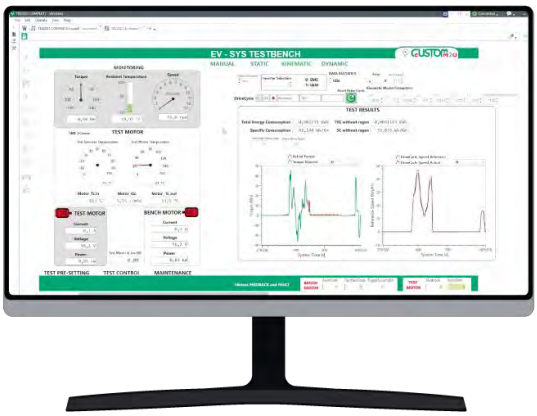
Another PC is provided for the virtual modelling workstation dedicated to the Mathworks (MATLAB + Simulink) perpetual licenses.

AUTOMATION, SIMULATION, MEASUREMENTS

CONTROL AND AUTOMATION

HARDWARE

SOFTWARE

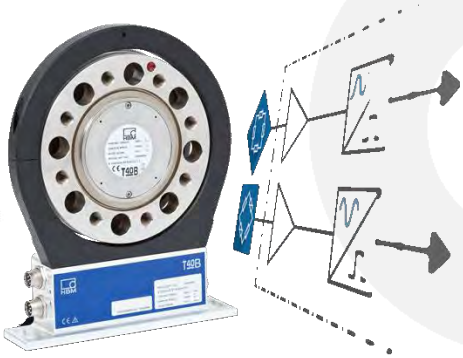


NI VeriStand

The software NI VeriStand is able to process as an input of the testing room the virtual models coming from Mathworks. The automation of the testing and measurements allows an easier use by the operator and the reporting of the tests.

AUTOMATION, SIMULATION, MEASUREMENTS

MEASUREMENTS - POWER ANALYZER



HARDWARE

SOFTWARE

The HBK solution composed by the Hardware Genesis and the Software Perception together with the current sensors and the torquemeter has a native synchronization of the measurements of the electric power with the mechanical power.

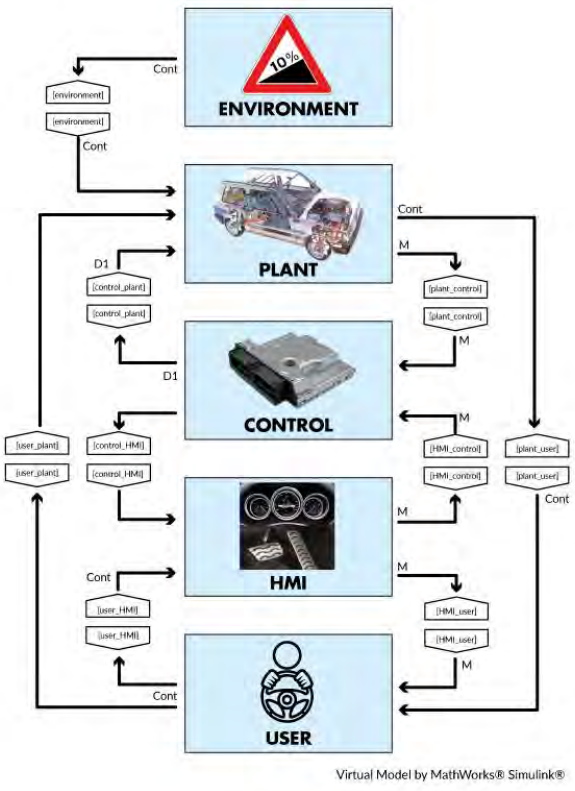
AUTOMATION, SIMULATION, MEASUREMENTS

SIMULATION -
VIRTUAL MODELS MANAGEMENT

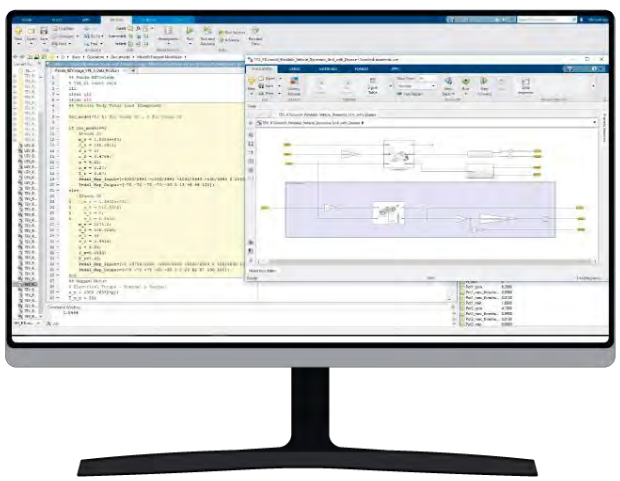
A dedicated PC is provided to have a workstation with all the needed perpetual licenses of MATLAB + Simulink.

The virtual models after the virtual testing can be uploaded on the bench so the customer is able to carry out the development of a semi-real prototype.

In this way it is possible to test the integration of the components step-by-step.



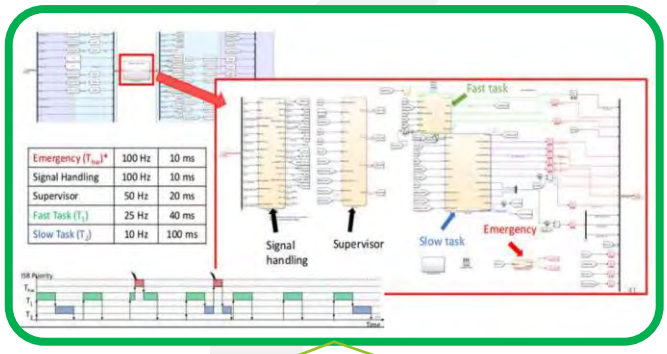
Virtual Model by MathWorks® Simulink®



MATLAB® & SIMULINK®

VMU RAPID PROTOTYPING

VMU Source Code developed under Simulink/ StateFlow

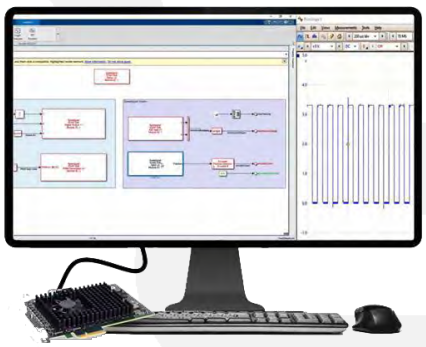


HARDWARE

SOFTWARE

HARDWARE

SOFTWARE



When the target of the development is the VMU/ECU of the vehicle, CustoM 2.0 offers the option of the VMU Rapid Prototyping integrating in the testing room one of the following tools:

- Micro Autobox II by dSpace together with its software interface Control Desk
- Speedgoat together with its software interface under Simulink

VMU TESTING

EXSISTING VMU

SOFTWARE

When the customer needs to test also the integration of the VMU/ECU of the vehicle, CustoM 2.0 offers the option of the VMU testing integrating in the testing room the following tools:

- PCAN Analyzer (to monitor the CAN communication of the VMU)
- Free Master (to debug and tune the VMU parameters)

BATTERY TEST

The customer could have the necessity to use the Real Battery Pack instead of the battery emulator to test the correct integration of the battery in the Powertrain.

CustoM 2.0 proposes the implementation of a dedicated container with its safety, fire extinguishing and heating/cooling systems which could be placed either inside or outside the building.

- External dimensions: 3 x 2,5 x h2,5 m
- Dimensions of the internal battery supports: 2 shelves of 1,5 x 2 m
- Temperature range: -45 / +45°C

To discover more and explore how we can meet your specific needs with a customized EV-SYS solution, feel free to contact us for a personalized quote

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Or fix an appointment at our HQ to discover our internal testing facilities

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