OPAL-RT TECHNOLOGIES

Success Story

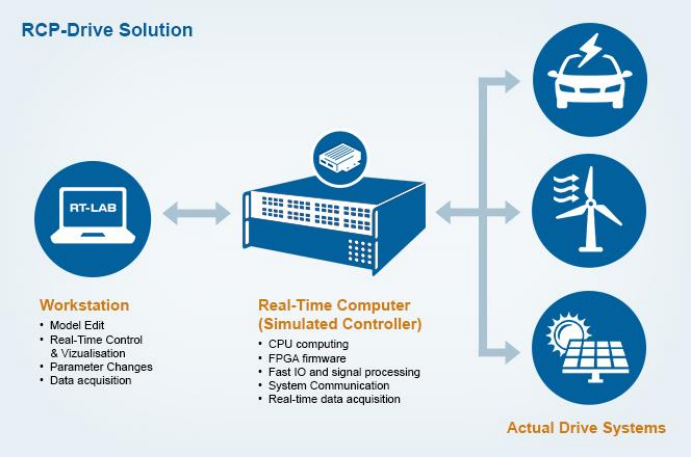
Valeo uses an OPAL-RT simulator to develop innovative powertrain solutions

The mission of the powertrain systems at Valeo is to develop innovative powertrain solutions aimed at reducing fuel consumption and CO2 emissions. These innovations cover a complete product range, from the optimization of internal combustion engines to the varying degrees of electrification of vehicles, from stop-start systems to the electric car. In this case, Valeo is aiming at developing a new power electronics system for use in electric vehicle applications.

1. Challenge

The R&D department in Créteil (France) had to study the system, to design new algorithms and control laws and to test their efficiency on a prototype. This type of demonstration is very time consuming and costly because, traditionally, computer code must be written and implemented.

This approach is inflexible and does not allow engineers to quickly modify/correct control loops; it also requires programming knowledge and investigating problems is complicated.



2. Solution

A Real-Time Platform Fully Integrated with Simulink

Valeo works with Simulink for their preliminary tests. OPAL-RT provided a Rapid Control Prototyping Drive system (RCP-Drive) that allows the user to automatically load a Simulink model on a real-time platform equipped with the I/O interfaces required for the project (PWM, voltage/current measurement, speed sensor, etc.)

Quick and Practical HCI and Datalogging

Valeo saved numerous work hours that would have proved very costly for them and would have impacted other industrial projects required by their customers. A quick and practical Human-Computer Interaction (HCI) and datalogging solution lets the users assess problems more quickly and in greater detail without needing extra tools.

More Precision and Flexibility

PWM management is both fast and accurate and can be configured using Simulink software, which makes it very flexible and allows users to test in greater depth. New control laws were tested and allowed Valeo to demonstrate new electric automobile concepts and respond to today’s challenges.

Its strengths are:

- Innovative techniques that synchronize generated PWM signals and ADC acquisition to prevent the system from acquiring signals during a switching event, thus avoiding interference.
- Robust "Resolver Input" feature, which takes the sine and cosine signals from a real resolver and converts them into the position information on the model.

3. Achievement

RCP decreases development time by allowing corrections to be made early in the products process. By giving engineering a look at the product early in the design process, mistakes can be corrected and changes can be made while they are still inexpensive.

With RCP-Drive, OPAL-RT provides a rapid control prototyping solution tailored to the needs and requirements of electric motor control, for all types of motors and electric power conversion topologies.

- System scalability to connect hundreds of I/O channels in order to represent complex systems (PCI Express)
- FPGA expertise that allows greater simulation power and precision, as well as greater flexibility for data acquisition
- Unique real-time simulation software for model edition, visualization and test programing
- Smooth integration with third party components thanks to the open architecture of OPAL-RT