OPAL-RT TECHNOLOGIES

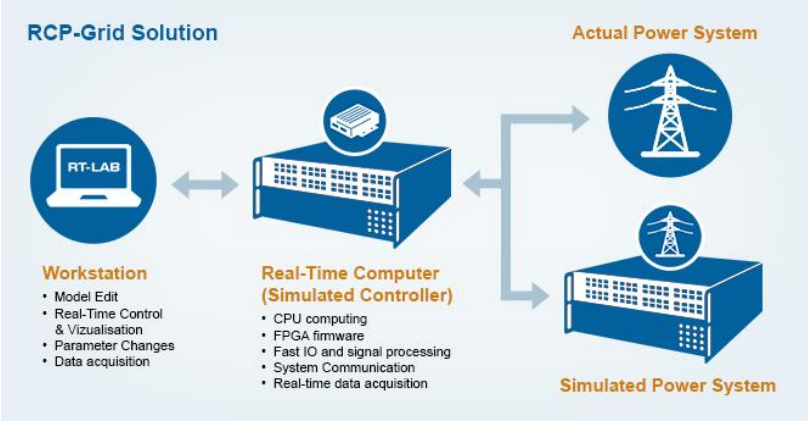
Success Story

The University of Nottingham uses an OPAL-RT simulator to develop new MMC controls

The University of Nottingham works on the development of new MMC type (pole and VBE) controls for VSC and HVDC. The university research team is very active in the field of power conversion. Their research is being applied in the fields of future transportation, renewable energy systems, industrial manufacturing systems and electrical power distribution. Jon Clare's team is one of the most renowned in the UK, on the cutting edge of research in this field and a leader involved in some of the largest European research projects.

1. Challenge

As part of commercial contract, the team must develop a new generation of sophisticated controls to manage hundreds of IGBT in a multi-level, modular architecture, with significant timing constraints and synchronization of thousands of signals.



The solutions already developed by the university are limited in terms of the number of signals supported and are complicated to implement (DSP/FPGA programming knowledge is required) and allow only minimal reuse of the software code developed..

2. Solution

A wealth of functions to facilitate and speed up development

By choosing the RCP-Grid solution, Nottingham University's Power Electronics, Machines and Control Group (PEMC) is equipped with one of OPAL-RT's latest innovations for rapid control prototyping for power electronics. The system is not only completely integrated into MATLAB/Simulink and able to manage thousands of channels (analog and digital) to drive IGBT and read values received from current and voltage sensors, it also lets developers access a wealth of functions to facilitate development and speed up validation and adjustment of existing models.

Innovative research in the UK

Thanks to the RCP-Grid platforms provided, the PEMC group gives demonstrations of their scope both in their laboratories and at the new Engineering and Physical Sciences Research Council Centre (EPSRC), inaugurated in 2013. The results of these demonstrations are highly anticipated for offshore wind farm development and HVDC links currently expanding in the United-Kingdom (as well as for DC and supergrid network projects). The research proposal for industrials is widespread and well supported, thanks to information sharing with industrial or academic partners using the standardized MATLAB/Simulink file format.

3. Achievement

OPAL-RT delivers a unique rapid control prototyping solution for MMC converters, which enables faster development, cost and risk reduction. This solution features exclusive characteristics to rapidly build a demonstration prototype, validate control algorithms, de-risk control design, detect design faults, and ensure lean implementation afterwards:

- Automatic translation of MATLAB/Simulink control algorithms for real-time execution and testing of high-level pole controllers and low level MMC cell controls
- Ability to implement voltage balancing control of each cell capacitor by reading back each individual capacitor voltage

With RCP-Grid, take advantage of the best solution to design control, protection and measurement of modern power systems.