RTDS Technologies

RTDS NEWS


2017 RTDS Applications and Technology Conference (Winnipeg, CANADA)

WHAT'S NEW: SEPTEMBER 2017

RTDS Technologies selected to provide record-breaking simulator to China's SGEPRI/NARI

Development of an MMC-based STATCOM using the RTDS Simulator at Hyosung Corporation in Korea

Upcoming Training Courses

Our 2017 training course schedule is now complete. Please be sure to sign up for our mailing list to be notified of the 2018 schedule once it's release!

Click here for more info on upcoming events.

Upcoming Events

CIGRÉ Canada
September 30-October 6, 2017
Winnipeg, Canada

Control and Protection HIL Seminar
October 5, 2017
Brunel University, London, UK

APAP 2017
October 16-19, 2017
Jeju, Korea

GCC CIGRE
October 16-18, 2017
Muscat, Oman

2017 China User's Group Meeting
October 25-27, 2017
Beijing, China

RTDS Technologies to provide record-breaking simulator to China's SGEPRI/NARI

RTDS Technologies has been selected as the provider of a record-breaking expansion project to the real time power system simulation laboratory at State Grid Electric Power Research Institute (SGEPRI) / NARI in Nanjing, China. The project will see 36 NovaCor units added to the existing simulation facility, giving the laboratory a total of 40 NovaCor units and 16 GTWIF/PB5-based racks. This makes NARI's RTDS Simulator the world's largest and most capable real time power system simulator, able to simulate systems comprised of more than 3600 three-phase buses and 20 HVDC links. The simulation hardware will be the critical tool at the heart of NARI'S SGCC System Protection Key Lab, where it will be used for validating system-level protection schemes, including wide area protection and control, AC and multiple HVDC coordination, and system stability control. NARI is among many of the world's leading research, development, and testing institutes adopting the NovaCor technology to enhance their real time power system simulation capabilities.

RTDS Technologies won the project, having competed with HYPERSIM as marketed by OPAL-RT and Keliang Technology. NARI's many years of successful experience with the technology and world class simulation support from the manufacturer meant that the RTDS Simulator emerged as the technology of choice.

Click here to read the full story on our website

GUEST ARTICLE

Development of an MMC-based STATCOM using the RTDS Simulator at Hyosung Corporation in Korea

J. Park, Y. Park, D. Lee, S. Yeo, D. Lee — Hyosung Corporation
I. Park — RTDS Technologies

Korea's Hyosung Corporation has been actively pursuing FACTS technology since 1997. In 2009, Hyosung developed a STATCOM based on the Quasi-Harmonic Neutralized three-level VSC, which is composed of IGCTs. Several of these systems have been supplied by Hyosung to Korea Electric Power Corporation (KEPCO) and are currently contributing to more stable operation of KEPCO's transmission grid. However, as the utility industry must address new challenges, the traditional fundamental functions of a STATCOM are no longer sufficient—new requirements such as unbalanced voltage control, sub-synchronous oscillation damping, and flicker compensation must be addressed. In order to accommodate these complex new demands, Hyosung developed an MMC-based STATCOM composed of IGBTs. The MMC STATCOM offers better compensation performance, lower harmonic generation, flexible scalability, and many other benefits to the better operation of the power system.

In order to verify the design, loading tests for both rated and overcurrent were applied. Although the system is relatively small scale, the power rating is approximately 10 MVA, so it is not easy to equip a power supply which is capable of supplying the rated current for testing. Instead, an MMC test circuit was designed containing the two MMC valves and an AC power supply.

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RTDS Technologies

Visit us online!

Don't miss this unique opportunity to see NovaCor™ in a seminar and demo

A Revolution in Real Time: Real time simulation and HIL testing with the new generation of RTDS Simulator

October 5, 2017
Brunel University, London, UK

This one-day seminar and live demo will give attendees an introduction to real time power system simulation and the advantages of connecting real control and protection equipment in a closed loop with the RTDS Simulator. On site demonstrations will make use of NovaCor, the latest generation of hardware for the RTDS Simulator, and include:

- Generator control system hardware in the loop
- Protection hardware in the loop via IEC 61850

Click here to learn more and to register

2017 China User's Group Meeting

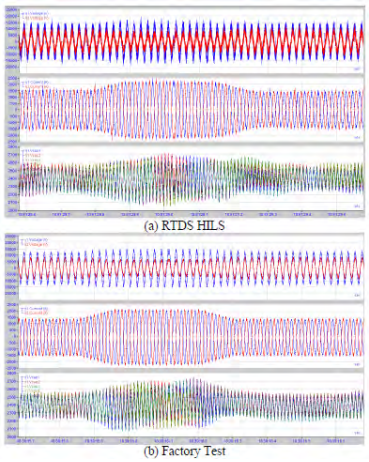
October 25-27, 2017
Beijing, China

RTDS Technologies is excited to announce that we are bringing our popular User's Group Meeting back to China! This is an incredible opportunity to connect with other users of the RTDS Simulator, explore new applications and stay informed on new developments. The event is open to all users, regardless of location, and to all power industry colleagues who are interested in real time digital power system simulation.

Click here to learn more and to register

Using the test circuit, rated and overloaded current can be supplied using a small capacity power supply. The PSC PWM method is used for the MMC operation in order to suppress the generation of harmonics, and the superior controller is used to control, protect, and monitor the system. Prior to testing the real MMC valves at a higher power level, hardware in the loop simulation was performed using the RTDS Simulator to confirm the correct operation of the control and protection schemes in various test scenarios. This prevents potential damage to the valve hardware from unexpected errors. The CHAINV5 model for MMC valves available in RSCAD was used to simulate the valves. Interface boards were designed to have the same role as submodule controllers. The phase controllers were connected via fibre to the interface boards as if connected to real submodules. Analogue output and digital input cards were used to connect the external controller to the simulator.

The control and protection system of the STATCOM station includes a fault recorder, HMI, protection IEDs, bay controllers, gateways to SCADA systems via DNP3/IEC 60870-5-104, and a connection to the substation automation system via IEC 61850. For the purpose of hardware in the loop testing, a reduced system was utilized. The analogue signals corresponding to measurements of CTs and PTs in the simulation are transferred via analogue output card to the station controller, and digital signals for BC, ES, and DS switching are provided from the station controller to the simulation via digital input cards. The RSCAD model of the STATCOM station has a 150MVA capacity and 40 full-bridge submodules per phase including 2 redundancies, and is composed of 4 small timestep bridge boxes. One box includes AC yard equipment and the others contain the MMC phase circuits, which are controlled by the phase controller.



(a) RTDS HILS

(b) Factory Test

The interface boards incorporate four virtual submodule controllers which interconnect to I/O cards via fibre cable from the phase controllers. The boards decode the control character from the phase controller into the three-bit word to control the submodule and provide the necessary input to the digital input card in order to drive the CHAINV5 model in the simulation. The boards also convert the analogue signals (capacitor voltages) from the analogue output cards into digital signals and transfer them to the phase controller via fibre. The board is also capable of a forced submodule outage by the operator. The environment enables Hyosung to not only examine the phase and submodule controllers but also test forced outages at the interfaces between the phase controllers and submodules.

The test results were recorded by the transient fault recorder. The figure shows the MMC valve voltage and currents and the submodule DC capacitor voltage in the overcurrent condition. The current order is increased from 1.0 to 1.5 pu, then decreased to 1.0 pu. It was designed to withstand 1.5 pu of overcurrent for a very short time, so the control scenario used for testing had to be set in such a way that the overcurrent condition must be released automatically after a given time limit.

Overall, the hardware in the loop testing with the RTDS Simulator closely resemble the results from the real MMC circuit test. Hyosung Corporation was able to eliminate faults and problems using this test method and will continue to use the RTDS Simulator to perform HIL testing as a key tool in the development of the MMC STATCOM and other technologies.

New Features in RSCAD

- The CYME to RSCAD Conversion Utility allows users to convert CYME-based distribution system models for use in RSCAD.
- The "Import CSV" feature allows a model's parameter values to be set from an external .csv file.
- A multi-phase synchronous machine model (up to 12 phases) has been added. The model provides access to neutral and both ends of stator winding.
- A three-phase dynamic average model has been added to allow interfacing DC sources to AC grids in the large dt.
- A regulator component containing no leakage inductance (to match CYME) has been added to the library.

Click here to log in to the RTDS client area, where you can access the full RSCAD release notes.

If you have an idea for a new feature, please send it to **feedback@rtds.com**. We want to hear from you!