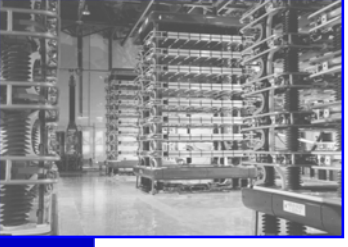


RTDS NEWS

Summer 2006

Real time digital simulation for the power industry

ABB Power Technologies FACTS

Ribbon Cutting Ceremony for Upgraded RTDS Simulator

The ABB FACTS group has been using the RTDS Simulator for many years and has recently upgraded their system to the latest in RTDS technology. ABB was convinced to go ahead with the upgrade after evaluating the performance of a test system consisting 1 rack of RTDS hardware.

One of the main motivators for ABB to evaluate the RTDS upgrade was the newest in Voltage Source Converter (VSC) simulation capabilities developed for the GPC card. ABB utilizes VSC technology in their SVC Light® which is an increasingly important part of their sales market. The other motivators were the need for increased simulation capacity and the desire for the improved ease-of-use that would be provided by the new technology.

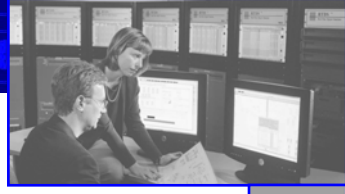
The VSC capability developed for the GPC card uses a dual timestep approach whereby the forced commutated bridge is represented with a small timestep in the range of 1-2 µs. Together with specially designed I/O boards, the GPC allows closed loop testing of firing pulse controls with very low latency (~3 µs).

The testing done at ABB FACTS using the evaluation system was the first commercial application of the small timestep VSC simulation. During the evaluation, ABB's MACH2 controller was easily connected to the RTDS Simulator. Results of several closed loop tests were compared to those from PSCAD/EMTDC simulations of the same system. The excellent results proved the accuracy of modeling the SVC Light® on the RTDS Simulator and sealed the upgrade contract.

The test system loaned to ABB, as well as the hardware upgrade, included GTNET cards to play back very large pre-recorded data files. ABB used this capability to inject arc furnace currents, recorded from actual steel plants, into the simulation. Some of the playback files represented upward of 30 minutes of operation. Injecting the recorded currents allows the VSC controller to compensate for the unpredictable arc furnace dynamics present on the steel plant bus. Running the simulations with the real arc furnace currents for 30 minutes or more allowed ABB to measure and tune the compensator's flicker mitigation response.

Thanks to good preparation, the evaluation testing at ABB was conducted in just 3 days. After the evaluation was completed, the test system remained at ABB and was used for project work until the complete upgrade was installed.

RTDS Technologies



Real time digital simulation for the power industry

Very pleased with the results, ABB proceeded with the order of a new 4 rack simulator. In their words –
"The capability of the RTDS Simulator to produce repeatable and identical results instils a high level of confidence in the results obtained, as well as, in the FACTS devices and controllers tested. ABB is of the opinion that the RTDS provides an ideal environment to fine tune control and protection systems for FACTS devices and to test their interaction with power systems in which they will be ultimately installed. The simulator also gives the capability to perform fast and effective fault tracing. This process ultimately leads to projects being completed with shorter lead times, with successful commissioning and performance testing at site, but without any surprises!"

During the first few weeks of operation, the importance and usefulness of the new system was proven at ABB FACTS. Compared to the former analogue simulator, the RTDS demonstrated greatly increased flexibility and speed of operation. The marked benefit of the simulator in tuning and optimizing controllers was also proven beyond a doubt.

GTNET - IEC 61850 and Playback

A number of applications have been developed for the GTNET card since it was released. As first reported in RTDS News – Summer 2005, the first application for the card was for IEC 61850 messaging of binary signals. The GSE firmware for the GTNET now supports both IEC GOOSE and GSSE messaging. One GTNET-GSE allows a maximum of 32 binary input and 32 binary output signals to be exchanged between the RTDS Simulator and up to five IEC 61850 compliant IED's.

UPCOMING EVENTS

Cigre – General Session
Exhibition August 28-September 1, 2006 in Paris, France

WPRC
Exhibition October 17-19, 2006 in Spokane, USA

PowerGen India & Central Asia
Exhibition October 25-27, 2006 in New Delhi, India

IEEE/PES PSCE 2006
Exhibition October 29-November 1, 2006 in Atlanta, USA

However the application of the GTNET does not end with IEC 61850. As mentioned in the previous article, the GTNET is also being used to read large data files from external hard drives. The data from the external drives is then used as part of the real time simulation. So far this capability has been used for arc furnace simulations and to playback very large COMTRADE data files. Using the GTNET, the number of points that can be played back is virtually unlimited.

Over/Under Excitation Limiter

We are finding that RTDS simulations are becoming larger and more complete all the time. To make it faster and easier to put these simulations together, we continually add more standard control blocks.

One of the more recent additions to the controls library are over and under excitation limiter blocks that can be used with the generic generator exciters.

KEPS Simulator Upgraded with GPC's

Now the world's largest and most advanced power system simulator is even more powerful. The 26 rack RTDS Simulator installed at the Korean Electric Power Research Institute, KEPCO has been upgraded with the addition of one GPC card per rack. During on-site testing, simulation of Largest Equivalent System (LES), which included 511 buses and 136 generators, was successfully demonstrated. The LES represents KEPCO's planned 2010 system for generation and transmission for 345kV and above. The RTDS files for the LES were generated using RSCAD's PSS/E data conversion facility.

2006 – Our Best Year Ever !!

We would like to thank our customers for making 2006 our most successful year ever! During the last 12 months we have completed more than 40 projects and installed or upgraded some 60 racks of equipment. With the installation of our first system in Australia in early 2007, there will be RTDS Simulator on six continents (does anyone know a power systems group in Antarctica?). We have also strengthened the company by adding people in our production and support groups. Now we are looking forward to the new challenges next year will bring!

RTDS Technologies Inc. 300-137 Innovation Drive, Winnipeg, Manitoba, Canada R3T 6B6
Telephone: 204 989 9700 Fax: 204 452 4303 Email: rtds@rtds.com Website: www.rtds.com