

RTDS® SIMULATOR OVERVIEW



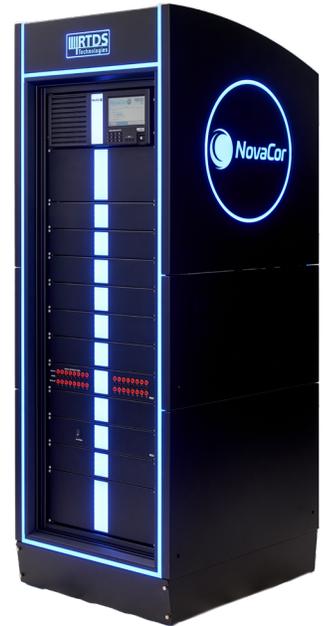
THE COMPANY

RTDS Technologies is the world standard for real-time digital power system simulation.

RTDS Technologies Inc. provides power system simulators and simulation support to customers in over 50 countries around the world. Our main product, the RTDS® Simulator, was the world's first fully digital real-time simulator, and continues to serve as the world's benchmark for performing real time power system simulation.

The RTDS Simulator was originally developed from a research project done at the Manitoba HVDC Research Centre, which resulted in the world's first real time digital HVDC simulation in 1989. Today, RTDS Technologies is the exclusive supplier of the RTDS Simulator.

Our customers are the world's leading electrical utilities, power system equipment manufacturers, research institutes, universities, and consultants. We are continuously developing our hardware and software capabilities in response to needs expressed by our customers. At RTDS Technologies, we are dedicated to equipping our users with what they need to push the limits.



NovaCor 2.0 cubicle



THE RTDS SIMULATOR

The RTDS Simulator consists of custom hardware and software, specifically designed to perform **real-time electromagnetic transient (EMT) simulation**. It operates continuously in real time while providing accurate results over a wide frequency range. This range provides a greater depth of analysis than traditional stability or load flow programs that study phenomenon within a very limited frequency range. Real-time operation enables **hardware-in-the-loop (HIL) testing**, in which protection and control devices are connected to the simulated network in a closed loop for testing.

The RTDS Simulator's fully digital parallel processing hardware is capable of simulating complex networks using a typical

timestep of 25-50 μ s. The Simulator also allows for smaller timesteps, enabling the simulation of power electronics devices with switching frequencies in the 200 kHz range.

Using the RTDS Simulator, analytical studies can be performed much faster than with offline EMT simulation programs. Hardware-in-the-loop testing allows for multiple control and protection devices to be tested simultaneously, allowing for system-level testing for comprehensive validation of device performance prior to deployment.

CLOSED-LOOP TESTING OF PROTECTION AND CONTROL SYSTEMS

POWER HARDWARE-IN-THE-LOOP STUDIES • IEC 61850 COMMUNICATION

MICROGRID, SMART GRID, AND RENEWABLE ENERGY • POWER ELECTRONICS



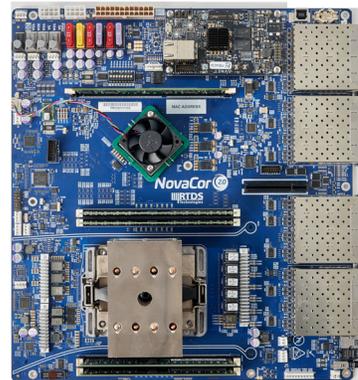
THE HARDWARE: CUSTOM, MODULAR, BUILT IN-HOUSE

The parallel processing required by the RTDS Simulator is carried out by a multicore processor. This processor is housed in a unit known as a chassis. One or more chassis may be housed in a cubicle. Of the ten cores of the multicore processor, varying amounts can be licensed depending on simulation requirements. As the simulation demands of a user increase, additional cores can be licensed. Additional chassis can also be acquired, and many different chassis can be involved in a given simulation.

RTDS Simulator cubicles include standard DIN rails for the installation of I/O cards and other components. The I/O cards available from RTDS Technologies allow the Simulator to be interfaced with external equipment such as protective relays.

THE IBM® POWER9™ PROCESSOR IS AT THE HEART OF NOVACOR 2.0, THE CURRENT HARDWARE GENERATION FOR THE RTDS SIMULATOR

NovaCor 2.0 chassis



NovaCor 2.0 board

THE SOFTWARE: USER-FRIENDLY, DEVELOPED IN-HOUSE

RTDS Technologies' proprietary software, designed specifically for interfacing to the RTDS Simulator hardware, is called RSCAD® FX. RSCAD FX is a user-friendly interface, intended to create a working environment familiar to the power system engineer.

RSCAD FX is an all-in-one package, containing all facilities that the user needs to prepare and run simulations, and to view and analyze results. This eliminates the need for third-party products. RSCAD FX is provided with a site license, which means it can be used for an unlimited number of users at a given site — there is no per-seat fee.

Since the RTDS Simulator operates in continuous real time, the simulated power system can be “operated” in a manner similar to a real power system. As simulation parameters are modified and contingencies are applied, the user can watch the power system respond in real time.



HVDC & FACTS CONTROL TESTING • INTERACTION OF AC AND DC SYSTEMS

DC GRIDS • MARINE SYSTEMS • MMC-BASED HVDC SCHEMES • PMU STUDIES

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