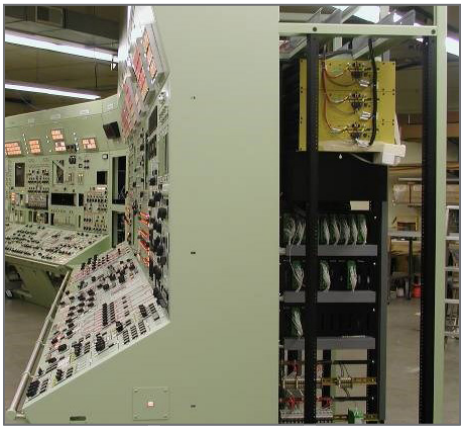
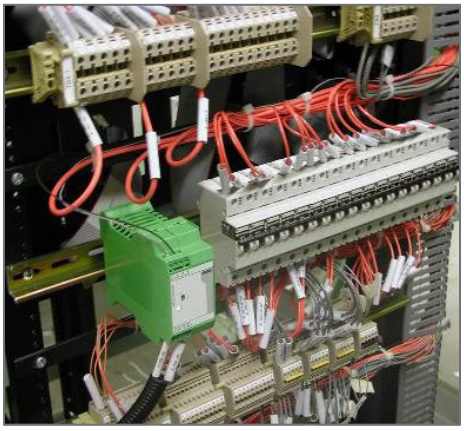
3KEYMASTER™ Nuclear Power Plants

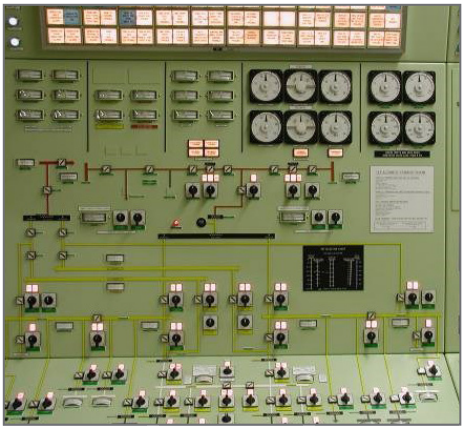
Solutions for Nuclear Power Plant Simulation Modeling

CURTISS-WRIGHT

Nuclear Power Products and Services







Why Use 3KEYMASTER?

Simulation involves model development, integration, execution, test, visualization, and analysis. The 3KEYMASTER™ environment, developed by Curtiss-Wright's Simulation Group*, provides everything needed to accomplish these tasks, with time-saving efficiency and engineering rigor, in a single, integrated environment.

Key Components

- Graphical Engineering Station (GES) with extensive run-time simulation controls and data visualization
- Powerful executive to run your models
- Versatile integration platform for real-time I/O, third-party systems and code
- Complete suite of engineering-grade modeling tools and components library

Why Choose 3KEYMASTER?

3KEYMASTER is the first simulation environment developed ground-up for the Microsoft Windows® operating system. Its open architecture, fully object-oriented approach, and leveraging of the Windows environment, offers distinct advantages in speed and usability.

To support nuclear power plant simulation, we provide 3KEYRELAP5-RT, our adaptation of the RELAP5 and NESTLE codes, to run in real-time under the 3KEYMASTER environment. Both codes provide best-estimate models for simulating nuclear reactors.

Curtiss-Wright has a reputation for working closely with its customers to provide a complete spectrum of high-quality and cost-effective simulation services. We maintain a partnering arrangement with I/O, panel, and computer system vendors to offer each customer an optimal solution.

Services Provided

- Complete simulator development, test, integration, and program management services for PWR, BWR, VVER, CANDU reactors/suppliers
- Procurement, test, integration, and installation of hardware panels, I/O and computer systems
- Simulator consulting services, assessments, and problem resolution including systems from other vendors and SAE
- Simulator upgrades and modernization
- On-site and off-site maintenance contracts

Full-Scope Nuclear Power Plant Control Room Simulator

*: WSC, a legacy brand of Curtiss-Wright's Simulation Group, headquartered in Frederick, MD, is a global simulation and services company. Acquired by Curtiss-Wright in 2024, WSC is recognized for the quality and efficiency of their products and flexible team-oriented approach to serving its customers.

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3KEYMASTER Advantages

- Fast, efficient, and cost-effective object-oriented technology with graphics-based model construction, test, deployment, and data visualization (see the 3KEYMASTER product sheet).
- Best-estimate code models for neutronics and thermal-hydraulics using 3KEYRELAP5-RTTM minimizes tuning needs. 3KEYRELAP5-RT can also be extended to modeling secondary systems (see the 3KEYRELAP5-RT Product Sheet).
- Comprehensive high-fidelity modeling for all plant systems using our Simulation Group's suite of engineering-grade 3KEYMASTER Modeling Tools. Knowledge of physical principles and equation solution methods are embedded in the tools (see the Modeling Tools Product Sheet).
- Accurate modeling of logic and control systems–for both traditional logic and control and DCS emulation, stimulation, or "virtual" control systems integration. DCS solutions are increasingly important in newer designs and upgrades (see the DCS Solutions Brochure).
- Extendable–Provides easy re-hosting or porting of legacy or custom code to preserve your existing investments.
- Easy integration with third-party software, hardware, I/O systems, and panels.
- Powerful Instructor Station and training management—comprehensive, customizable, and integrated solution for developing and implementing a training and certification program (see the Instructor Station Product Sheet).

3KEYMASTER Applications

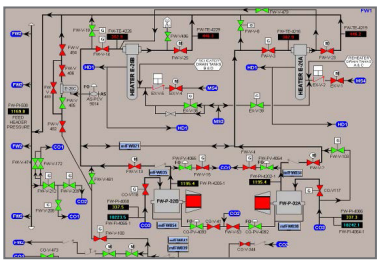
Curtiss-Wright's technology provides great flexibility in deploying simulation for a variety of uses to provide bottom-line benefits in engineering cost-reduction, schedule savings, quality management, and training. Most plants require training simulators, but our technology makes it affordable to have multiple deployments of a plant-specific, engineering-grade simulator across various departments (i.e., engineering) in addition to the training department. This is increasingly important for both new-builds and existing plants. For new-builds, a simulator can be deployed in engineering at the start of the project to provide immediate benefits.

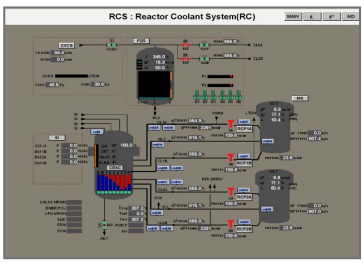
3KEYMASTER Application Examples

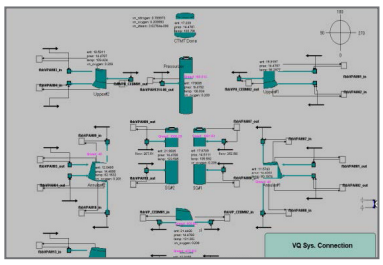
- Conduct safety analysis studies and generate data in support of licensing applications
- Perform Human Factors Engineering studies, test and refine Human-Machine Interface design
- Perform systems engineering functions–develop and verify process sheets, P&IDs, Control & Logic diagrams, and build a central repository based catalog of plant equipment
- Perform Control and Logic systems test, tuning, and V&V, including changes as a result of upgrades and migration to DCS
- Test and validate plant system modifications
- Test and validate operating procedures and plant system test procedures
- Perform studies for validating procedures and time estimates for plant manipulations in conjunction with maintenance or modifications outage planning
- Use 3KEYMASTER as an authority-source of plant design-basis engineering data–e.g., P&IDs, Logic and Control diagrams, etc.
- Implement a rigorous learning management, training, testing and certification program using the powerful 3KEYITSTM. This can be extended beyond operator training to other departments, e.g. engineering and maintenance.

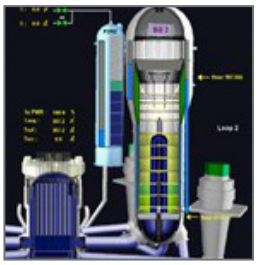
3KEYMASTER Simulator Configurations

- Full-scope replica–full hard panel, soft-panels, and control room environment integration with high-fidelity plant models
- Part-task or compact simulators–only specific systems are fully simulated to train operators on specific tasks, with simplified modeling of the remaining systems. Panels can be emulated using LCDs.
- TouchPanel control room panel replica–interactive training using touch screen technology and a soft-panel based full-scope simulator
- Multiple installations of the above types of simulators, including soft-panel based full-scope simulators outside the operations training room, for engineering analysis
- Graphical Engineering Station for desktop simulation and systems engineering









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