

# BHABHA ATOMIC RESEARCH CENTRE (BARC)



## BARC Simulator

### A NEW PERSPECTIVE

The Training simulator is a dynamic real-time simulator for teaching and learning different aspects of Nuclear power plant. The Advanced Simulator is designed by Sim Infosystems, to create a safe and informative environment for expanding knowledge and experience.

Integrated simulation tool provides a comprehensive simulation platform for model Development, integration, generation of run-time executable, visualization, and conduct of Real-time steady state and transient simulation studies pertaining to thermal power plants for use in analysis and operator training.

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### • BACKGROUND

Bhabha Atomic Research Centre (BARC) has active groups for Research and Development in Reactor Technologies, Fuel reprocessing and waste management, Isotope Applications, Radiation Technologies and their application to health, agriculture and environment, Accelerator and Laser Technology, Electronics, instrumentation and reactor control and Materials Science. Strong emphasis on basic and applied research in a number of core disciplines of Science has made synergy between basic research and technology development possible.

### • ProSimulator INSTRUCTOR STATION

ProSimulator Instructor station enables the instructor to control and direct the training sessions. From the Instructor station, multiple independent training sessions can be invoked by the Instructor and each training sessions can be assigned to work with one or more operator stations. Using this software the Instructor can load a model, invoke malfunctions and monitor the performance of the trainee.

### • ProSimulator OPERATOR STATION

The simulator is provided with emulation for Centum CS3000 DCS. All functions and features that are essential for training are included in the emulation. The controls and interlock logic are also simulated and provides exact replica of the real plant systems. The field operations are simulated through separate FOD graphics on the operator station.

### • ProSimulator PROCESS MODELS

ProSimulator simulation models are based on rigorous application of first principles calculations. It provides a comprehensive Physical Property methods Database, thermodynamic, unit library, instrument/control library and Numerical methods.

## BENEFITS OF BARC SIMULATOR

- ✓ integrated simulation tool for development of real-time power plant simulators
- ✓ Steady state analysis of the plant model at various operating conditions
- ✓ Study various transient scenarios
- ✓ Malfunction studies

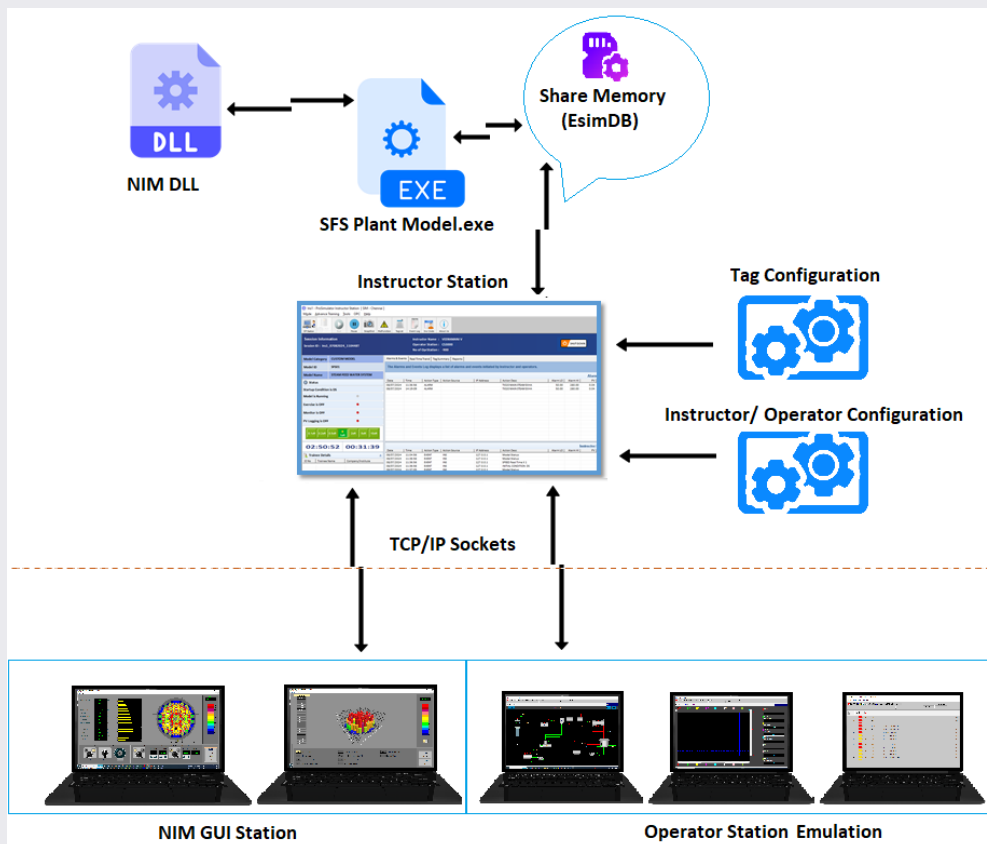


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The following is the scope of BARC Simulator project:

- Supply of an integrated simulation tool with two nos. of perpetual licenses for development of real-time power plant simulators,
- Development, testing and supply of plant simulator including
  - Development and supply of steam and feed water system (SFS) model of a Pressurized Water Reactor (PWR) as per inputs provided by BARC,
  - Integration of a prototype Nuclear Island Model (NIM) of the PWR (provided by the BARC as a pre-compiled library file or DLL file) with the developed SFS model
  - Development and supply (along with source code) of a Graphical User Interface (GUI) for prototype NIM, and its interface with the plant simulator,
  - Integrated testing of the SFS model and NIM along with the developed GUI
- Testing, installation & commissioning, training and warranty services



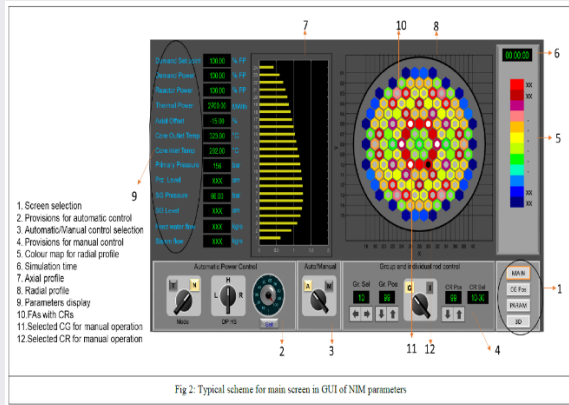
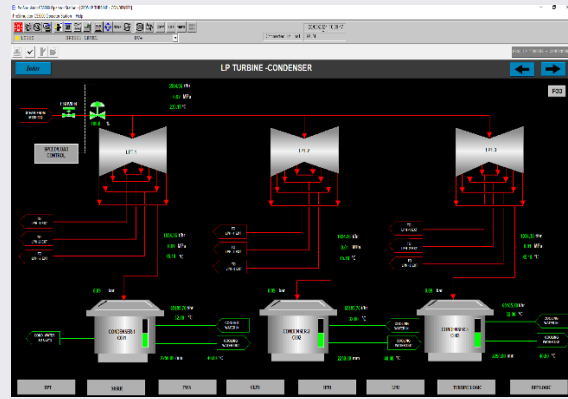
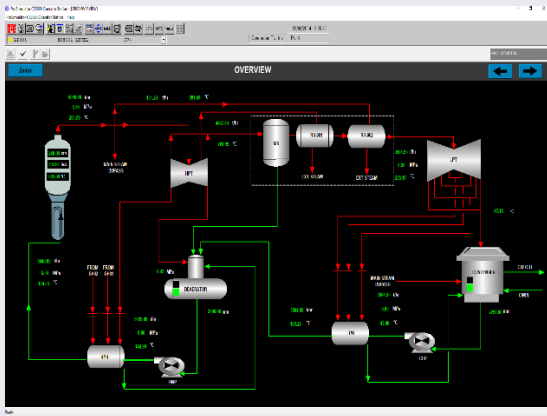


Fig 2: Typical scheme for main screen in GUI of NIM parameters

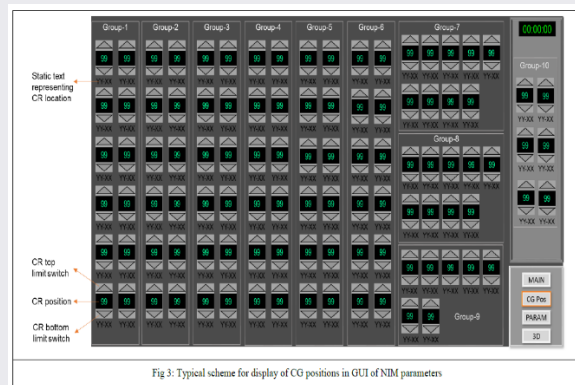


Fig 3: Typical scheme for display of CG positions in GUI of NIM parameters

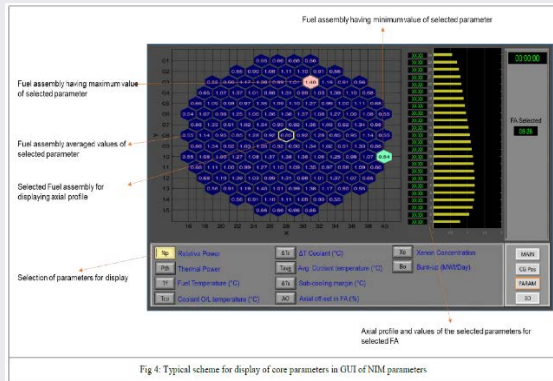


Fig 4: Typical scheme for display of core parameters in GUI of NIM parameters

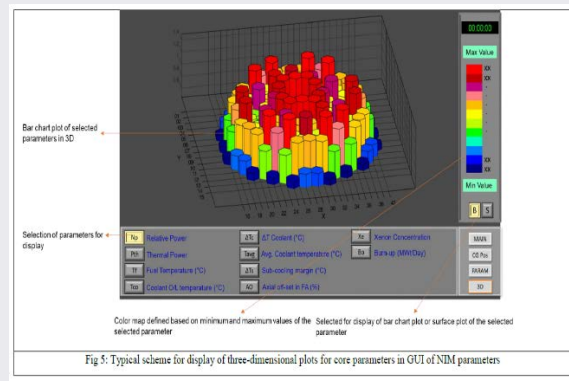


Fig 5: Typical scheme for display of three-dimensional plots for core parameters in GUI of NIM parameters

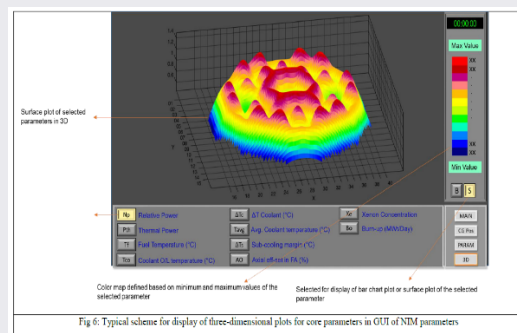


Fig 6: Typical scheme for display of three-dimensional plots for core parameters in GUI of NIM parameters