



**पावरग्रिड**  
**POWERGRID**

**POWERGRID  
ADVANCED RESEARCH and  
TECHNOLOGY CENTRE (PARTeC)**

**The Fulcrum of Power System Innovation**



Leading Continuous  
improvements through  
innovation in business  
processes with emphasis on  
development and/or  
demonstration of the State-of-  
the-Art technologies and be the  
Global Technology Leader in  
power transmission

**POWER GRID CORPORATION OF INDIA LIMITED**

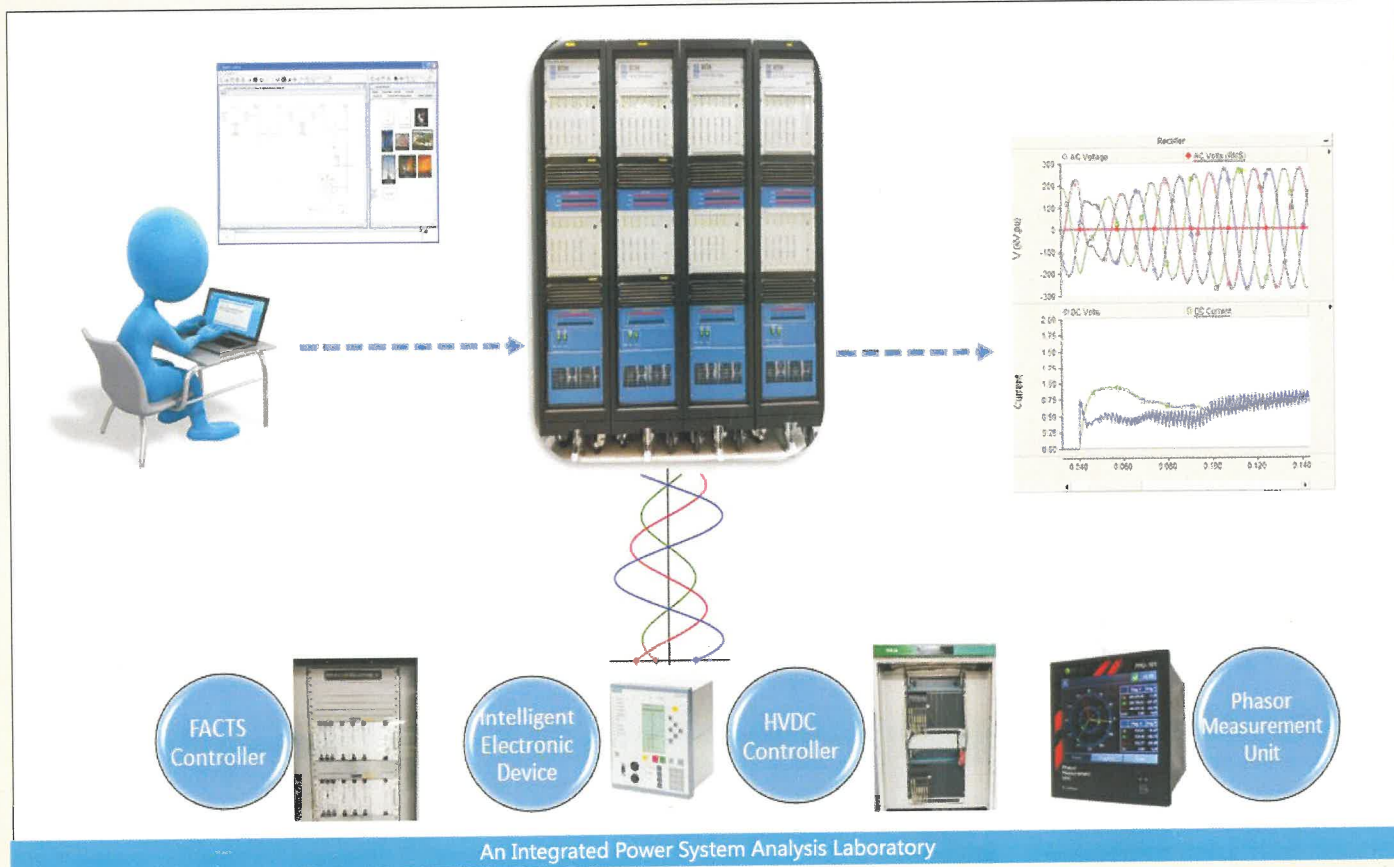
(A Government of India Enterprise)

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## The Real Time Simulator Laboratory

The largest Real Time Simulator (RTS) facility in India with 2340 Nodes (13 racks)  
Capacity up-gradation to 5220 Nodes (29 Racks) by 2021



### The Real Time Digital Simulator

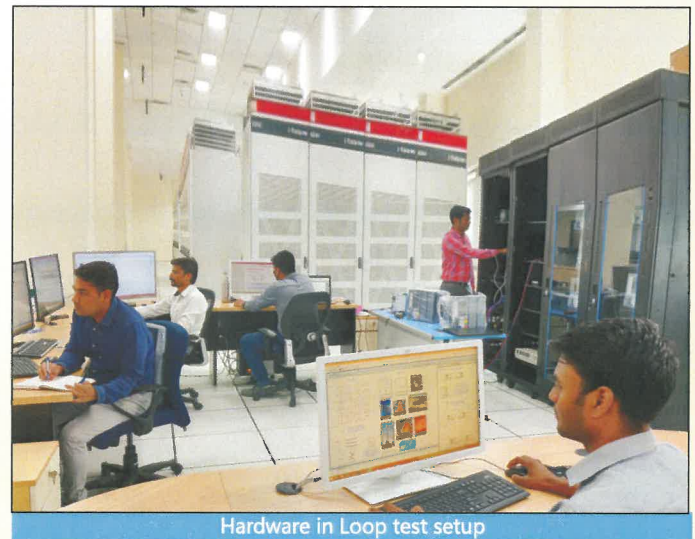
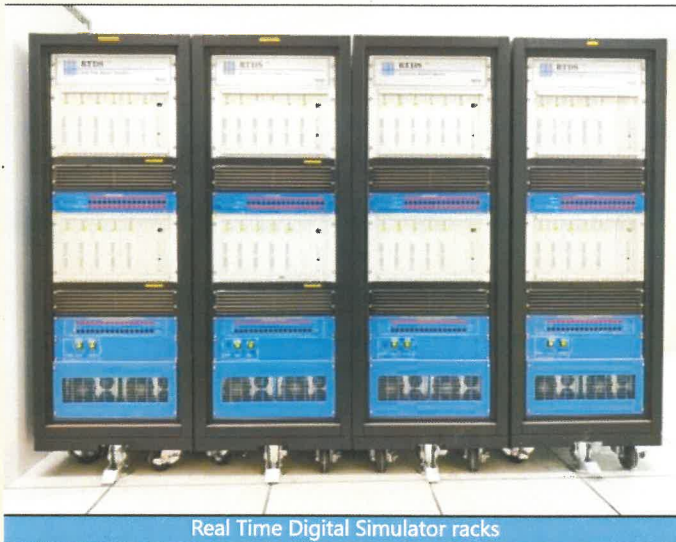
- Runs electromagnetic transient type simulations in real time
- Can be integrated with a plethora of power system devices
- Permits interaction between the simulated network and protection, control, and power devices

The Real Time Simulator (RTS) allows system transients to be studied in great detail over a wide frequency bandwidth and user specific requirements

### Capabilities

- Dynamic Testing of Intelligent Electronic Devices (IEDs) using RTS
- Study of Impact of faults on HVAC/ HVDC system using RTS
- Study of Impact of PV system integration on protection system using RTS
- Power System Transient Studies through PSCAD, EMTP-Rv
- Steady State studies through PSS-E, PSS-SINCAL

The current interface capability is upgraded to SMART simulation system with capability of simulating Sampled Values for Dynamic Testing of Process Bus Compliant IEDs



## Protection, Automation and Control Laboratory

State-of-the-art laboratory to carry out conformance testing of IEC 61580 devices as per latest standards and with additional capabilities



Interoperability Test Setup



PAC lab overview

- Design and Engineering of Digital Substations
- IEC 61850 Conformance related testing and Interoperability Studies
- Parallel Redundancy Protocol /High-availability Seamless Redundancy Testing of IEDs
- Cyber Security studies, vulnerability assessment and audit of IEC 61850 systems

Specialized Hands-on Trainings on IEC 61850 Standard & Digital Substation to Protection Engineers

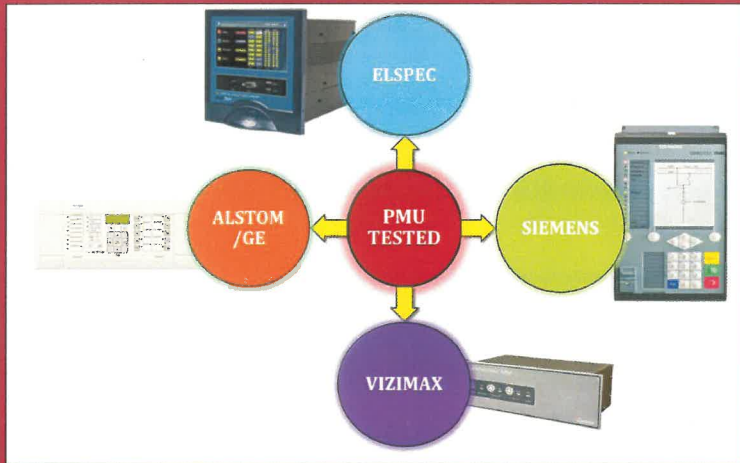


## Wide Area Measurement System Laboratory

Fast, Automated, Traceable Calibration facility, which allows testing of PMUs of various makes/model as per latest IEEE standard C37.118, IEEE Synchrophasor Measurement Test Suite Specification and Customized Test Cases



Contributions to International Forum - NASPIWG:  
 Performance Requirements, Standards, & Verification Task Team Meeting (PRSVTT)  
 PMU Application Requirements Task Force (PARTF)



PMU's tested so far

## Advanced Diagnostic Centre

### Field Measuring Instruments (FMI) laboratory

- State-of-the-art instruments for field testing
- EHVAC / UHVAC equipment diagnosis and failure investigation
- Residual Life Assessment studies



HVAC Electric and Magnetic Field Measurement and Analysis Services for Line and Substation



Field Testing of Power Transformers

### Electrical / Electronic Diagnostic and Calibration laboratory capabilities

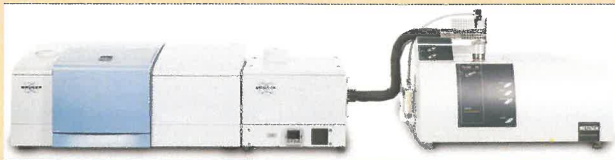
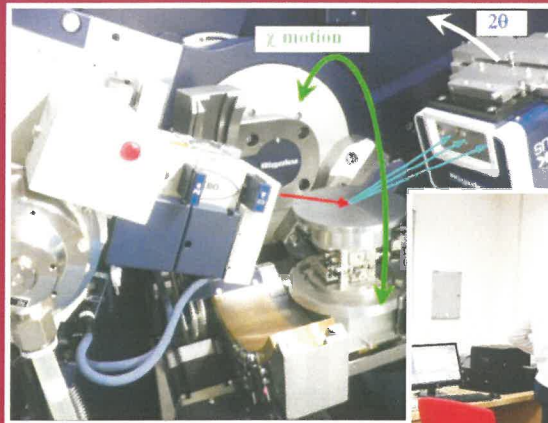
- Electro-Technical Calibration of field equipment viz. Capacitance-Tan  $\delta$  kit, Winding resistance measuring kit, Insulation testers, Energy meters, Multimeters, Clamp-on meters, Temperature sensors, pressure gauges etc.
- On-site/Field calibration services for substation equipment
- Diagnosis and minor repairs of Electronic/printed circuit boards
- Calibration and Testing



## Material Science Laboratory

Structural failure and material analysis, quality assurance, in-service performances, validation and testing of new and in-service materials

- Analysis of Composition, Ageing Process, Desorption Behaviour, Decomposition of materials
- Residual stress analysis, Phase Analysis, Crystallographic texture analysis



X-ray diffractometer facilitated with Texture cradle and large area detector for characterizing crystalline materials

Thermo-gravimetric analysis (TGA) – Fourier Transform Infrared (FTIR) Spectroscopy: A powerful analytical technique that combines the qualitative capabilities of Thermo-gravimetric analysis (TGA) and the quantitative capabilities of Fourier-Transform Infrared (FTIR) spectroscopy – Capable of Thermal Analysis of Materials up to 1000°C





## **PARTeC**

R&D Centre of a World Class Integrated Global Transmission Giant



# **पावरग्रिड POWERGRID**

**पावर ग्रिड कॉर्पोरेशन ऑफ इंडिया लिमिटेड**

(भारत सरकार का उद्यम)

**POWER GRID CORPORATION OF INDIA LIMITED**

(A Government of India Enterprise)

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