

## A.8: Control system for vertical test stand

The vertical test stand (VTS) facility at RRCAT is used for characterization and qualification of superconducting RF cavities. In order to make the various parameters available to the operators sitting in control room and to enable them to set various values in the field, a control system has been developed and installed. Fig.A.8.1 shows the scheme of VTS control system.

### Control system features:

- Two tier architecture: Layer-1 has PC for GUI for Process & Devices monitoring and Layer-2 has PLC for Data acquisition, Control & Interlocks
- Communication: Ethernet (TCP/IP) & Serial (RS-232)
- Devices: Temperature transmitters, Pressure transmitters, Level sensors, Valves, Radiation monitors etc.
- No. of Parameters : Approx. 100
- Parameters: Related to Liquid N<sub>2</sub>, Liquid He, Gas He, Vacuum line, Radiation Monitoring systems etc.
- Interlocks: For liquid He line, Vacuum and Radiation safety.

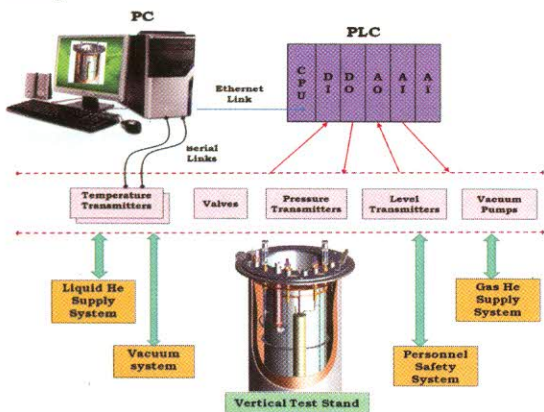


Fig.A.8.1: Scheme of VTS control system

### Hardware scheme:

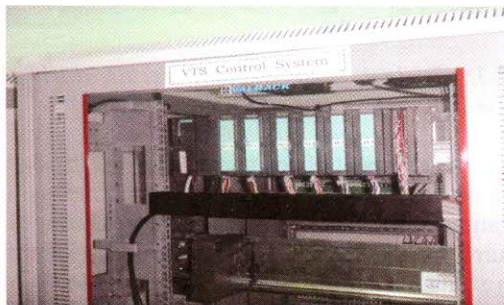


Fig.A.8.2: VTS control system rack with PLC

PLC CPU and I/O Modules are from Siemens S7-300 Family. Siemens STEP-7 software is used to configure and program

the PLC. Ladder logic programming is used to implement various logics.

Fig.A.8.2 depicts the control system rack with the PLC. Following devices have been integrated with the control system:

- Lakeshore make temperature monitors for Cernox sensors.
- PT-100 temperature sensors
- AMI make Liquid Helium level sensor
- PLA make Gamma radiation monitor.

### Software Scheme:

Siemens SCADA WinCC has been used for designing the Graphical User Interfaces (GUI) (Fig. A.8.3 & Fig. A.8.4).

#### Features :

- User Authentication.
- Graphical representation of Process & Instrumentation (P & I) diagram.
- Online display of process parameters
- Data logging in SQL database.
- Action logging in Log-File.
- Color changing of process objects as per their states.
- Data trending in graph format.
- Warning and Alarm logging in table format.
- Warning and Alarm pop-up message displays.
- Configuration setting using User-Archive.

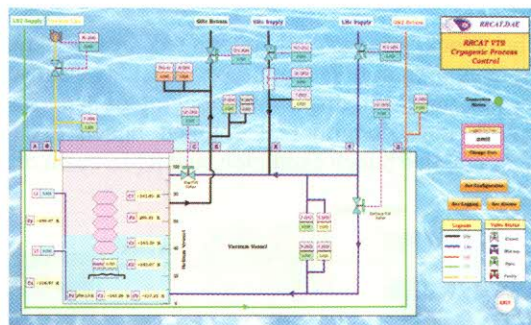


Fig. A.8.3: Snapshot of process GUI

Presently the VTS setup is operated in manual mode and mainly temperature, level and radiation are observed and recorded. For this another version of GUI has been developed as shown below.

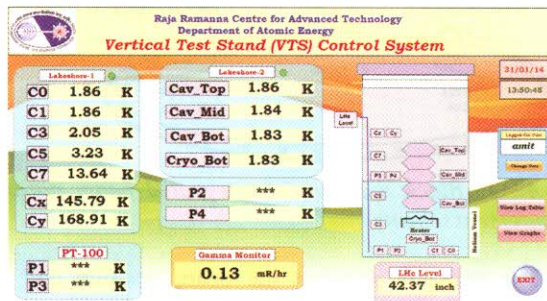


Fig. A.8.4: Process GUI for manual mode operation

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