

## A.4: Control system for remote operation of diagnostics beamlines of Indus-2

In Indus-2, Beam Line Frontend (BLFE) control system is developed for interlocking and regulation of beam line operations from Indus-2 control room. Recently, additional requirements towards remote operation of diagnostics beamlines BL-23 and B-L24 were raised. To meet this requirement, different control modules have been developed and integrated with Indus-2 machine control system at different levels. The scheme of the developed system is depicted in figure A.4.1.

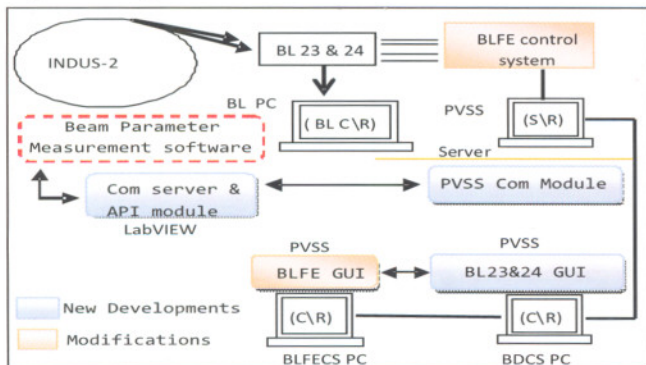


Fig. A.4.:1 Remote operation scheme for Indus-2 BL-23 and BL-24

The system comprises of modified BLFE control system to accommodate the additional beamline interlocks and beamline local/remote signals, newly developed PVSS and LabVIEW software modules deployed at PVSS server PC, Beamline PC and BL parameter measurement PC at BL site.

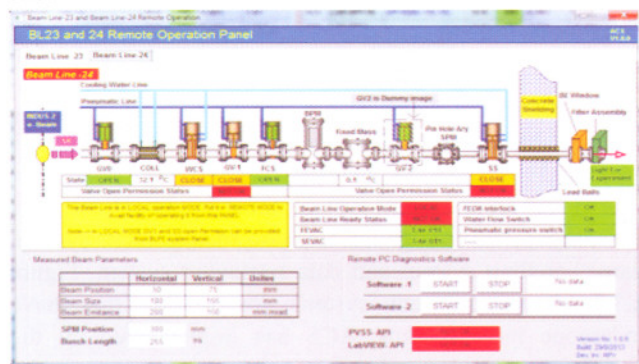


Fig. A.4.2: GUI for remote operation of BL23 and 24

The existing BLFE Graphical User Interface (GUI) is also modified to accommodate the interlocking requirements of BL23 and 24 to support exclusive operation from only one GUI panel depending upon the beamlines' local/remote operation state.

The developed system broadly comprises of three software modules, a) PVSS control and GUI module, b) PVSS communication module, c) LabVIEW based communication server module and application programming interface (API). The PVSS 'GUI and control module' implements the functionalities for display of BL-23 and BL-24 mimic that shows the beam line component states, measured beam data, different server states and the beam line controls and messages interlocked with different beam line states. Figure A.4.2 shows the PVSS GUI screenshot for this.

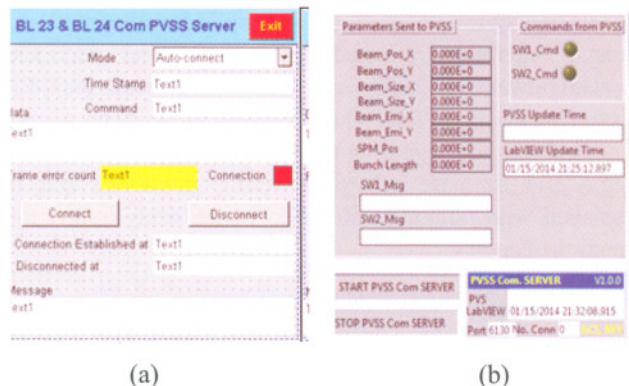


Fig. A.4.3: GUI of (a) PVSS server and (b) LabVIEW server and application programming interface in BL PC

PVSS communication module is developed to act as client for retrieval and notifying data over TCP/IP streaming socket. Using a custom protocol, it handles data collection, data parsing, error handling and updating of PVSS Data Point (DP) structures for the bidirectional data communication related to the measured beam parameters from the beamline software. Figure A.4.3 (a) shows the GUI for this. LabVIEW communication module is developed for extending PVSS capabilities to LabVIEW environment. It provides the interfacing of 'Beam line measurement software' running at beamline location. This module acts as the server that waits for connection request on TCP/IP dedicated port. Module is developed with multiple connection handling capability and auto handling communication error conditions in case of cable disconnection / other TCP/IP related errors. This module is in the form of standalone unit and provides the API that exposes the interface to write/read the data to the PVSS DPs from external application. The interfacing VIs, viz. "read data" and "write data" are developed for easy integration of beam data measurement software developed separately by BDS. All the modules are tested and interfaced with the machine control system.

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