A.16: Control System and Software Package for Interactive Global COD Correction in Indus-2

Global COD (Closed Orbit Distortion) correction in Indus-2 was successfully implemented during last few months. This was done using the Indus control systems for magnet power supplies and beam diagnostics and a COD correction software package developed specifically for this activity. This Global COD correction software represents the machine elements within itself and provides the COD viewing and manipulation facility from control room. Software is presently fully functional along with its complementary part (Response Matrix generator software) which is used to automatically generate Indus-2 Response Matrix (RM). Various experiments for COD correction and RM measurements were performed successfully which helped not only to achieve the target of reduced rms orbit but also to provide proper synchrotron beam for all the five working beam line users.

Software Architecture for COD Correction:

COD correction software is a platform which provides extensive set of features to perform following actions remotely from control room:

- Graphical display of the Indus-2 orbit
- Predict corrector strengths for correcting Indus-2 orbit
- Analyse the behaviour of predicted strengths and view predicted orbit
- Apply predicted strengths to steering magnets

MATLAB is used for development of GUI and implementation of correction algorithms whereas JAVA APIs are used to provide a communication framework to COD server API at PVSS (Layer-1 of Indus-2 control architecture). COD correction software is integrated with the existing 3 layer control architecture and it communicates with COD server API, running at PVSS (Layer-1) and abstracting lower layers of control system.

Software features

- Displays all orbit and corrector strength data graphically.
- Option to select correction algorithms like Singular Value Decomposition (SVD) and Least Square Minimization (LSM).
- Database save and browse operation.
- Detailed view, orbit & strength statistics (max, rms) of data display.
- Option to save all orbit & strength data locally.

- Orbit bump operation, persistent mode display of orbit option, option to display strength in
- mrad or Amp.
- Option to apply strengths in wanted fractions.
- Option to enter the desired SVD value to optimize rms steering magnet current.

Figure A.16.1 below shows architecture of Indus-2 control system and COD correction software highlighting the data flow in the orbit correction process.
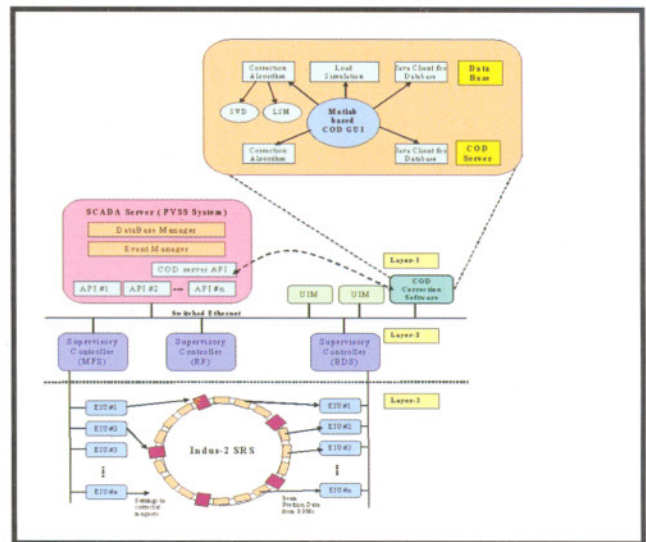

Fig. A.16.1: Data Flow Across Indus-2 Control System and Architecture of COD correction software

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