A QUALITY ASSURANCE APPROACH FOR THE FULL REMOTE ALIGNMENT SYSTEM

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INTRODUCTION

Full Remote Alignment System (FRAS) is
- part of HL-LHC around ATLAS and CMS
- a multi-sensor monitoring and alignment system
- remote alignment of 68 components
- 9 different sensor systems
- approximately 1150 sensors and 344 actuators

The system requires a rigorous data handling: structure, flow, storage, asset management and database interactions.

RETURN OF EXPERIENCE & FUTURE NEEDS

The return of experience shows that the quality assurance scheme in place does not reflect all needs in terms of data consistency and efficient asset management.

The future FRAS asset management has to take into account
- new sensor technologies and therefore new sensor parameters
- local coordinate systems – translations and rotations – as the calculation method evolved to a 3D network adjustment
- automated parameter uploading during reception, validation, calibration, installation, maintenance and storage
- hierarchical relationships that must be represented directly in the database structure

RELATIONSHIPS & PARAMETERS

naming, assets, work orders and their relationship

CERN TOOLS

CERN tools interaction to provide all information for position calculation and remote alignment of the FRAS components.

CMMS®
- Mainly static data issued from calibrations and fiducialisations. Occasionally updated during maintenance.

LGC
- CERN compensation software for 3D position network adjustment. Combines all measurements and parameters from the different databases into a measurement model.

NXCALS
- Storage location for the sensor measurement data.

LAYOUT DB
- Definition reference for infrastructure data, e.g. equipment naming and functional position definitions.

SURVEY DB
- Naming reference for geodetic points, storage location for magnet assembly fiducialisation data and storage location for position determination results.

RESULTS & FUTURE DEVELOPMENTS

The FRAS asset management concept specifies the
- asset types to be created
- naming of each type of asset
- work orders and tasks for each asset type
- parameters created during the work tasks
- storage location for each parameter
- exchange / data flow between databases

The implementation of the concept will be valid for
- all functional positions as designed by the HL-LHC layout
- all geodetic reference points as defined in the SURVEY database
- all assets that are part of the Full Remote Alignment system

The concept validation will take place on the following installation
- Single Component Test
- Inner Triplet String Test
- FRAS installations in HL-LHC
- Remote Alignment Consolidation in LS3