CMS ENDCAP MUON ALIGNMENT TESTS ; MP9 - ISR

11/12/99
D. Eartly

I. GOALS

(1) Setup hardware prototype of the new DCOPS and analog sensor system

(2) Test hardware prototypes of sensors, supports, survey references, calibration

(3) Test hardware prototypes of Transfer plates, lasers, R and Z transfer sensors

(4) Test readout concepts/process with integration of the serial DCOPS

(5) Test first ideas of measurement analysis, reconstruction, data exchange

(6) Use of and comparison with PG survey results in system definition

(7) Demonstrate R, PHI, Z position monitoring capability in a ME2 SLM mockup using the new DCOPS sensor system

(8) Verify long term stability, estimates of resolution, error propagation through the complete alignment chain

(9) Understand measurement averaging, fluctuations, procedures, pulsed sources, laser stability, background, electronic noise levels

(10) Demonstrate the stability of system operation, calibration, positions, laser beam effects over long paths, shimmering, mode fluctations, beam shape

(11) Provide data set for detailed analysis and software development

(12) Demonstrate validity of hardware prototypes or changes

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II. Configuration

One Transfer (Link to SLM endpoint) defined from the ALU MAB sensor (et3) and a "FAR MAB" fixed sensor (et2) and cross referenced by PG survey.

The ALU MAB sensor and mount will be DCOPS on prototype mounts defined for the future MABS

Transfer plate can be translated and rotated; will include Inclinometer monitoring.

Opposing SLM endpoint defined by a fixed sensor (et12); defined by PG survey.

Position monitor with a full complement of CSC DCOPS sensors (two moveable)

Bi-Directional laser measurement tests in the 14 m SLM (two opposing lasers) across the whole EMU CSC layer

Z transfer from a MAB reference surface to the Transfer plate using our prototype tube and sensor system (standoff laser distance measuring device to the MAB ref)

R transfer from a MAB reference to the Transfer plate (temperature monitoring)

R transfer from the Transfer plate to "ME2/2" simulated as a tube structure with temperature monitoring

R transfer from "ME2/2" to "ME2/1"

AD592 current source T sensors; Z tube, Transfer plate, R tube, sample sensors

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III. MP9 Schedule

(1) Design drawings on hardware components/layout are complete (~ 50 drawings)

Go to ftp://www-ppd.fnal.gov/cms_ftp/ (cms underscore ftp)

LP0200030B is the ISR layout, various mechanical parts dwgs go from

Transfer plate LP020020A to LP020089 for Z connection

(2) Majority of components in construction at the Northeastern shops (Dbase list)

(3) Commercial parts are in procurement (metric based)

(4) Analog Readout system based on HP 3470A Data Acquisition system in procurement

(5) Serial data interface program possible from CDF effort- to handle DCOPS

(6) Serial downloading, multi sensor operation, CCD readout (1 Dim, Bi-Di DCOPS)
is working; 3 Interface boards, 4 DCOPS boards, 5 FNAL 90 degree Sensor heads (Bi-Di), >= 1 Dir Sensor Head THERE ARE FOUR WORKING DETECTORS for Readout development and tests

(7) Final artworks; DCOPS, Interface, sensor PC boards checking done this week

(8) DCOPS parts procurement for 10 additional detectors, artwork to procurement next week

(9) Will begin readout of analog R, T sensors in Lab 7 and begin preparation of MP9 tunnel

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(10) Setup of 14 m SLM string with Transfer plate, 10 DCOPS sensors, Dual end Lasers, control and timing modules

(11) Complete readout of analog devices and serial interface to DCOPS by the end of Jan 2000

IV. ISR SCHEDULE

(1) Initial hardware setup, survey, preliminary measurements Febuary 2000

Based on having the required support blocks/sufaces in place

Based on the **installation of the ALU MAB (or new MAB substitute)**

Based on the **setup of the Link line system**

Installation, survey, MAB sensors, connection to MAB

Operation of the readout system , certification of readout values

Data buffer exchange, preliminary **local** geometry reconstruction, re-survey

Preliminary data runs, data exchange, movements

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(2) Analysis back home, modifications, software development March 2000

(3) Second long term data cycle (long term stability, movements, error analysis)

April 2000

(4) Result analysis for EDR June 2000

V. REQUIREMENTS

(1) Physical support blocks and plates at the X, Y (elevation relative LINK), Z as specified in the layout and corresponding to LP020030A layout.dwg

ftp://www-ppd.fnal.gov/cms_ftp/ in directory CMSEMUalign

(2) Local cluster of 220v power for LV supplies, computer, readout

(3) Photogrammetry local survey with 50 micron resolution, grid wide 100 micron