Solenoid Status Report

Pablo Campero

8/2/17

Solenoid arrival

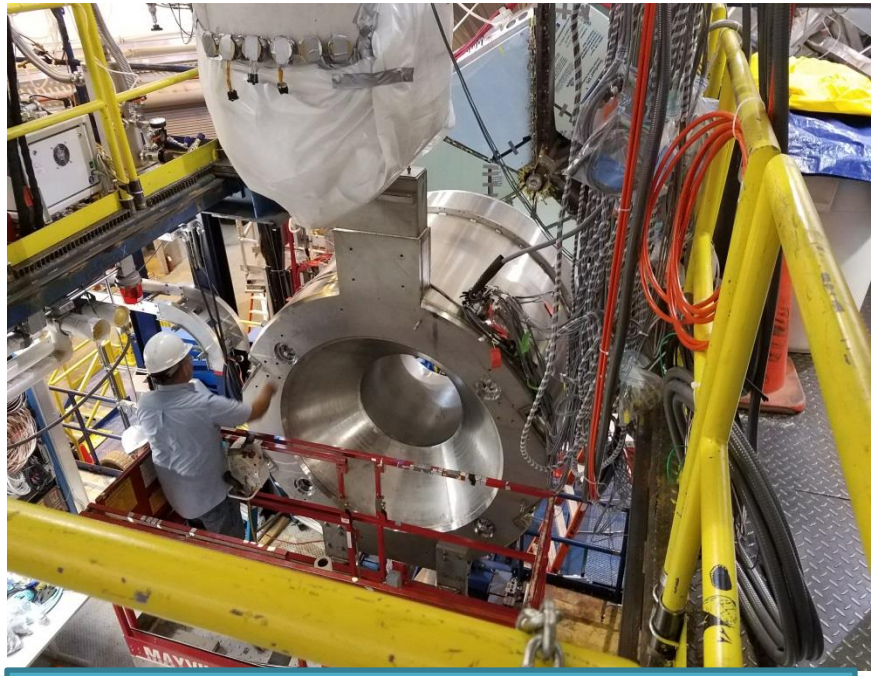
- Solenoid was delivered at JLab on June 28th

Solenoid placed on hall B outside on June 27th

Downstream view of Solenoid magnet on its assembly car support at hall B

Highlights

- Initial alignment – align to the beamline
  - Re-tension radial suspension links
  - Removed shipping restrains and installed Z-axis restrains
  - Completed on 06/29



Solenoid during process of installation of axial supports

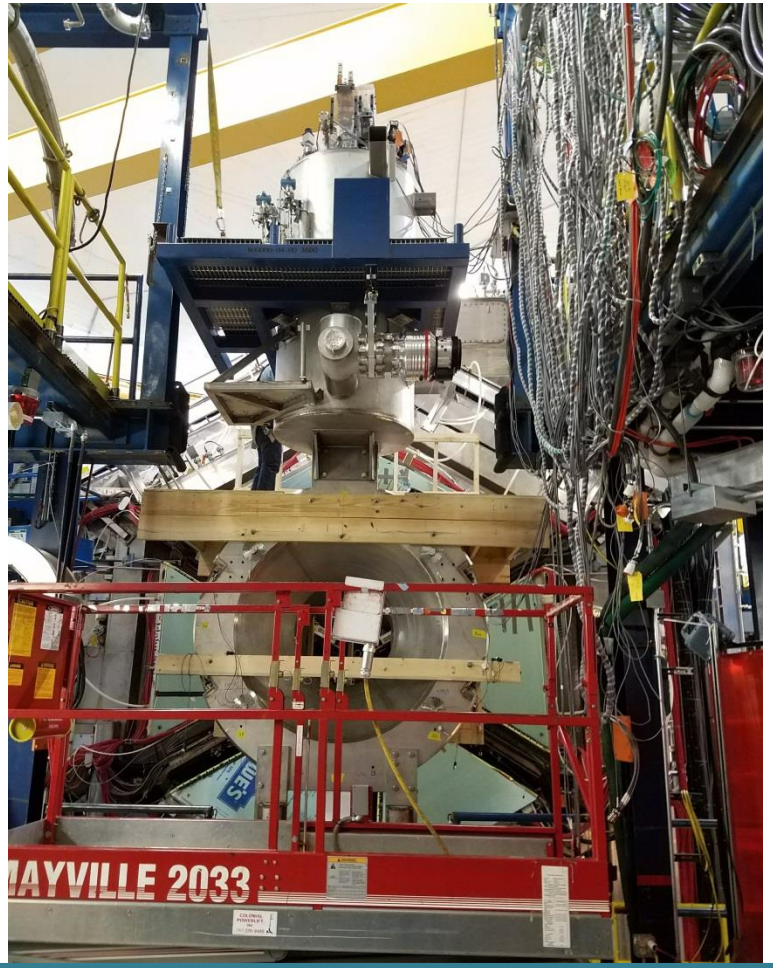
Highlights

Solenoid Service Tower without bottom shield during alignment with Solenoid

- First alignment of the SST at the top of the Solenoid
- Splice block components installed - Completed on July 8th .
- Installation of voltage taps and wiring –Completed on July 17th.
- Pressure leak test of the Solenoid Magnet shield piping at 320 psig completed on July 12th.

Highlights

- Completed primary vacuum instrumentation installation on Jul 26th.
- All planned welding on parts of the Solenoid Installation was completed on Jul 31st.



Solenoid final assembled with SST and Vacuum system

Activities completed

- Solenoid Power-up and Cooldown ERR review on July 6th and July 7th .
  - Final report to close actions for the recommendations of the Solenoid Power-up review due by August 15th.
  - Final report to close actions for the recommendations of the Solenoid Cooldown review due by August 15th.

Instrumentation and Controls Tasks

- Identified all sensor cables to be connected to the magnet for initial instrumentation test prior to its arrival. (Pablo Campero)
  - Identified feedthroughs for temperature sensors, voltage taps, load cells sensors.
  - Verified proper lengths and labels on the cables
  - Completed on June 27th.

Instrumentation and Controls Tasks

- PLC was disconnected (lost power supply) due to electrical disconnection in DBX control racks. (Pablo Campero)
  - Solenoid PLC was re-established by moving power cable to a safe circuit of the backup UPS power supply.
  - Solenoid local and remote PLC chassis were reset to re-established the communication status.
  - Completed on June 27th

Instrumentation and Controls Tasks

- Sol-FastDAQ-cRIO could not be connected to the network, presented unrecoverable issues. (Brian Eng/Tyler Lemon)
  - Re-installed firmware and Re-formatted to reinstall software. Action did not work.
  - Replaced cRIO-9068 controller with the spare cRIO-9067.
  - Loaded LabVIEW 2016, latest firmware v.4.0 and modified program to use the new cRIO controller
  - Solved on June 27th

Instrumentation and Controls tasks

- Radial load cells presented negative values for the readouts in the Solenoid control systems. (Brian Eng/Pablo Campero)
  - Compared negative values with FUTEK readouts.
  - Measured excitation voltage and voltage sense for each radial load cell.
  - Verified serial number and operation range (0-100 KN)
  - Changed lookup tables from Normalized to the No normalized values in the LV-cRIO program for all axial load cells.
  - In progress – Still negative values present for two radial load cells, waiting for further information from the HBM vendor of load cells.

Instrumentation and Controls tasks

- Readout for the axial load cells ~ 120 Lbf during test at zero lbf load. (Brian Eng/Pablo Campero)
  - Analyzed axial supports configuration with respect to the location of the load cell sensor.
    - Changed some bolt from 2,5 inch to 2,0 inch
  - Changed lookup tables form the Normalized to the No normalized values in the LV-cRIO program for all axial load cells.
  - Replaced one damage axial load cell.
  - Improved the readouts at zero load, the best of the 6 tested was the replaced load cell AL_01 (~ 2 lbf) - Completed on July 13th.
  - Still need to test 2 of the 8 axial load cells located in the upper downstream position.
  - In progress, lift practical training is required to reach the remain two upper load cells.

Instrumentation and Controls tasks

- Lost of communication with Solenoid Crycon temperature monitor units via web page. (Brian Eng/Pablo Campero/Tyler Lemon)
  - Configured network settings.
  - Tested condition for communication with hall B subnet, blocked no required options.
  - Replaced firmware version from 1.4 to 2.10

  - Solved on July 20th.

Instrumentation and Controls tasks

- Connected temperature sensors in the magnet and found misbehave at ambient temperature (~300 K) for PT-100 and Cernox sensors. (Brian Eng/Pablo Campero)
  - Measured excitation voltage on LV chassis.
  - Verified wiring for all sensor and corrected serial numbers in drawings related.
  - Found that serial numbers were not the correct for the sensors , when they were compared with the ETI documentation.
  - Corrected discrepancies in the documentation used for programming.
  - Serial numbers in the Sol-LV-cRIO program for 13 Cernox sensors were changed.
    - Two Cernox sensors dead - TS23 and TS16 with a 0 ohm resistance measured.
  - Resistance and Temperature in the lookup tables for all PT100 sensors were swapped in the Sol-LV -cRIO program.

  - Solved on June 30th.

Instrumentation and Controls tasks

- Connected temperature sensors in the SST and found five of them were out of range. Displaying a ‘clip error’ in the Cryocon units. (Brian Eng/Pablo Campero)
  - Verified wiring and measured voltage sense and excitation currents for faulty sensors.
  - Swapped voltage sense cables polarity in the terminal block for five faulted temperature sensors.
  - Noticed that sensor TR8673 was damaged.
  - Replaced TR8673 with TR8673r (redundant) lookup table on Cryocon unit # 2 at channel B.
  - Solved on July 20th.

Instrumentation and Controls Tasks

- Issues with the actuating of electric valves in the SST were found and suspected that generates pressure leaks on the solenoid. (Pablo Campero)
  - Re-calibrated three LVDTs used to control the position of the electric valves.
  - Removed sync mode no need for the 4 LVDTs
  - Corrected wiring and drawings related to the LVDTs.
  - Verified mechanically that all electric valves operates properly at fully open and close positions.
  - Verified seal pressure for the valves (~200 psi)

  - Not complete, pressure leak still present in the process He lines. In process to rebuilt valve stems for EV8611JT and EV8611CD.

Instrumentation and controls tasks

- As part of the recommendation during the ERR review it was suggested the synchronization of the time clocks of the controls systems. (Brian Eng/Pablo Campero)
  - Implemented E-WEB PLC module to allow all the PLC synchronize their internal clocks with the JLab NTP server.
  - cRIO Control systems were configured to get the system time from the Jlab NTP server.
  - Completed on July 25th.

Instrumentation and Controls tasks

- Tested Instrumentation for the Vaporizer (Pablo Campero/Brian Eng)
  - Solenoid valve SV8678DV
  - Solenoid valve SV8678CR
  - Temperature sensor TP8675
  - No issues presented for the three signals instrumentation, tested readouts in PLC and EPICS.
  - Completed on July 25th.
- To complete with the test for the instrumentation on the vaporizer panel, valve SV8675BY (Pneumatic valve now) requires 120V AC power and air line connection.

Instrumentation and Controls tasks

- Performed initial test for the vacuum signals and found that readouts for vacuum gauges were switched on control systems (PLC/EPICS)
  - Verified correct assignment PLC module channels for three signals tested.
    - CG 8606, CG8600TB and TB8600
  - Checked PLC logic to ensure correct scales factor for the readouts.
  - Corrected drawing and wiring to change the gauge position on the analog outputs (0-10 V) of the Vacuum controller to the PLC.
    - Switched wiring for pin-out connector (pin 1 and 2)
  - Solved August 1st .

Conclusions

- There are still instrumentation that need to be tested for the vacuum guard, vaporizer, and Solenoid Service Tower.
- Running tasks at this moment :
  - Vacuum pump-down
  - Installing drain line of vaporizer
  - Installing primary U tubes.
- Possible power-up of the solenoid magnet by end of September.

Acknowledgments

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  - Peter Bonneau
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  - Brian Eng
  - Tyler Lemon
- Magnet group