GlueX-doc-1883

02-January-2012

C. A. Meyer

**CDC Construction Status:**

Phase one of the CDC construction results in the chamber frame and inner shell assembled and mounted on the construction mandrill. This task is 100% complete.

Phase two is the installation of the straws in the CDC. This task is 100% complete. Phase three is the installation of gas lines and the outer shell. This task is about 100% complete. Phase four is stringing of the chamber is 50% complete and phase five, the electrical hook up is about 5% complete.

The following table lists the parts that are needed during the first two phases of construction of the CDC. Original estimates for delivery of parts (inner shell, straws and plastic donuts/feedthrus) were early be several weeks.

|  |  |  |  |
| --- | --- | --- | --- |
| Part | Date at CMU | Status | Ready to Use |
| Al. Donuts | 1-Apr-2010 | Checked and cleaned | 6/20/10 |
| Al. Feedthrus | 1-Apr-2010 | Checked and cleaned | 6/20/10 |
| Plastic Donuts | October | Checked and cleaned | 11/24/10 |
| Plastic Feedthrus | October | Checked and cleaned | 11/24/10 |
| Pin holders | October | Check/clean (arrived 11/2) | 80% ready |
| Crimp pins | 7-June-2010 | Checked and in clean storage. | 6/15/10 |
| Al. Endplate | 1-May-2010 | Reamed, cleaned and ready. | 7/10/10 |
| Cfib. Endplate | 1-May-2010 | Reamed, cleaned and ready. | 6/22/10 |
| Support Rods | 1-May-2010 | Installed | 6/22/10 |
| Straws | 23-Sept-2010 | 1900 arrived, 100% checked | 10/20/10 |
| Straws | 29-July-2010 | 250 Sample Checked & Accepted | (250) now |
| Inner Shell (good)  Inner Shell (test)  Installed | 15-July-2010  20-July-2010  20-Sept-2010 | Cleaned, finished end  Glue tests completed  Installed | 7/15/10  8/15/10  9/20/10 |
| Stringing Mandrill | Made at CMU | Finished, cleaned | 7/10/10 |
| Frame Bolts | 10-Sept.-2010 | Installed | 10/15/10 |
| Spacer Rods | Made at CMU | Installed | 10/15/10 |
| Straws | 26-May-2011 | Installed | 15/06/11 |
| Swiss Cheese Plate |  |  |  |
| Support rings |  |  |  |

As of 01 November, 2010 the CDC frame has been fully assembled on the mandrel and the endplates are aligned to within 2 mils. The chamber is in its vertical stringing position and ready to install straws. The final installation and gluing procedures need their final optimization before full-scale installation can start.

All plastic donut and feedthrus and pinholders have been checked and cleaned and are ready to be used.

We have started manufacturing the hook-up wires to be used to connect the crimp pins to the pc board that mounts the HVB. At this point, around 1400 wires have are cut and the ends that makes contact with the chamber are done. All parts to complete the other end are at CMU. We are estimating that manufacturing the wires represents 10% of the hook-up effort in the latter stage of the project.

The outer shell and gas plumbing was successfully installed on the CDC in September of 2011.

Because of delays in the delivery of straws, layers 1,2,3,4, 13 and 14 (438/3522 straws) were strung during the spring of 2011. Tension checks were made multiple times on these straws. All the issues occurred within about one week of stringing, and no further issues have been encountered with these straws, even after the chamber was lowered to install the outer shell.

1. 431/438 straws were within acceptable tension ranges.
2. Seven straws had no measureable tensions. These wires were removed from the chamber. Six appear to have broken inside one of the crimp pins. One appears to have broken about 3 cm from the crimp pin. These wires will be replaced when we start stringing the chamber again.
3. Tension measurements will be repeated on a sample of these during July to monitor the stability of the tensions.
4. Tensions for layers 1-4 were remeasured in August. All tensions were consistent with earlier measurements.

Stringing started in earnest October of 2011. To date all the axial layers have been strung and tensions have been checked. This includes layers 1,2,3,4, 13,14,15,16,25,26,27 and 28. Stringing of stereo wires is also underway. In order to minimize the torque on the endplates, we have been stringing alternate directions of stereo layers. To date, we have completed stringing layers 5,6,9 and 10. We anticipate that layer 7 will be strung by December 1. Tension measurements are about one week behind stringing to allow the wires to settle. We are finding that no more than a few percent of wires need to be restrung. We estimate based on the current rate of stringing that all wires will be in by early February 2012, and all tension tests will be completed by mid February.

Construction Issues Encountered:

1. Initial installation of the straws was stopped when we discovered that some fraction of the straws had surface resistances that were 5-6 times too high. It was traced down to a very thin aluminum layer and the vendor was notified and is checking the last shipment of straws. Careful checks seem to show that it is isolated to one of seven bundles of straws that we have. We have spot checked the others and used a full second bundle with no further problems.
2. As a result of this problem, 42 completed straws were removed from the chamber before gluing and another 24 had to be discarded. This issue resulted in about 1 lost week of effort.
3. Procedures have been changed to add additional checks on the straws’ conductivity before starting.
4. Even though it was checked and reamed in June, we are finding that we need to hand ream about 5% of the holes in the endplate. There may be some oxidation occurring. This is a minor annoyance.
5. We also have a minor hindrance in that some small number of Al feedthrus stick in the Al endplate and need to be tapped out. This is a minor annoyance.
6. As we start installing stereo tubes, we expect that other annoyances will be encountered. Minimal issues were encountered.
7. In early July, we realized we would run out of about 100 aluminum donuts and feed throughs. Jefferson Lab ordered additional units and they are expected at CMU in very early September. These are needed to complete installation of straws.
8. We consider the 7 broken wires out of 438 to be normal. All wire will have their tensions checked and those out of tolerance will be replaced.
9. The outer shell is at CMU. The edges of the two half shells are flat, rather than round. In order to try and repair this, we have built some rounded clamps that we are using to try and hold the shells in their final position for several weeks.
10. The first attempt to build the installation rings for the outer shell snapped at the glue joint. We are redoing with 3/64 aluminum rather than 3/64 G10.
11. All of the 209 straws in layer 28 were cut 1mm short. This was due to the stop having been bumped fairly hard and being tilted slightly. 90 of these have donuts already glued in and are being installed pushed towards the carbon fiber endplate. CMU will look into gluing the remaining donuts slightly out of the straw to recover the 1 mm.

Conducting Epoxy Schedule:

40 10-gm packets arrived June 2010.

100 10-gm packets arrived October 2010.

100 10-gm packets arrived December 2010.

15 2.5-gm packets arrived June 2010.

40 2.5-gm packets arrived November 2010.

60 2.5-gm packets arrived December 2010.

100 10-gm packets arrived January 2011.

70 2.5-gm packets arrived in June 2011.

12 10-gm packets arrived in July 2011.

58 10-gm packets arrived in July 2011

10 2.5-gm packets arrived in August 2011.

CMU supplied manpower on the project:

Project Scientist: Naomi Jarvis

Curtis Meyer

Paul Mattione (since August 2011)

Construction Manager: Gary Wilkin

Manpower billed to the project:

Technician: Amy Woodwell (since June 1)

Kaitlin Mueller (since August 15 ).

Current Undergraduate Students:

Rahul Kurl (50%) (November 2010 to August 2011)

Maddi Braumbaugh (since April 2011)

Former Undergraduate Students:

Tom Charley (100%) (May 15 to on July 30).

Devin McGuire (60%) (June 1 to June 30)

Elizabeth Keller (10%) (Nov-Dec 2010)

Mason Blaschak (10%) (Nov-Dec 2010)

Aleksandar Popstefanija (10%) (Nov-Dec 2010)