



# Jefferson Lab Alignment Group

## Data Transmittal

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**Checked:** cg

**# :** A2054

**DETAILS:**

M:\align\DATA\Inspection\HallA\MOLLER\_2025\221010A

Below are presented the results of the Hall A Moller TM coil frame assembly inspection surveyed on 10<sup>th</sup> September, 2022. A Beam Following Coordinate System has a positive dx on the left looking downstream, a positive dy is up, and a positive dz downstream. The Beam Following Coordinate System for this part was created for the US and DS sectors as follow:

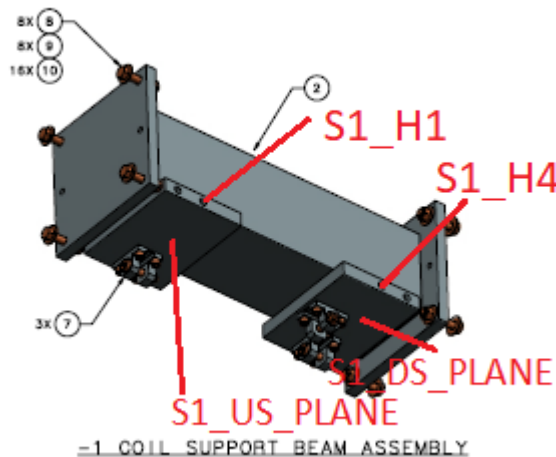
- First a plane build through the holes on the US/DS side of the sectors;
- a circle projected on the created plane using the US/DS holes of each sector;
- a line between the circle centers of the US and DS sectors represents the z axis;
- the plane measured on the bottom of the US and DS plates hold the roll;
- as origins, the build sectors circle center points.

The part coordinate system is defined for each sector and it was created by rotating the US and DS frames the ideal angular value of 51.4286degrees.

The delta angles are the difference from design shown in degrees. The average delta on the roll angle is of 0.0139 degrees. Pitch was also reported with an average delta of 0.0853 degrees.

Table 1. Sector planes rotations

	Rotation angles	
	Rx from Y	Rz from X
S1_US_PLANE	0.0314	90.0480
S1_DS_PLANE	0.0087	90.0567
S2_US_PLANE	0.1820	89.9857
S2_DS_PLANE	0.1760	89.9902
S3_US_PLANE	0.0893	90.0058
S3_DS_PLANE	0.0833	90.0079
S4_US_PLANE	0.0264	90.0169
S4_DS_PLANE	0.0294	90.0213
S5_US_PLANE	0.0785	90.0281
S5_DS_PLANE	0.0751	90.0284
S6_US_PLANE	0.1587	90.0239
S6_DS_PLANE	0.1638	90.0256
S7_US_PLANE	0.0494	89.9755
S7_DS_PLANE	0.0418	89.9805



For table 2, an ideal distance from circle center to each hole on the 7 sectors is 101.60mm, an ideal radial distance is 676.28mm according to the drawing *A09005-15-03-5500.pdf*. An ideal distance between the two holes of the sectors is of 8 inches.

**Table 2. Sectors holes position**

Component	Part Coordinate system			Beam Following System			dist.[inch]
	X[mm]	Y[mm]	Z[mm]	dX[mm]	dY[mm]	dZ[mm]	
S1_H1	100.07	676.61	-0.72	-1.53	0.34	-0.72	
S1_H2	-103.57	676.59	0.10	-1.97	0.31	0.10	8.017
S1_H3	-102.04	676.39	0.01	-0.44	0.12	0.01	
S1_H4	101.63	676.61	-0.80	0.03	0.34	-0.80	8.018
S2_H1	101.38	677.42	1.61	-0.22	1.14	1.61	
S2_H2	-102.02	677.56	1.65	-0.42	1.28	1.65	8.008
S2_H3	-101.76	676.40	1.61	-0.16	0.13	1.61	
S2_H4	101.63	676.42	1.59	0.03	0.15	1.59	8.008
S3_H1	101.44	676.87	1.38	-0.16	0.59	1.38	
S3_H2	-102.03	676.94	1.21	-0.43	0.66	1.21	8.011
S3_H3	-102.11	676.35	1.20	-0.51	0.07	1.20	
S3_H4	101.34	676.47	1.42	-0.27	0.20	1.42	8.010
S4_H1	103.52	676.95	0.07	1.92	0.67	0.07	
S4_H2	-99.89	677.24	-0.82	1.71	0.96	-0.82	8.008
S4_H3	-101.40	676.93	-0.78	0.20	0.65	-0.78	
S4_H4	102.02	676.92	0.13	0.42	0.65	0.13	8.009
S5_H1	101.11	676.88	-0.98	-0.49	0.61	-0.98	
S5_H2	-102.38	676.80	-0.34	-0.78	0.52	-0.34	8.011
S5_H3	-101.67	676.22	-0.30	-0.07	-0.06	-0.30	
S5_H4	101.79	676.47	-0.94	0.19	0.20	-0.94	8.010
S6_H1	101.79	677.34	-0.41	0.19	1.06	-0.41	
S6_H2	-101.70	677.31	-0.50	-0.10	1.03	-0.50	8.011
S6_H3	-101.81	676.18	-0.49	-0.21	-0.10	-0.49	
S6_H4	101.70	676.40	-0.44	0.10	0.12	-0.44	8.012
S7_H1	102.71	677.09	-0.84	1.11	0.82	-0.84	
S7_H2	-100.76	677.22	-1.39	0.84	0.95	-1.39	8.011
S7_H3	-101.35	676.85	-1.36	0.25	0.58	-1.36	
S7_H4	102.13	676.93	-0.86	0.53	0.65	-0.86	8.011

Table 3, presents the position of the average points of the sectors projected on the sector plane in the Beam Following System. The ideal radial distance was calculated based on *A09005-15-03-5500.pdf* drawing with a value of 663.575mm.

**Table 3. Sectors average point position**

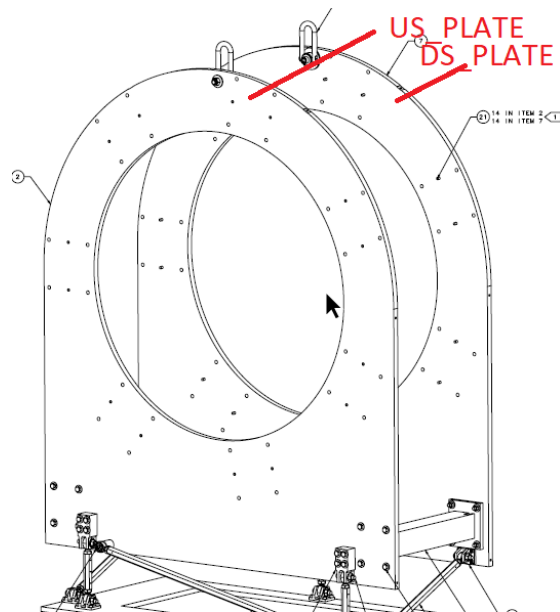
	Beam Following System			radial dist.[mm]
	dx[mm]	dy[mm]	dz[mm]	
S1_US_AVG	-1.74	0.19	-0.32	663.77
S1_DS_AVG	-0.19	0.06	-0.39	663.63
S2_US_AVG	-0.32	1.08	1.59	664.65

	Beam Following System			radial dist.[mm]
	dx[mm]	dy[mm]	dz[mm]	
S2_DS_AVG	-0.06	-0.02	1.56	663.55
S3_US_AVG	-0.29	0.48	1.28	664.05
S3_DS_AVG	-0.39	-0.01	1.29	663.56
S4_US_AVG	1.82	0.76	-0.38	664.34
S4_DS_AVG	0.31	0.59	-0.33	664.16
S5_US_AVG	-0.63	0.44	-0.68	664.01
S5_DS_AVG	0.07	-0.07	-0.63	663.51
S6_US_AVG	0.05	0.86	-0.49	664.44
S6_DS_AVG	-0.05	-0.15	-0.50	663.42
S7_US_AVG	0.97	0.72	-1.13	664.29
S7_DS_AVG	0.38	0.45	-1.12	664.03

Table 4, presents the position of the US and DS plates in reference to the center of the circles constructed by the upstream average sectors points projected on the sector planes. The ideal distance between the two plates is 650.88mm, and the measured distance is 652.12mm concluding a delta of 1.24mm.

Table 4. Frame position

Component	Part Coordinate System			Ideal
	X[mm]	Y[mm]	Z[mm]	Z[mm]
US_PLATE	-0.82	-0.10	-146.01	-146.05
DS_PLATE	-0.13	1.66	506.11	504.83



The following table shows the pointing position of each of the sector planes at the centerline of the defined coordinate system. The position was constructed by intersecting the normal of each of the (14) planes with the YZ plane.

Table 5. Pointing position

	Beam Following System		
	dx[mm]	dy[mm]	dz[mm]
S1_US_INT	0	-5.30	-0.68
S2_US_INT	0	-0.54	-0.53
S3_US_INT	0	-0.25	0.24
S4_US_INT	0	9.06	-0.69
S5_US_INT	0	0.49	-1.59
S6_US_INT	0	-0.33	-2.33
S7_US_INT	0	-1.10	-1.70
S1_DS_INT	0	2.08	-0.49
S2_DS_INT	0	-0.20	-0.48
S3_DS_INT	0	-0.33	0.33
S4_DS_INT	0	2.514	-0.67
S5_DS_INT	0	-0.64	-1.50
S6_DS_INT	0	-0.25	-2.40
S7_DS_INT	0	-0.25	-1.60

