Jefferson Lab Alignment Group

Data Transmittal

TO: Pastor, Kashy		**DATE:** 29 May 2014
FROM: CG	**Checked:**	**# :** B1567

DETAILS: M:\align\DATA\Inspection\HallB\vac_jacket\Hall B Vac Jacket Surveys\140528A

The 2nd article Torus vacuum jackets were surveyed May 27th, 2014 at Craft machine shop in Hampton. The hole numbering system that was followed is the same shown on drawings B00000-04-01-1301 rev E ,B00000-04-01-1302 rev. D. The un-numbered holes were assigned numbers starting at 40 and are shown on the sketch at the end of this transmittal.

The front plate was measured on the coil side. The 1st table shows the comparison between the measured and design coordinates and their circle diameters. A least squares fitting routine was used holding the design values and the 32 common points to accomplish this comparison. The standard deviation value on the residuals is 0.15 mm.

Table 1 Front Plate Design vs Measured

Design					Measured(9 Par)					Deltas		
	Units millimeters											
pt	x	y	Dia		pt	x	y	Dia		pt	dx	dy	dia
1	0.00	0.00											
2	851.93	611.42	26.0		2	851.89	611.24	25.9		2	-0.04	-0.18	-0.1
3	1234.82	579.73	26.0		3	1234.69	579.53	25.8		3	-0.13	-0.20	-0.2
4	1611.83	579.84	26.0		4	1611.96	579.61	25.9		4	0.13	-0.23	-0.1
5	1955.13	630.73	26.0		5	1955.06	630.51	25.9		5	-0.07	-0.22	-0.1
6	1391.54	907.71	26.0		7	1391.59	907.67	25.9		6	0.05	-0.04	-0.1
7	1843.37	993.21	26.0		6	1843.64	993.08	25.8		7	0.27	-0.13	-0.3
8	699.43	968.39	26.0		8	699.47	968.13	25.8		8	0.04	-0.26	-0.2
9	1032.32	1103.01	26.0		9	1032.67	1102.80	25.8		9	0.35	-0.21	-0.2
10	1356.58	1233.90	26.0		10	1356.67	1233.85	25.8		10	0.09	-0.05	-0.2
11	1693.92	1370.20	26.0		11	1694.08	1370.04	25.8		11	0.16	-0.16	-0.2
12	534.04	1372.82	26.0		12	534.13	1372.92	25.8		12	0.09	0.10	-0.2
13	870.52	1508.75	26.0		13	870.73	1508.83	25.9		13	0.21	0.08	-0.1
14	1196.68	1640.54	26.0		14	1196.77	1640.50	26.0		14	0.09	-0.04	0.0
15	1531.16	1775.69	26.0		15	1531.15	1775.81	25.8		15	-0.01	0.12	-0.3
16	370.44	1777.93	26.0		16	370.53	1778.02	25.8		16	0.09	0.09	-0.2
17	704.50	1912.90	26.0		17	704.80	1912.97	25.9		17	0.30	0.07	-0.1
18	1053.02	2053.69	26.0		18	1053.02	2053.67	25.8		18	0.00	-0.02	-0.2
19	1366.70	2180.42	26.0		19	1366.68	2180.15	25.8		19	-0.02	-0.27	-0.2
20	208.59	2183.75	26.0		20	208.51	2183.88	25.8		20	-0.08	0.13	-0.2
21	551.09	2322.13	26.0		21	550.89	2322.19	25.9		21	-0.20	0.06	-0.1
22	868.57	2450.42	26.0		22	868.42	2450.65	25.9		22	-0.15	0.23	-0.1

23	1200.41	2584.50	26.0		23	1200.33	2584.74	25.9		23	-0.08	0.24	-0.1
25	388.57	2710.47	26.0		25	388.27	2710.54	25.8		25	-0.30	0.07	-0.2
26	712.32	2841.26	26.0		26	712.14	2841.41	25.9		26	-0.18	0.15	-0.1
27	1016.64	2942.25	26.0		27	1016.59	2942.47	25.9		27	-0.05	0.22	-0.1
29	184.65	3215.04	26.0		29	184.53	3215.14	25.8		29	-0.12	0.10	-0.2
30	508.44	3345.85	26.0		30	508.40	3346.07	25.8		30	-0.04	0.22	-0.2
31	834.84	3470.68	26.0		31	834.70	3470.92	25.8		31	-0.14	0.24	-0.2
32	1224.64	3445.55	26.0		32	1224.52	3445.85	25.8		32	-0.12	0.30	-0.2
40	520.70	244.50	38.1		40	520.43	244.01	37.9		40	-0.27	-0.49	-0.2
41	2409.40	388.00	38.1		41	2409.35	387.76	37.8		41	-0.05	-0.24	-0.3
43	1268.50	3606.60	38.1		43	1268.61	3606.76	37.9		43	0.11	0.16	-0.3
44	706.70	4012.20	38.1		44	706.81	4012.35	37.7		44	0.11	0.15	-0.4

Similarly, the back plate data is shown in table 2. The same methodology used for the right plate was used. Thirty eight hole locations were used in the transformation resulting in a standard deviation of 0.15 mm.

Table 2 Back Plate Design vs Measured

Design						Measured(9Par)					Deltas			
	Units millimeters													
Pt	x	y	Dia			Pt	x	y	Dia			dx	dy	dia
1	0.00	0.00				1								
2	851.93	611.42	25.4			2	852.06	611.10	25.3		2	0.13	-0.32	-0.1
3	1234.82	579.73	25.4			3	1234.87	579.34	25.3		3	0.05	-0.39	-0.1
4	1611.83	579.84	25.4			4	1611.93	579.48	25.3		4	0.10	-0.36	-0.1
5	1955.13	630.73	25.4			5	1955.15	630.39	25.2		5	0.02	-0.34	-0.2
6	1391.54	907.71	25.4			6	1391.71	907.54	25.2		6	0.17	-0.17	-0.2
7	1843.37	993.21	25.4			7	1843.51	993.13	25.2		7	0.14	-0.08	-0.2
8	699.43	968.39	25.4			8	699.48	968.18	25.2		8	0.05	-0.21	-0.2
9	1032.32	1103.01	25.4			9	1032.42	1102.83	25.3		9	0.10	-0.18	-0.1
10	1356.58	1233.90	25.4			10	1356.71	1233.84	25.3		10	0.13	-0.06	-0.1
11	1693.92	1370.20	25.4			11	1694.02	1370.15	25.4		11	0.10	-0.05	0.0
12	534.04	1372.82	25.4			12	534.05	1372.70	25.3		12	0.01	-0.12	-0.1
13	870.52	1508.75	25.4			13	870.53	1508.69	25.3		13	0.01	-0.06	-0.1
14	1196.68	1640.54	25.4			14	1196.74	1640.60	25.2		14	0.06	0.06	-0.2
15	1531.16	1775.69	25.4			15	1531.12	1775.76	25.3		15	-0.04	0.07	-0.1
16	370.44	1777.93	25.4			16	370.43	1777.83	25.3		16	-0.01	-0.10	-0.1
17	704.50	1912.90	25.4			17	704.51	1912.93	25.3		17	0.01	0.03	-0.1
18	1053.02	2053.69	25.4			18	1053.05	2053.78	25.3		18	0.03	0.09	-0.1
19	1366.70	2180.42	25.4			19	1366.59	2180.47	25.3		19	-0.11	0.05	-0.1
20	208.59	2183.75	25.4			20	208.51	2183.77	25.2		20	-0.08	0.02	-0.2
21	551.09	2322.13	25.4			21	551.06	2322.18	25.1		21	-0.03	0.05	-0.3
22	868.57	2450.42	25.4			22	868.57	2450.54	25.3		22	0.00	0.12	-0.1
23	1200.41	2584.50	25.4			23	1200.26	2584.62	25.3		23	-0.15	0.12	-0.1
24	93.97	2572.36	25.4			24	93.89	2572.43	25.3		24	-0.08	0.07	-0.1

25	388.57	2710.47	25.4			25	388.53	2710.57	25.3		25	-0.04	0.10	-0.1
26	712.32	2841.26	25.4			26	712.30	2841.46	25.3		26	-0.02	0.20	-0.1
27	1016.64	2942.25	25.4			27	1016.59	2942.42	25.2		27	-0.05	0.17	-0.2
28	-137.37	3079.01	25.4			28	-137.40	3079.17	25.2		28	-0.03	0.16	-0.2
29	184.65	3215.04	25.4			29	184.62	3215.29	25.2		29	-0.03	0.25	-0.2
30	508.44	3345.85	25.4			30	508.48	3346.12	25.3		30	0.04	0.27	-0.1
31	834.84	3470.68	25.4			31	834.76	3470.93	25.3		31	-0.08	0.25	-0.1
32	1224.64	3445.55	25.4			32	1224.58	3445.84	25.3		32	-0.06	0.29	-0.1
40	520.70	244.50	38.1			40	520.44	244.01	38.0		40	-0.26	-0.49	-0.1
41	2409.40	388.00	38.1			41	2409.56	387.64	38.0		41	0.16	-0.36	-0.1
42	-469.3	2684.90	38.1			42	-469.37	2684.96	37.9		42	-0.07	0.06	-0.2
43	1268.50	3606.60	38.1			43	1268.41	3606.82	37.7		43	-0.09	0.22	-0.4
44	706.70	4012.20	38.1			44	706.61	4012.85	37.7		44	-0.09	0.65	-0.4

The third plate, drawing B00000-04-01-1303, has a coordinate system constructed using the bottom left corner to define the origin, and the bottom edge to control roll. Positive X is to the right and positive Y is up.

Table 3 Small Plate Design vs Measured

Design					Measured					Deltas		
	Units millimeters											
pt	x	y	Dia		pt	x	y	Dia		pt	dx	dy	dia
1	86.50	578.90	38.1		1	86.84	578.98	37.9		1	0.34	0.08	-0.2
2	566.60	263.60	26.0		2	566.86	263.48	25.9		2	0.26	-0.12	-0.1
3	541.8	820	26.0		3	542.31	819.93	25.4		3	0.51	-0.07	-0.6

The corner points were calculated from the drawings and compared against the measured data. The naming convention starts with “c1” at the bottom left hand corner and continues clockwise around the part.

Table 4 Front Plate Corner Points Design vs Measured

	Design Corner Pts					**Measured Corner Pts**					**Deltas**	
	X	Y				X	Y				X	Y
c1	415.50	193.20			c1	415.06	192.4			c1	-0.44	-0.84
c2	415.50	260.90			c2	415.36	259.8			c2	-0.14	-1.15
c3	-334.92	2118.22			c3	-335.19	2118.2			c3	-0.27	-0.03
c4	37.44	2268.65			c4	37.39	2268.93			c4	-0.05	0.28
c5	266.01	2495.60			c5	265.76	2495.6			c5	-0.25	0.05
c6	-82.80	3359.06			c6	-83.10	3359.2			c6	-0.30	0.11
c7	353.54	3535.34			c7	353.07	3535.8			c7	-0.47	0.47
c8	771.55	4259.41			c8	771.54	4259.6			c8	-0.01	0.19
c9	807.47	4259.41			c9	807.58	4259.8			c9	0.11	0.39
c10	794.77	3885.86			c10	794.73	3886.1			c10	-0.04	0.22
c11	1055.47	3885.86			c11	1055.18	3886.2			c11	-0.29	0.29
c12	1055.47	4259.41			c12	1055.26	4259.8			c12	-0.21	0.42
c13	1100.32	4259.41			c13	1100.33	4259.8			c13	0.01	0.37

c14	2516.68	753.27			c14	2516.71	753.4			c14	0.03	0.18
c15	2516.68	193.20			c15	2516.60	192.8			c15	-0.08	-0.35

Table 5 Back Plate Corner Points Design vs Measured

	Design Corner Pts					Measured Corner Points					Deltas		
	X	Y					X	Y				X	Y
c1	415.50	193.20				c1	415.28	192.54			c1	-0.22	-0.66
c2	415.50	260.90				c2	415.16	261.16			c2	-0.34	0.26
c3	-659.50	2921.55				c3	-660.10	2922.60			c3	-0.60	1.05
c4	-659.50	3249.96				c4	-659.98	3250.30			c4	-0.48	0.34
c5	-583.02	3249.96				c5	-583.50	3250.21			c5	-0.48	0.25
c6	-583.02	2876.36				c6	-583.57	2877.02			c6	-0.55	0.66
c7	-335.02	2876.36				c7	-335.10	2876.96			c7	-0.08	0.60
c8	-335.02	3257.17				c8	-335.22	3257.63			c8	-0.20	0.46
c9	353.54	3535.34				c9	353.36	3535.96			c9	-0.18	0.62
c10	771.55	4259.41				c10	771.39	4260.01			c10	-0.16	0.60
c11	807.47	4259.41				c11	807.43	4260.16			c11	-0.04	0.75
c12	794.77	3885.86				c12	794.66	3886.31			c12	-0.11	0.45
c13	1055.47	3885.86				c13	1054.82	3886.46			c13	-0.65	0.60
c14	1055.47	4259.41				c14	1055.87	4259.82			c14	0.40	0.41
c15	1100.32	4259.41				c15	1099.55	4261.02			c15	-0.77	1.61
c16	2516.68	753.27				c16	2516.68	753.80			c16	0.00	0.53
c17	2516.68	193.20				c17	2516.95	192.75			c17	0.27	-0.45

Table 6 Small Plate Corner Points Design vs Measured

	Design Corner Pts				Measured Corner Points					Deltas		
	X	Y				X	Y				X	Y
c1	0.00	0.00			c1	0.00	0.00			c1	0.00	0.00
	0.00	872.60			c2	-0.18	873.83			c2	-0.18	1.23
	121.81	1174.10			c3	122.34	1174.84			c3	0.53	0.74
	192.73	1145.44			c4	193.36	1146.19			c4	0.63	0.75
	52.79	799.05			c5	53.00	799.07			c5	0.21	0.02
	282.73	706.14			c6	283.19	706.28			c6	0.46	0.14
	425.38	1059.20			c7	426.22	1059.59			c7	0.84	0.39
	700.50	1059.20			c8	701.35	1059.37			c8	0.85	0.17
	700.50	125.90			c9	700.83	125.90			c9	0.33	0.00
	401.00	0.00			c10	401.01	0.00			c10	0.01	0.00