LCLS II Quadrupole Fiducialization Report
1.51Q7.0 Quadrupole Magnet (Refurbish)

Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-902-708-54
Barcode # : 4067
Mfg. S/N : 1.5Q7-3

Coordinate System Setup

Spatial Alignment

The Spatial Alignment of the magnet is created through a composite best-fit of the pole tips. Each pole tip scanned 0.367 inch inboard from the upstream magnet face and the downstream magnet face. A composite best-fit of the upstream poles and the downstream poles is made with the nominal pole tip shape and location. An axis is created through the two best-fit centerpoints. This axis is the spatial alignment of the magnet and defines the Z axis.

Planar Alignment

The Planar Alignment of the magnet is the created by averaging the rotations of the composite best-fits of the upstream pole tips and downstream pole tips. This direction defines the Y and X directions of the magnet.

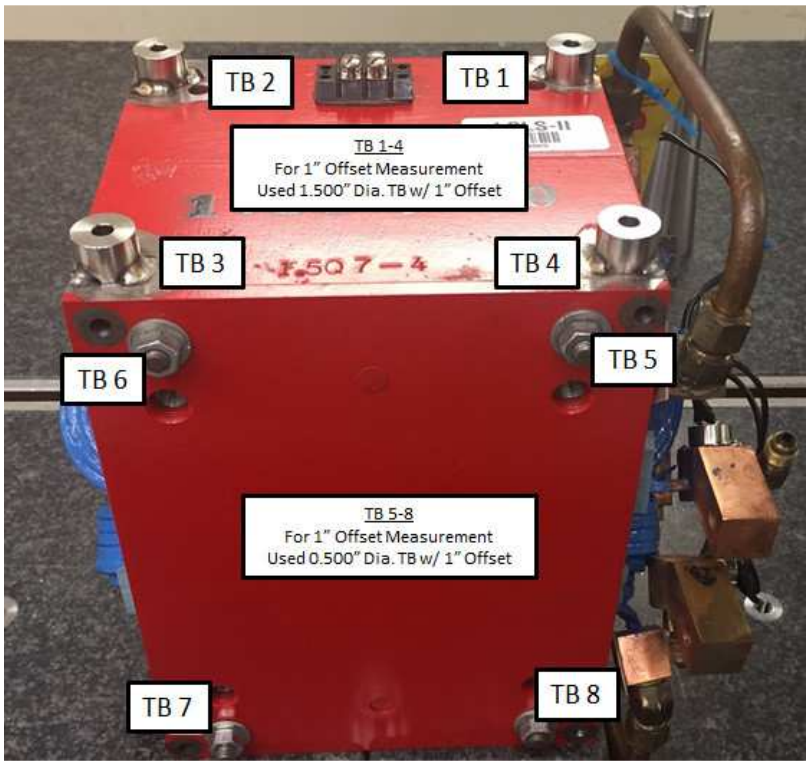
Coordinate Origins

The origins of the magnet coordinate system are as follows. The XY origin lies on the axis of spatial alignment. The Z origin is the intersection of the mid-plane between the upstream and downstream magnet faces and the Z axis.

Barcode # : 4067

Mfg. S/N : 1.5Q7-3

Tooling Ball Locations @ 1.000 in. Offset



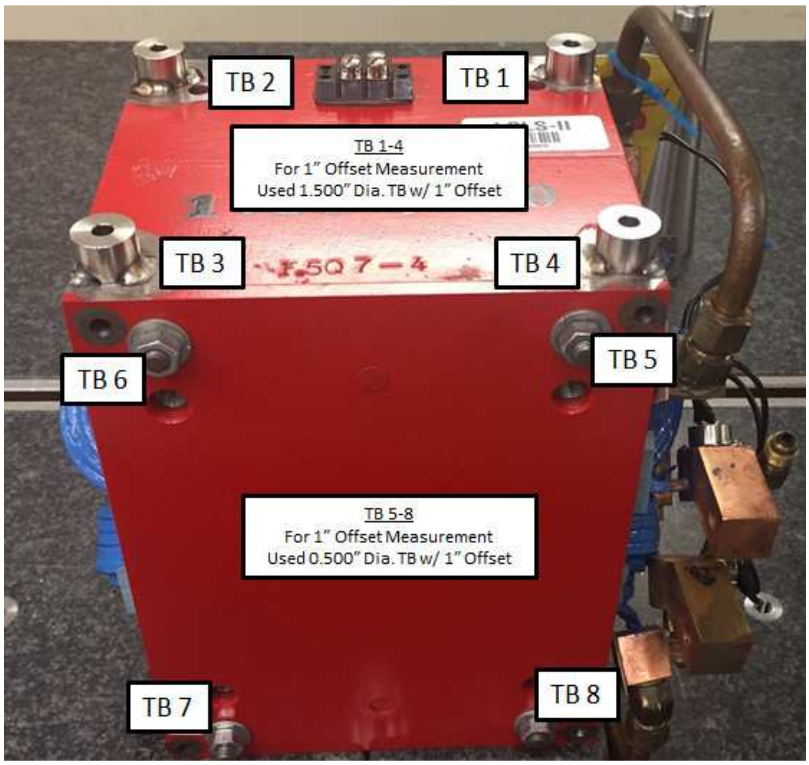
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-2.4564	6.1149	-3.0854
TB 2	-2.4464	6.1200	3.1101
TB 3	2.4863	6.1264	3.0526
TB 4	2.4670	6.1221	-3.0983
TB 5	4.1292	4.3000	-3.2246
TB 6	4.1315	4.3306	3.1591
TB 7	4.1367	-4.2730	3.1554
TB 8	4.1366	-4.2795	-3.1860

Dimensions in Inch

Barcode # : 4067

Mfg. S/N : 1.5Q7-3

Tooling Ball Locations @ 0.3125 in. Offset



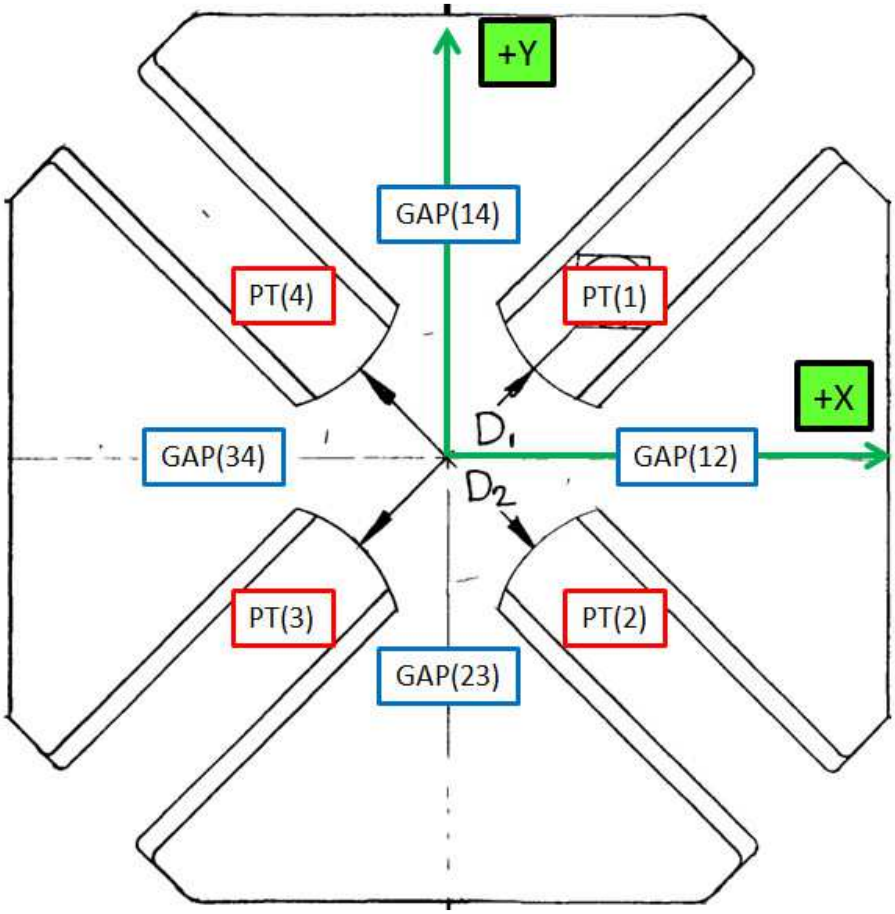
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-2.4501	5.4279	-3.0872
TB 2	-2.4422	5.4324	3.1135
TB 3	2.4877	5.4395	3.0534
TB 4	2.4683	5.4355	-3.1004
TB 5	3.4403	4.3049	-3.2277
TB 6	3.4448	4.3359	3.1632
TB 7	3.4486	-4.2805	3.1581
TB 8	3.4483	-4.2777	-3.1885

Tooling Ball Locations are 5/16 inch above Tooling Ball Adapter Plane
Dimensions in Inch

Barcode # : 4067

Mfg. S/N : 1.5Q7-3

Pole Tip Gap Measurements



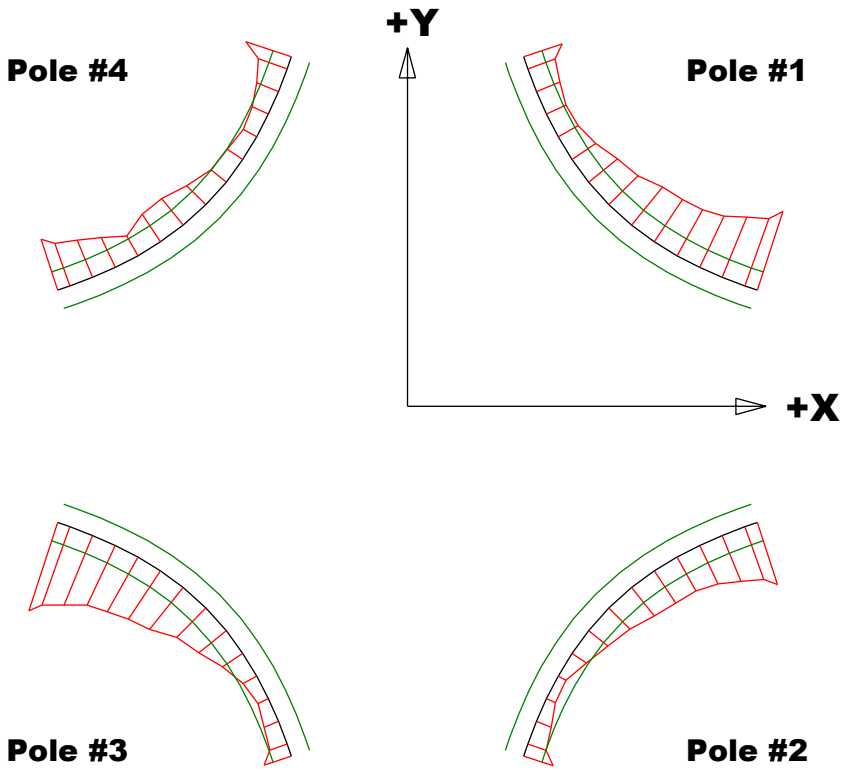
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	1.510± .001	1.51435	1.51227
Pole Tip Distance 2-4	1.510 ± .001	1.51304	1.51049
Gap 1-2	0.6154 ± .001	0.62098	0.61653
Gap 2-3	0.6154 ± .001	0.61686	0.61679
Gap 3-4	0.6154 ± .001	0.62083	0.61833
Gap 4-1	0.6154 ± .001	0.61907	0.61857

Dimensions in Inch

Barcode # : 4067

Mfg. S/N : 1.5Q7-3

Composite Best-fit of Pole Tips, Downstream



Black = Nominal Pole Tip
Red = Pole Tip Deviations
Green = +/- .001 Tolerance

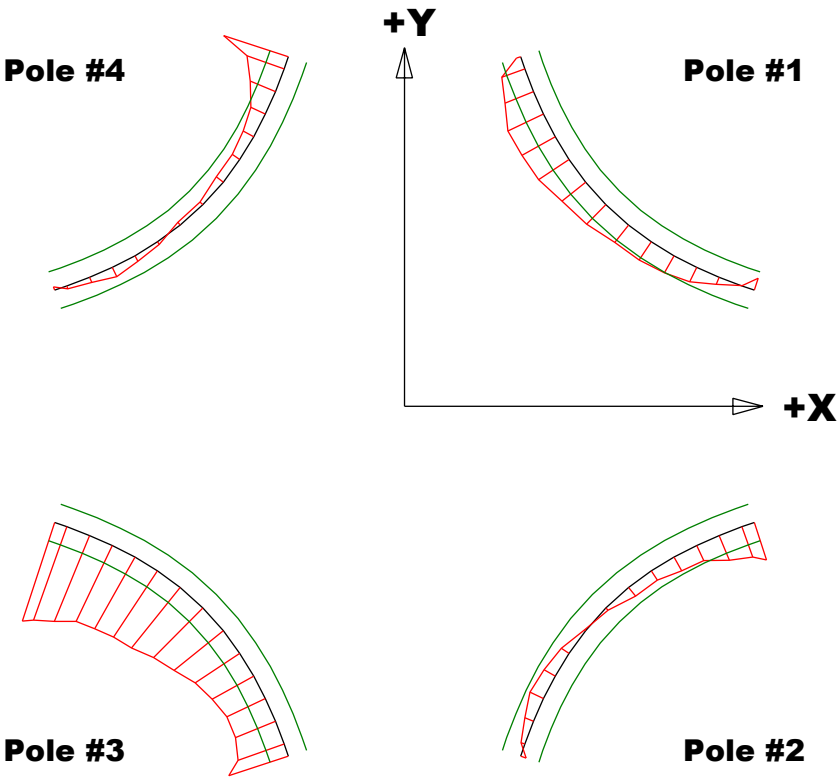
Dimensions in Inch

Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00433	-0.0034	-0.00483	-0.00279
Max. Dev.	-0.00112	-0.00047	-0.0006	-0.0008

Barcode # : 4067
Mfg. S/N : 1.5Q7-3

Composite Best-fit of Pole Tips, Upstream



Black = Nominal Pole Tip

Red = Pole Tip Deviations

Green = +/- .001 Tolerance

Dimensions in Inch

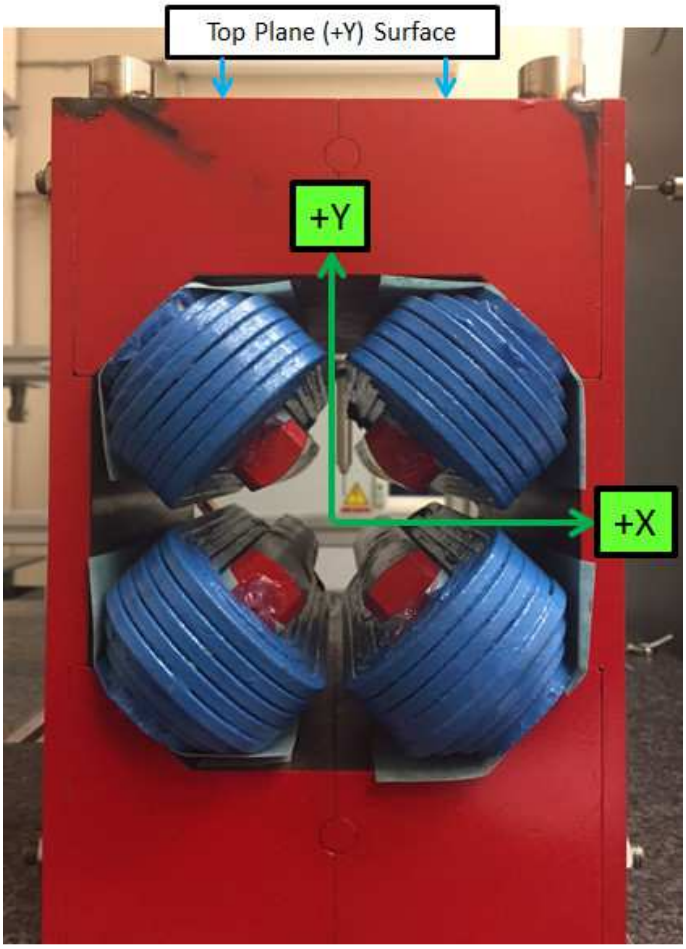
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00065	-0.00205	-0.0054	-0.00354
Max. Dev.	0.00206	0.00078	-0.00222	0.00054

Barcode # : 4067

Mfg. S/N : 1.5Q7-3

Angle of the Composite Pole Tip Best-Fit In Relation to Top (+Y Plane)



Angle in Decimal Degrees ° :-0.04729

Angle in Milliradians :-0.82535

Barcode # : 4067

Mfg. S/N : 1.5Q7-3