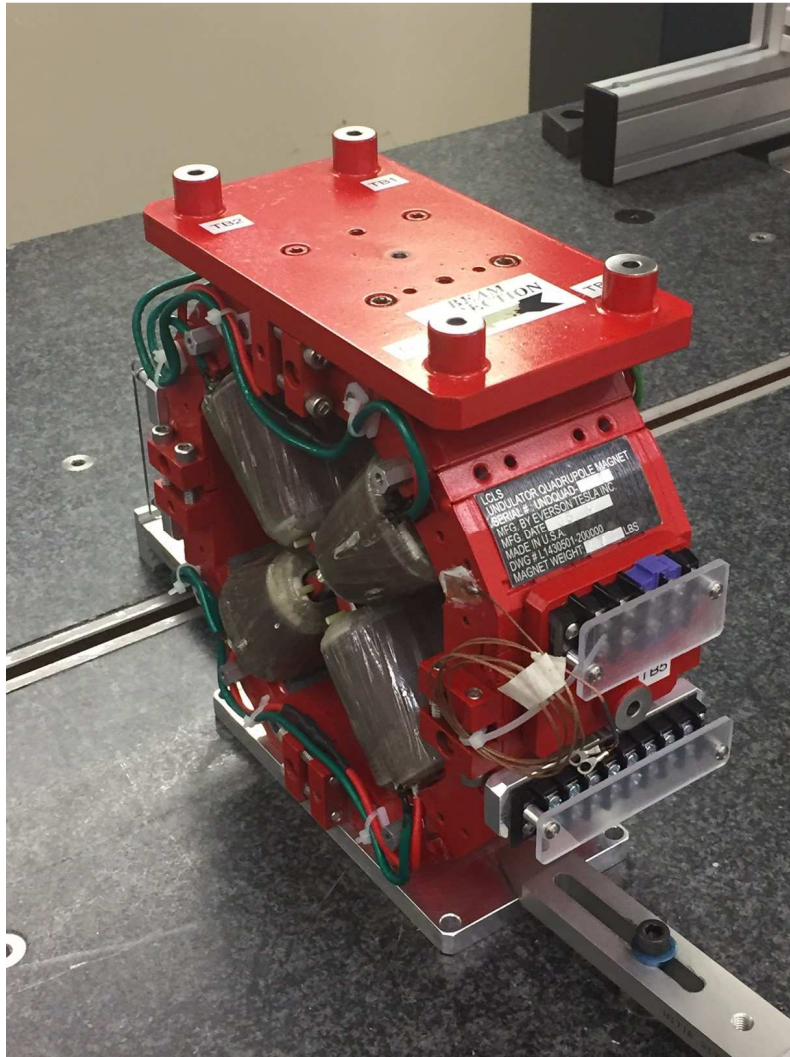


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4098
Mfg. S/N : 023

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 .150 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.

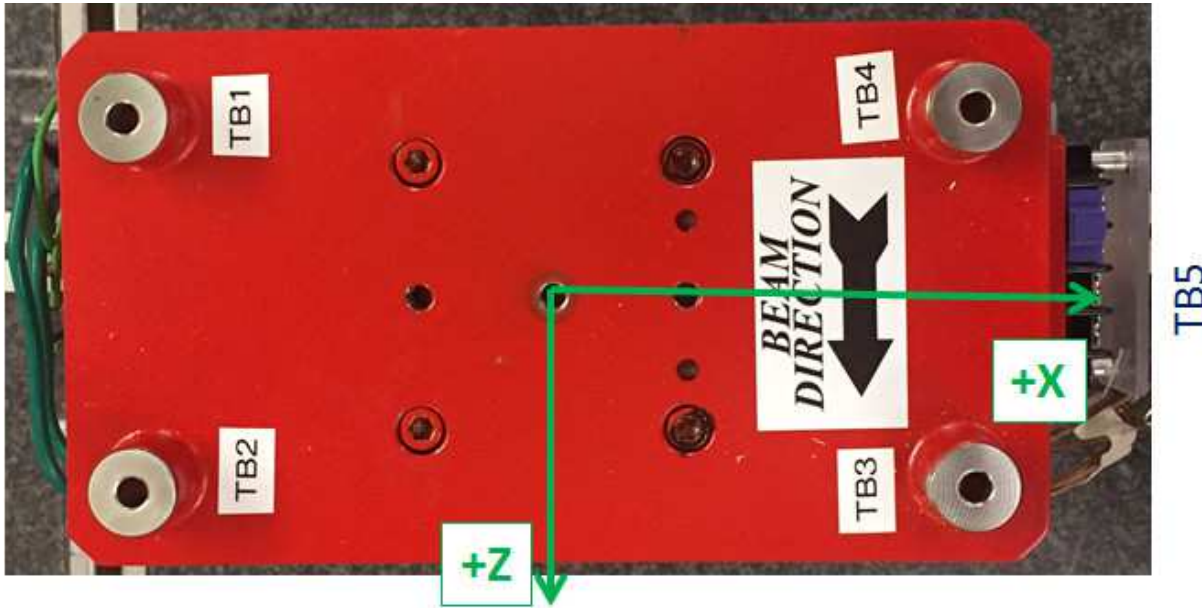
Coordinate Origins

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.

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Tooling Ball Locations



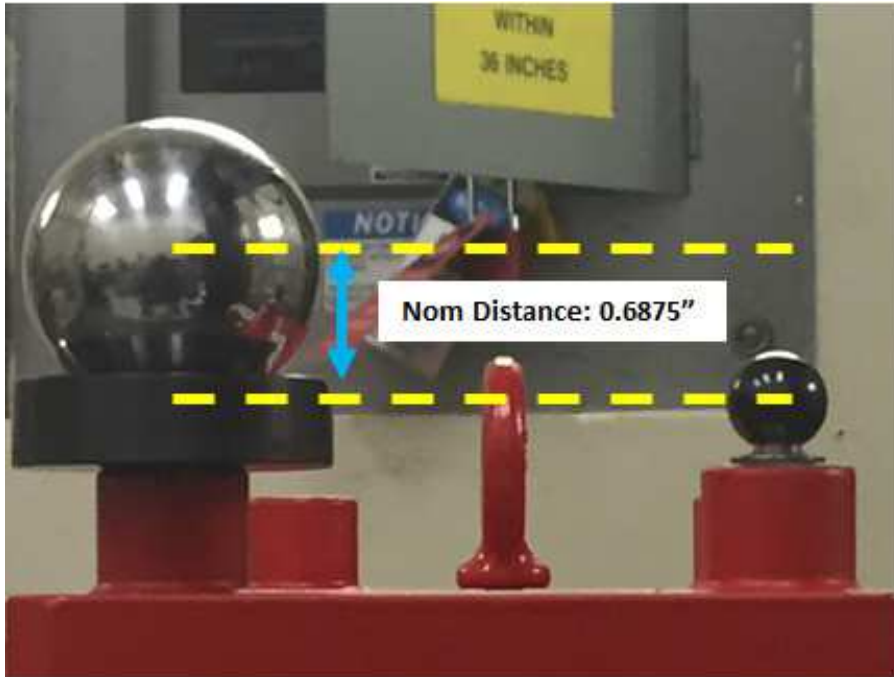
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36574	6.81396	-1.53186
TB 2	-3.36849	6.81262	1.46955
TB 3	3.37637	6.80782	1.47196
TB 4	3.37663	6.81425	-1.52768
TB 5	6.58786	0.12598	-0.02796
TB A	-3.36716	6.12715	-1.53134
TB B	-3.36852	6.12506	1.46902
TB C	3.37699	6.11938	1.47128
TB D	3.37821	6.12712	-1.52883
TB E	5.90013	0.12861	-0.02861

Tooling Ball Locations (1-5) are 1 inch above Tooling Ball Adapter Plane
 Tooling Ball Locations (A-E) are 5/16 inch above Tooling Ball Adapter Plane
 Dimensions in Inch

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1" Tooling Ball to 5/16" Tooling Ball Difference



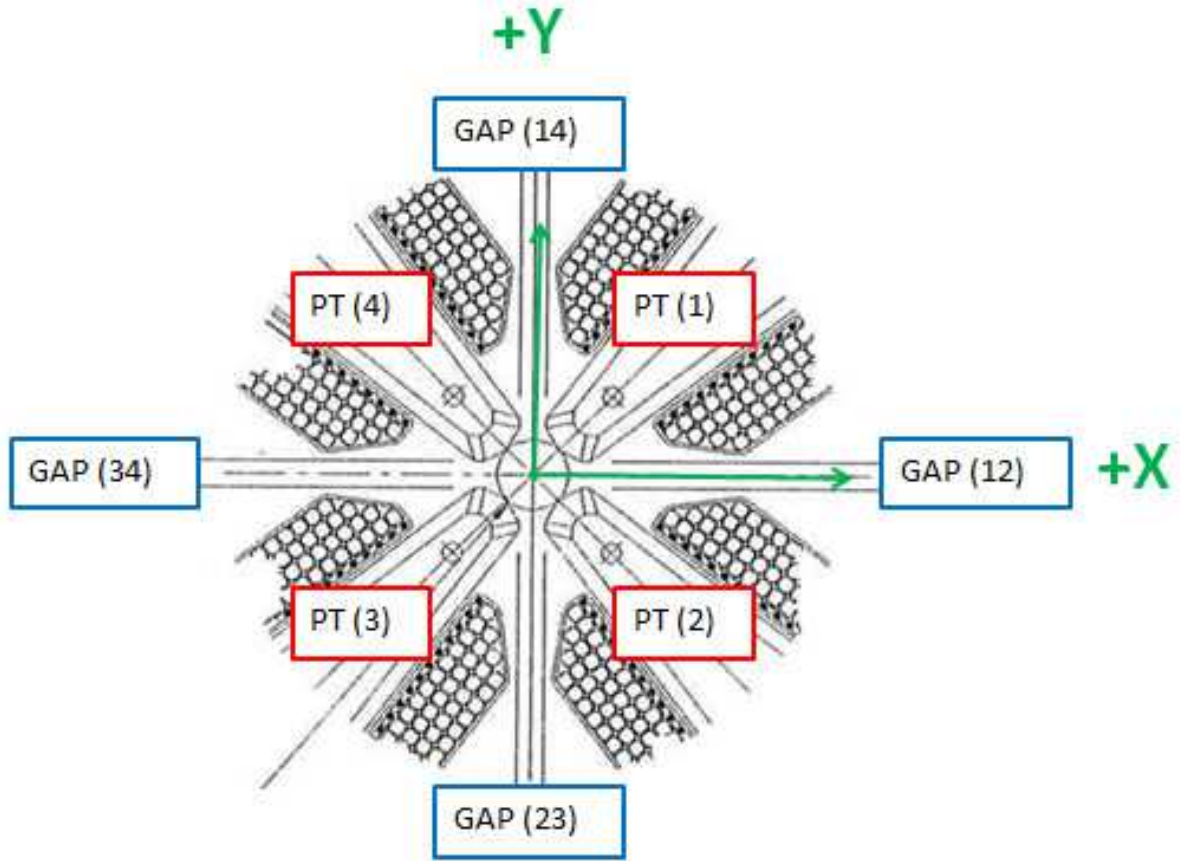
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68682
TB 2	0.6875 ± 0.001	0.68755
TB 3	0.6875 ± 0.001	0.68844
TB 4	0.6875 ± 0.001	0.68714
TB 5	0.6875 ± 0.001	0.68773

Dimensions in Inch

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Pole Tip Gap Measurements



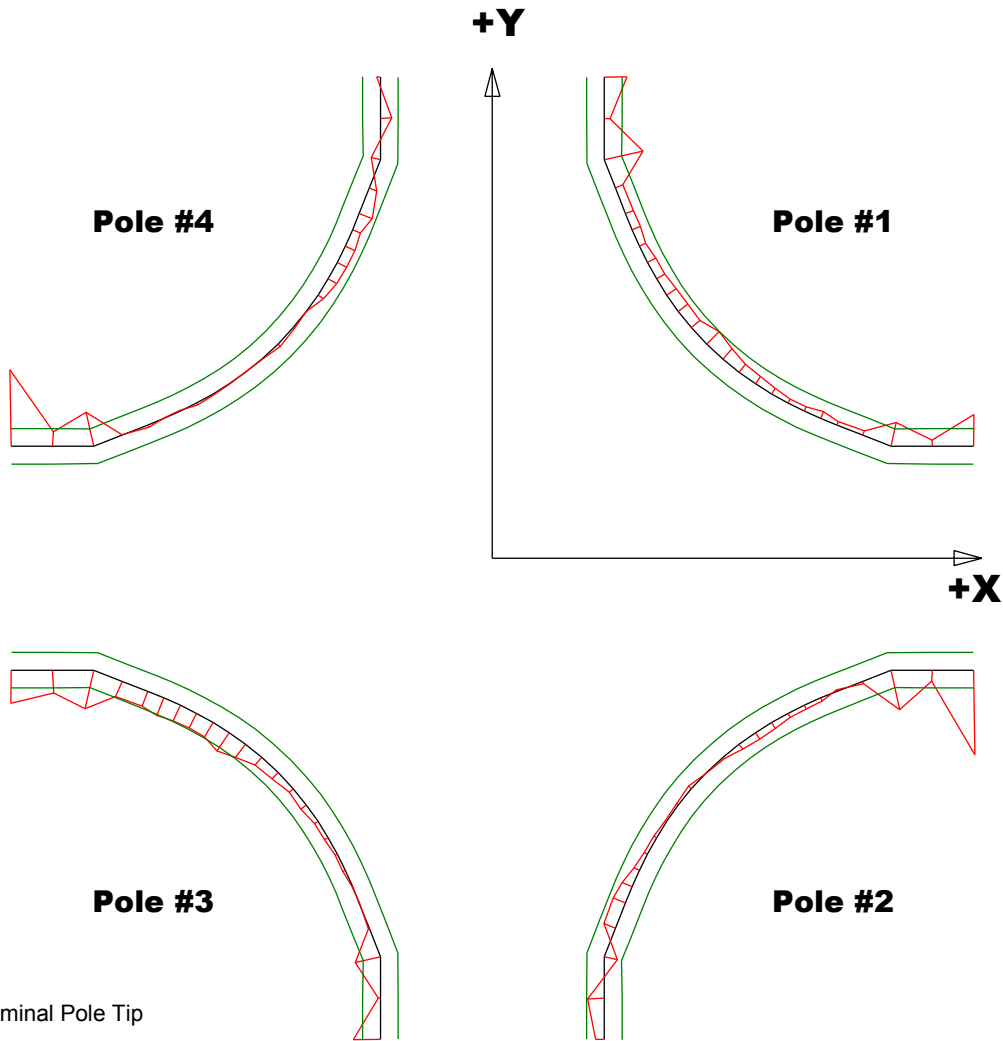
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.4345	0.43365
Pole Tip Distance 2-4	0.433 ± .002	0.43291	0.43361
Gap 1-2	0.159 ± .002	0.16091	0.15969
Gap 2-3	0.159 ± .002	0.1586	0.159
Gap 3-4	0.159 ± .002	0.16164	0.16167
Gap 4-1	0.159 ± .002	0.15956	0.15852

Dimensions in Inch

Barcode # : 4098

Mfg. S/N : 023

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

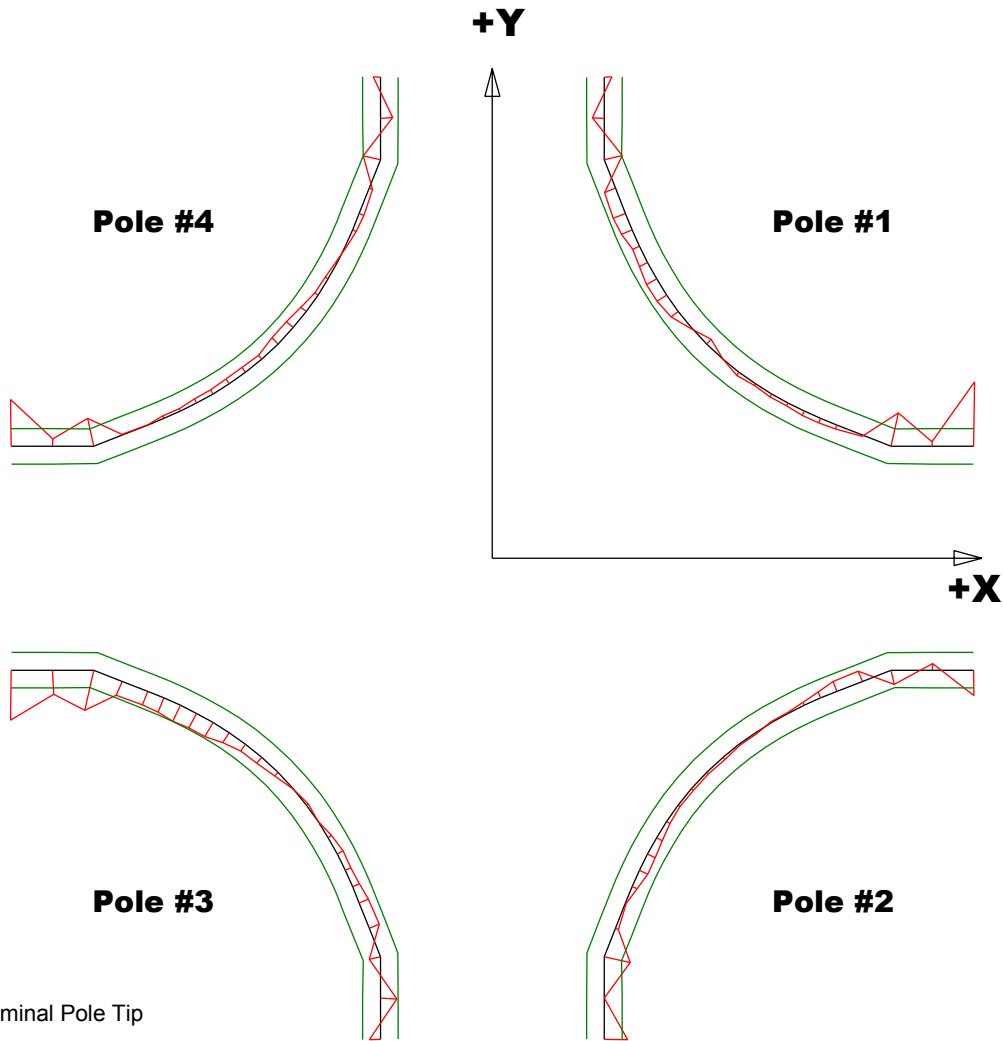
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00224	-0.00476	-0.00223	-0.00431
Max. Dev.	-0.00021	0.00094	0.00002	0.00079

Barcode # : 4098

Mfg. S/N : 023

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

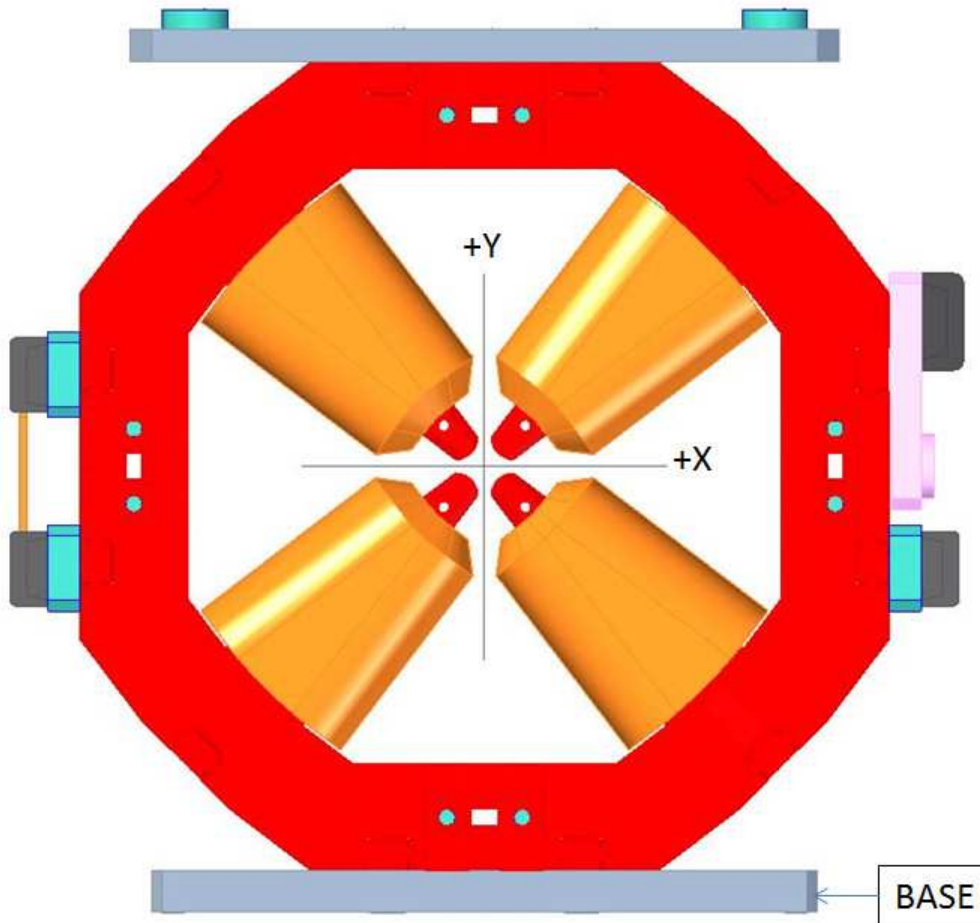
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00362	-0.00149	-0.00282	-0.00263
Max. Dev.	0.00074	0.00062	0.00093	0.00069

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Angle of the Composite Pole Tip Best-Fit In Relation to Base



Angle in Decimal Degrees ° :-0.02999

Angle in Milliradians :-0.52338

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