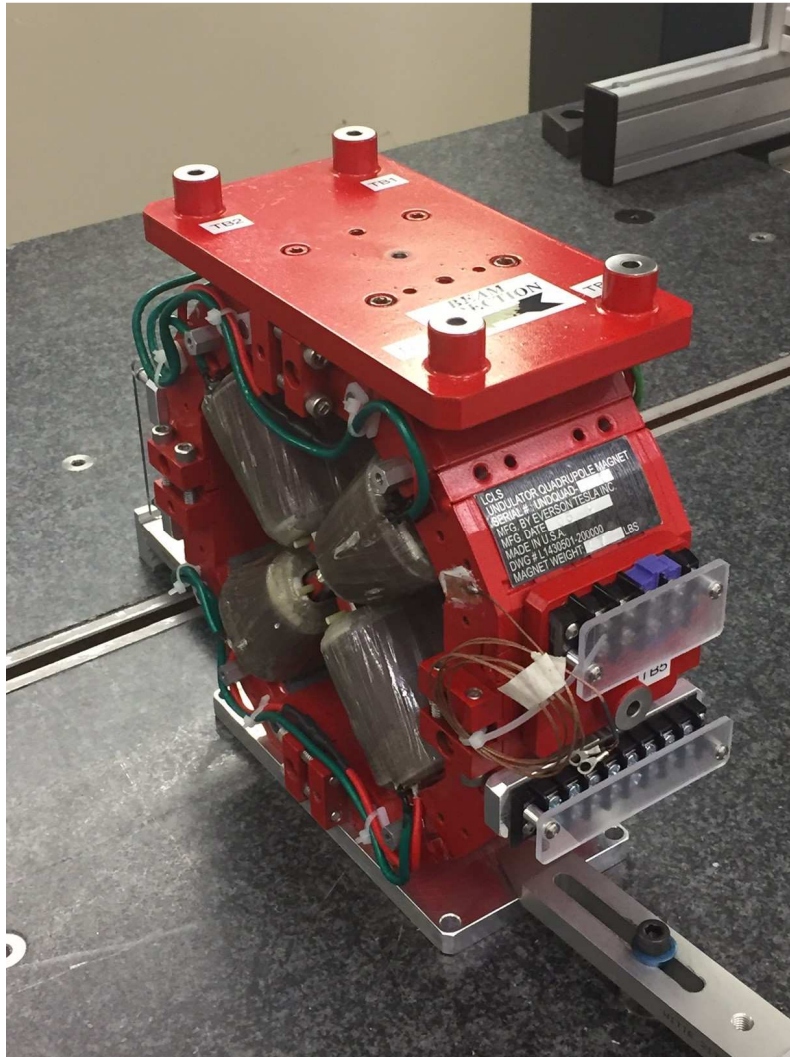


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4078
Mfg. S/N : 003

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.

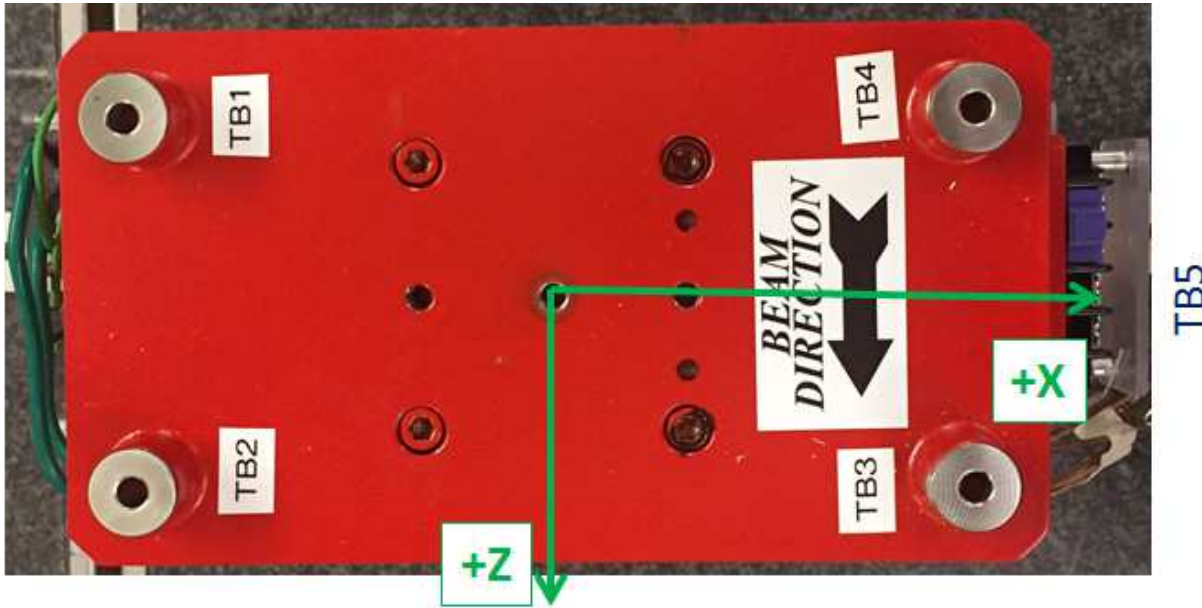
Coordinate Origins

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



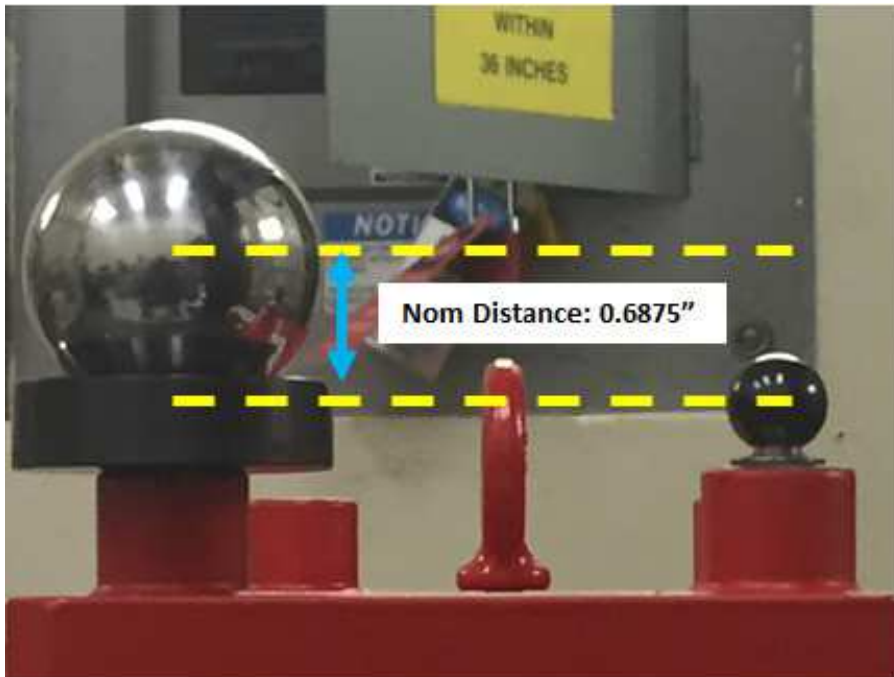
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36019	6.81492	-1.52909
TB 2	-3.36332	6.81497	1.46957
TB 3	3.38274	6.80714	1.47527
TB 4	3.38329	6.81060	-1.52663
TB 5	6.59056	0.11894	-0.02096
TB A	-3.36094	6.12790	-1.52814
TB B	-3.36436	6.12711	1.46932
TB C	3.38134	6.12050	1.47496
TB D	3.38496	6.12416	-1.52513
TB E	5.90032	0.12157	-0.02244

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



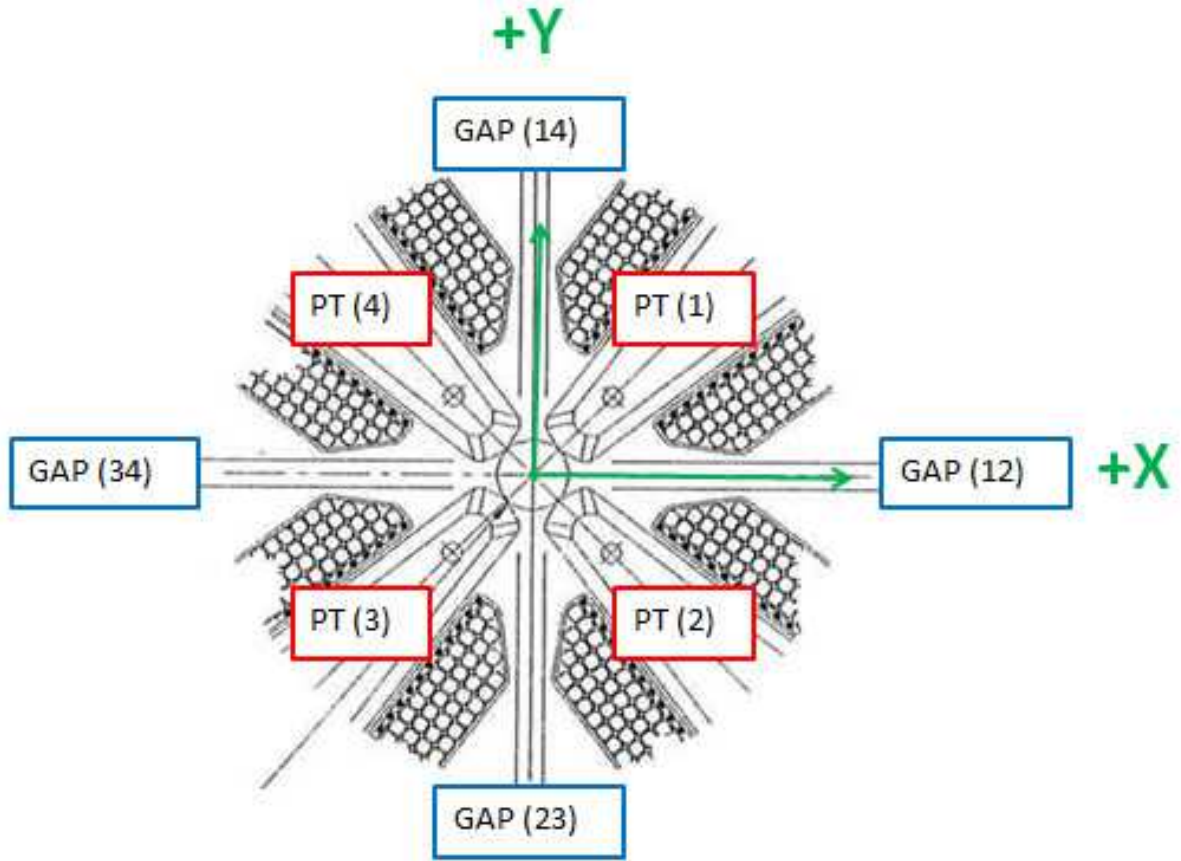
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68702
TB 2	0.6875 ± 0.001	0.68786
TB 3	0.6875 ± 0.001	0.68664
TB 4	0.6875 ± 0.001	0.68644
TB 5	0.6875 ± 0.001	0.69025

Dimensions in Inch

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Pole Tip Gap Measurements



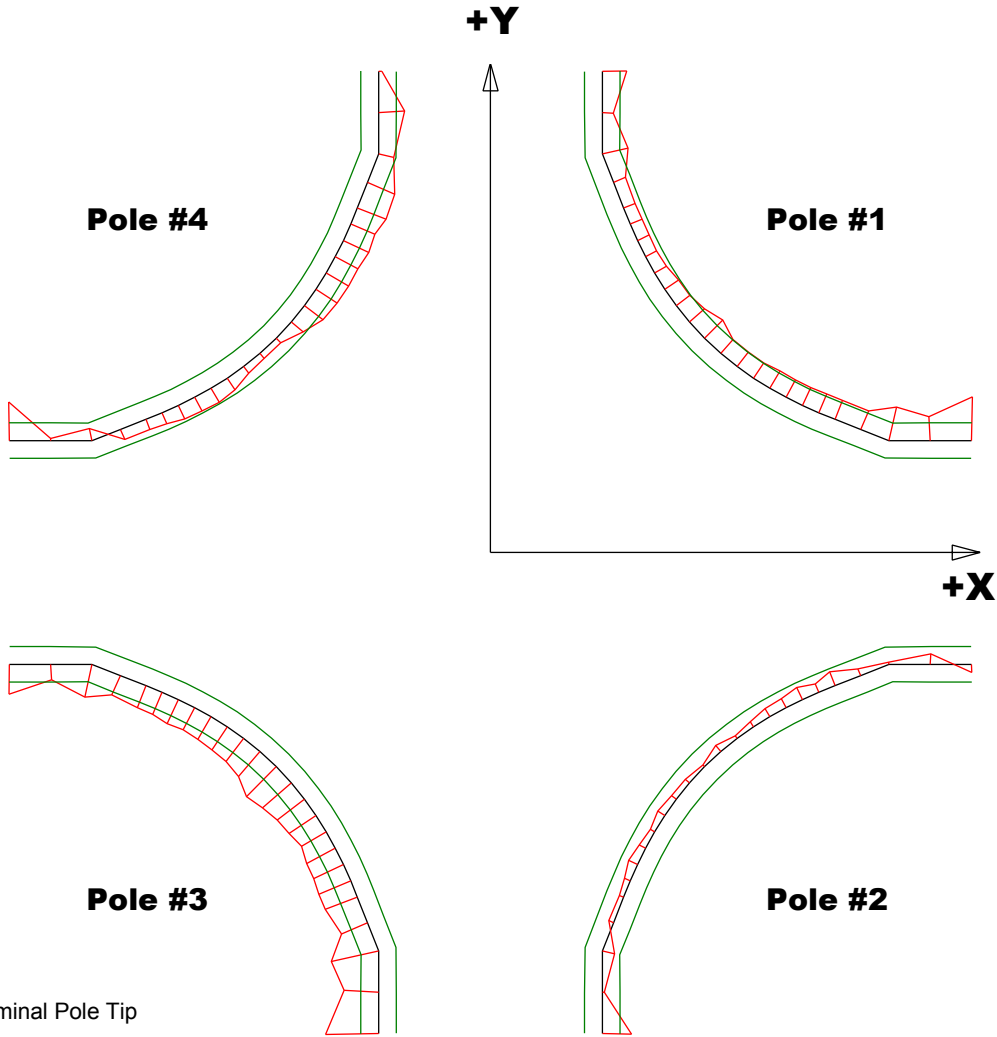
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43663	0.43161
Pole Tip Distance 2-4	0.433 ± .002	0.43239	0.43463
Gap 1-2	0.159 ± .002	0.16055	0.1614
Gap 2-3	0.159 ± .002	0.16154	0.15894
Gap 3-4	0.159 ± .002	0.16082	0.15969
Gap 4-1	0.159 ± .002	0.15897	0.15842

Dimensions in Inch

Barcode # : 4078

Mfg. S/N : 003

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

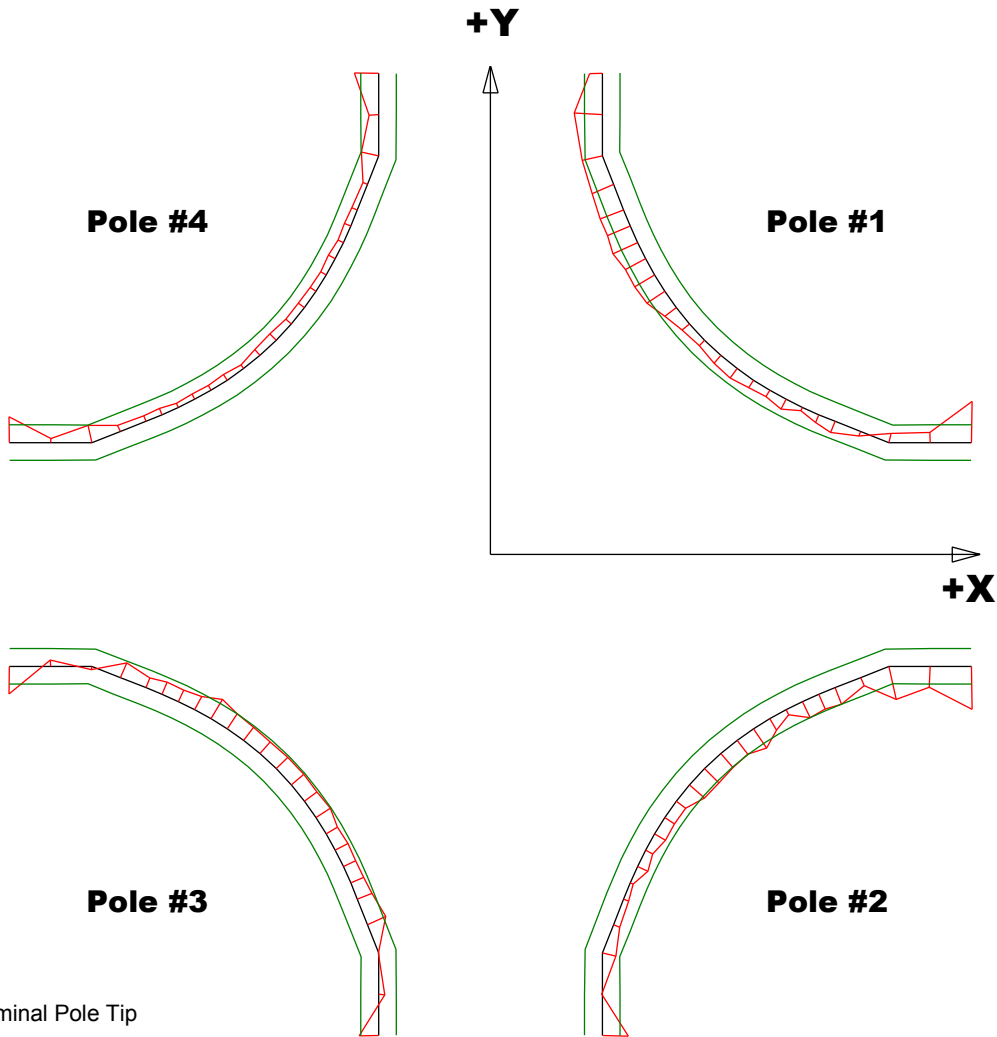
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00245	-0.00165	-0.00299	-0.00217
Max. Dev.	-0.00061	0.00083	-0.00086	0.00175

Barcode # : 4078

Mfg. S/N : 003

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

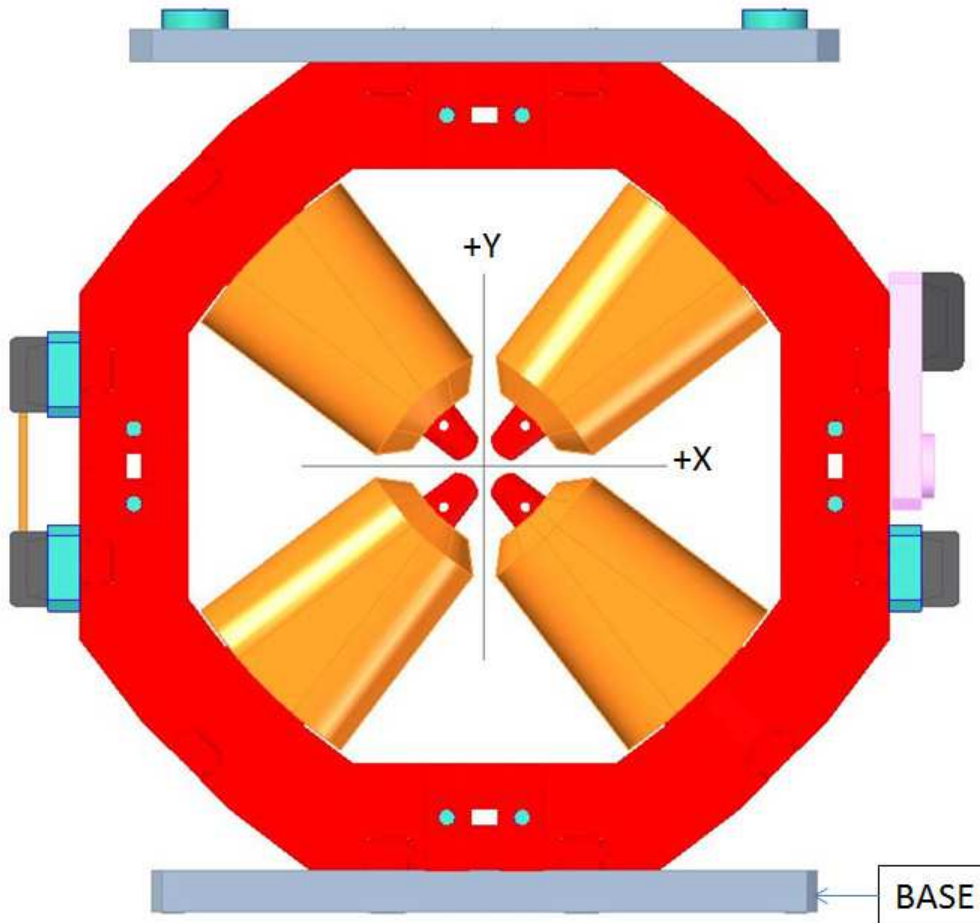
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00231	-0.00241	-0.00156	-0.00145
Max. Dev.	0.00159	0.00004	0.00126	-0.00022

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



Angle in Decimal Degrees ° :0.04733

Angle in Milliradians :0.82613

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