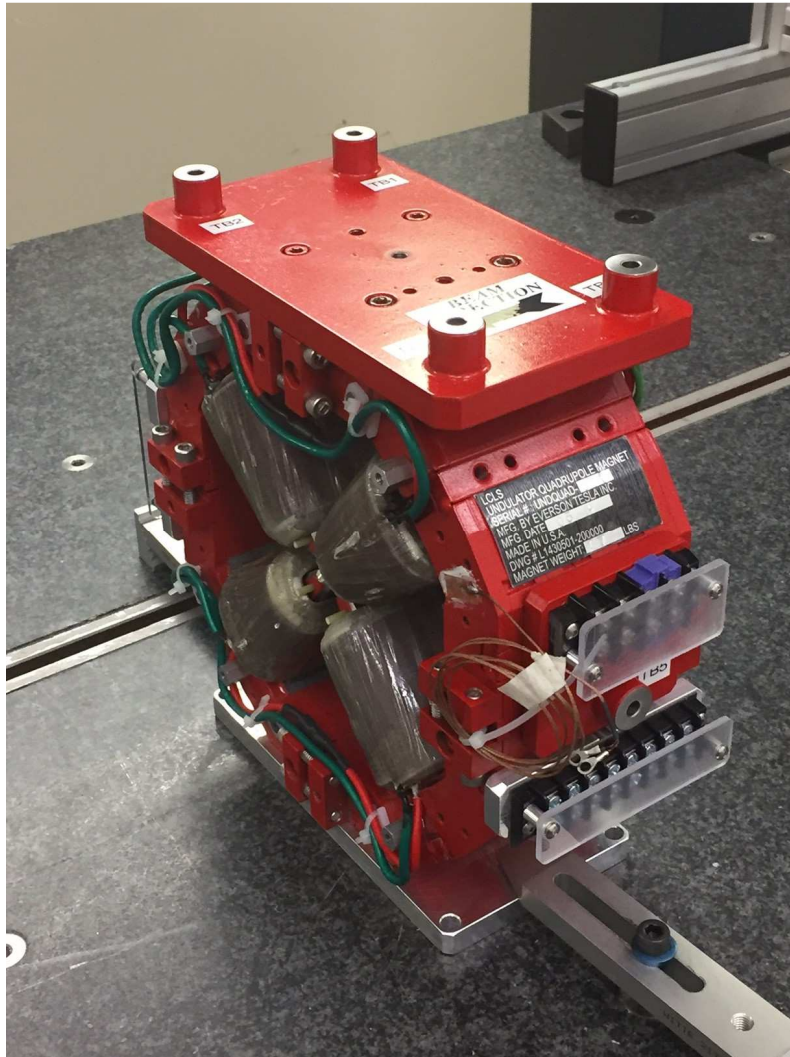


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4097
Mfg. S/N : 027

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 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.

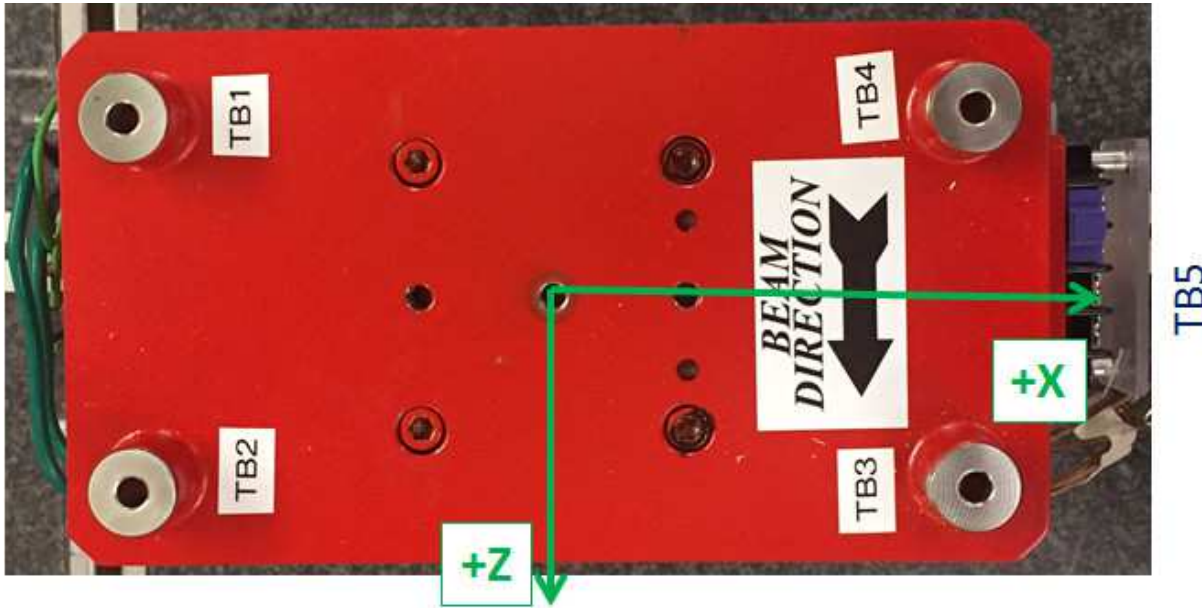
Coordinate Origins

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



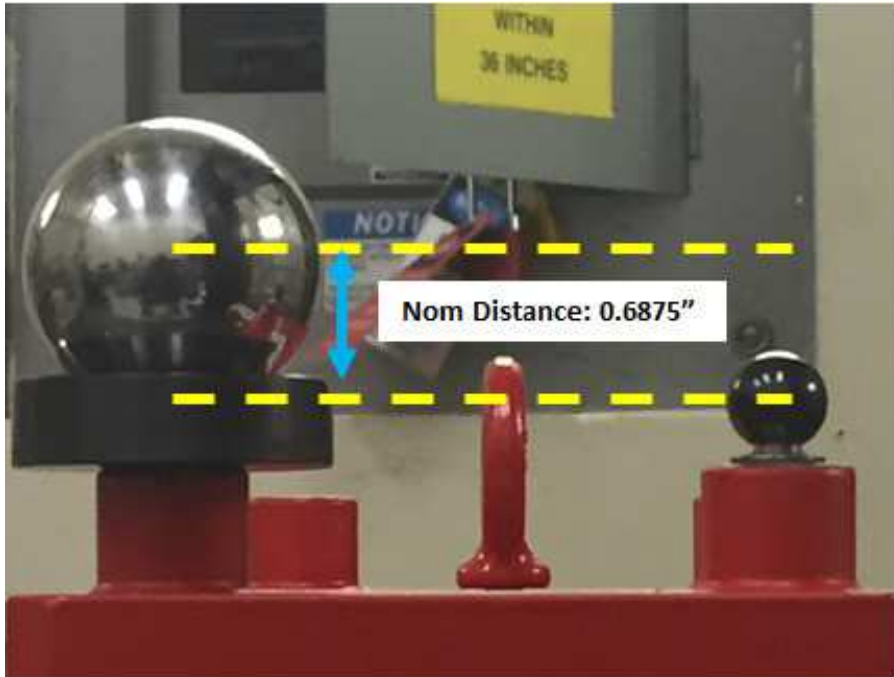
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37653	6.81112	-1.48126
TB 2	-3.38009	6.80490	1.52011
TB 3	3.36672	6.80426	1.52650
TB 4	3.37350	6.81323	-1.47703
TB 5	6.58905	0.12626	0.03168
TB A	-3.37725	6.12353	-1.48322
TB B	-3.38078	6.11641	1.51773
TB C	3.36701	6.11678	1.52432
TB D	3.37131	6.12514	-1.47498
TB E	5.90057	0.12895	0.03149

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



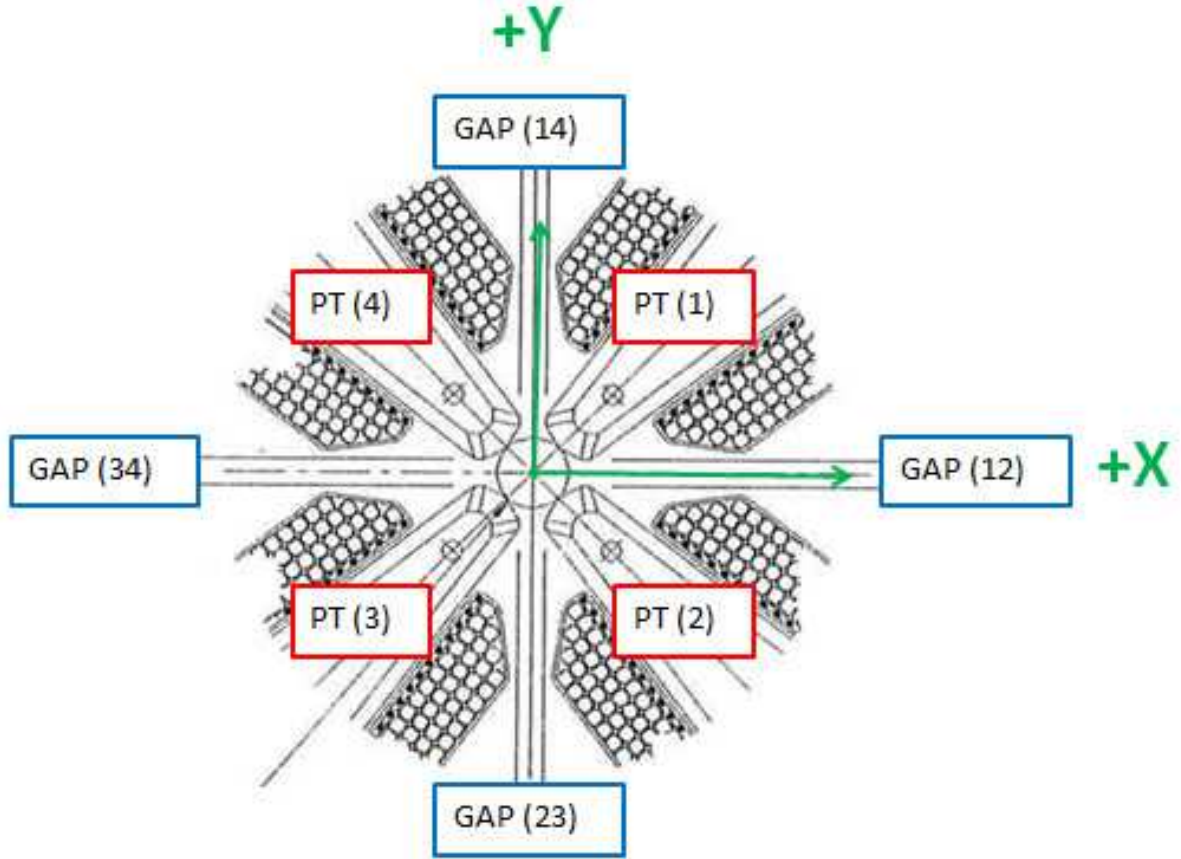
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68759
TB 2	0.6875 ± 0.001	0.6885
TB 3	0.6875 ± 0.001	0.68748
TB 4	0.6875 ± 0.001	0.6881
TB 5	0.6875 ± 0.001	0.68849

Dimensions in Inch

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Pole Tip Gap Measurements



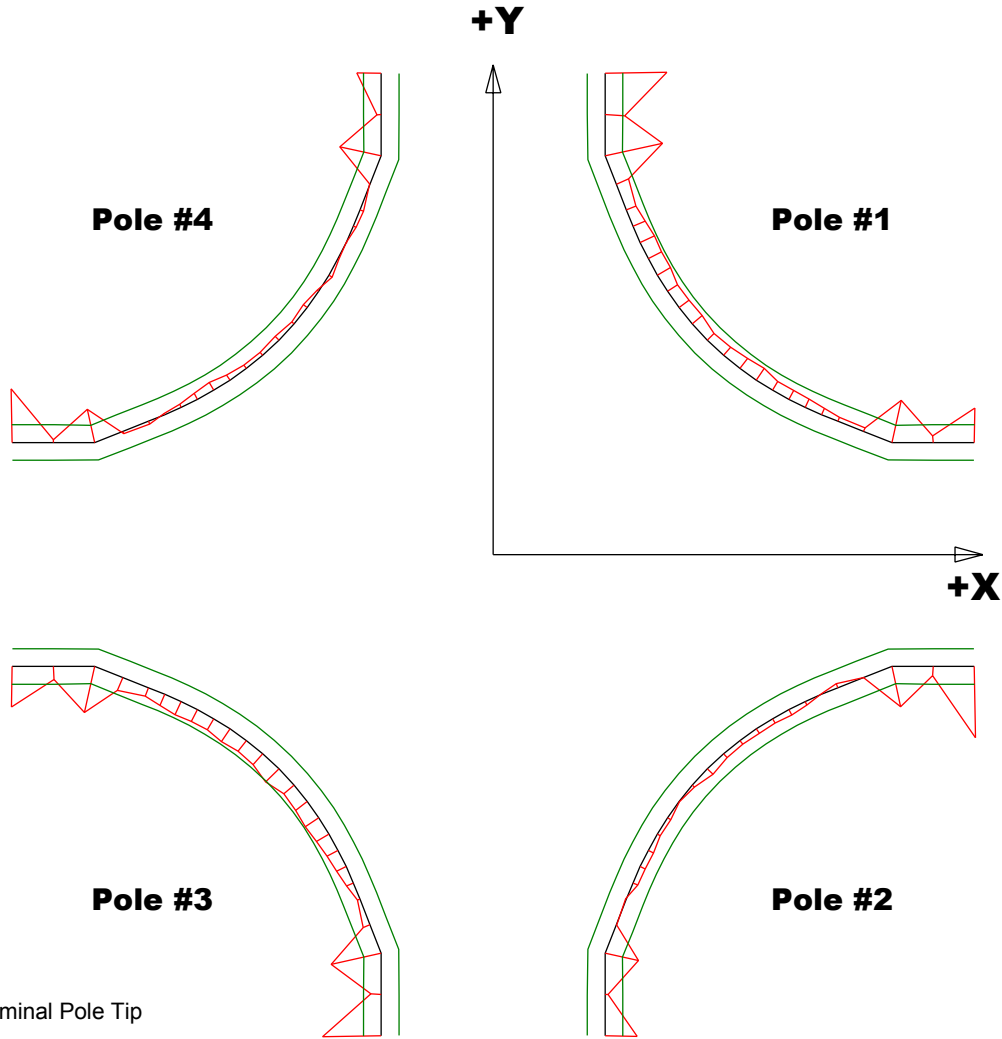
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43464	0.43538
Pole Tip Distance 2-4	0.433 ± .002	0.43371	0.4327
Gap 1-2	0.159 ± .002	0.16085	0.16084
Gap 2-3	0.159 ± .002	0.16064	0.16055
Gap 3-4	0.159 ± .002	0.16057	0.16093
Gap 4-1	0.159 ± .002	0.16115	0.15967

Dimensions in Inch

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Mfg. S/N : 027

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

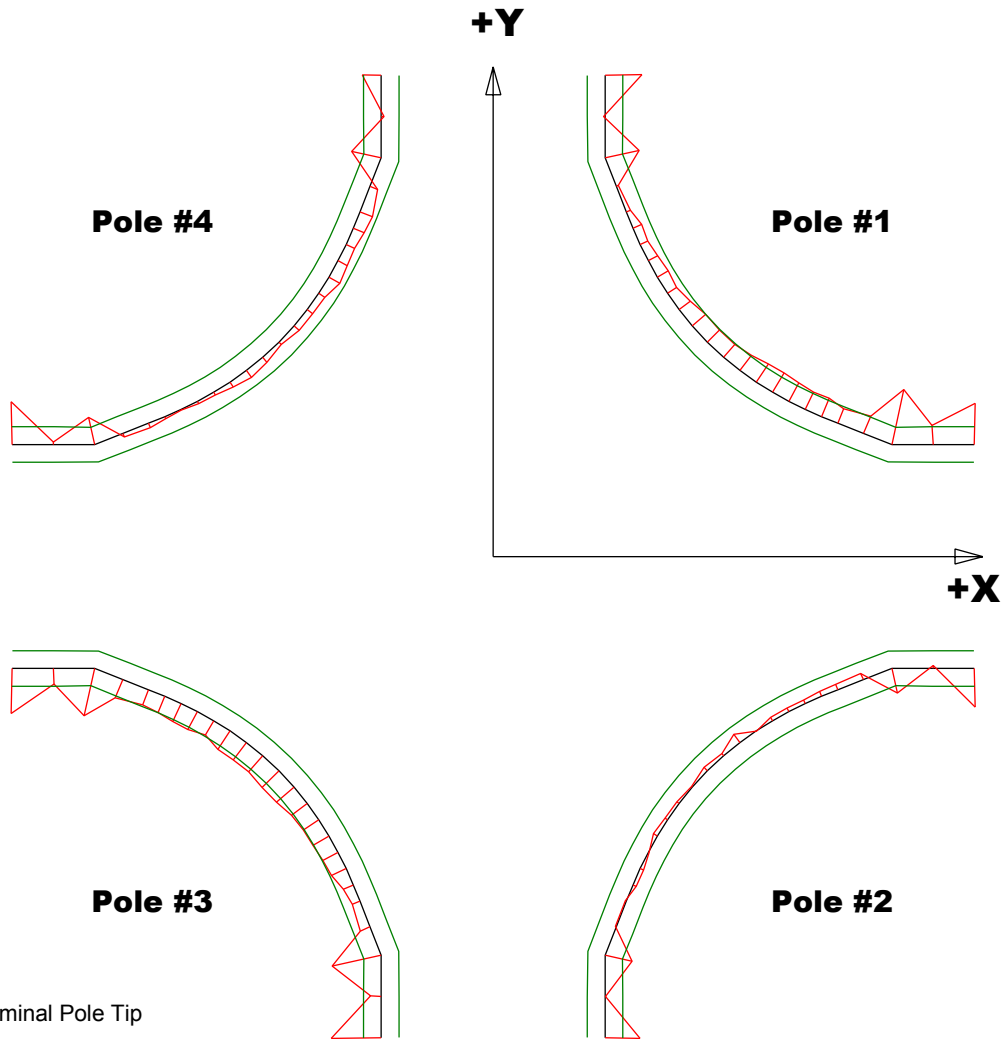
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00349	-0.00401	-0.0033	-0.00303
Max. Dev.	-0.00022	0.00024	-0.00015	0.00021

Barcode # : 4097

Mfg. S/N : 027

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

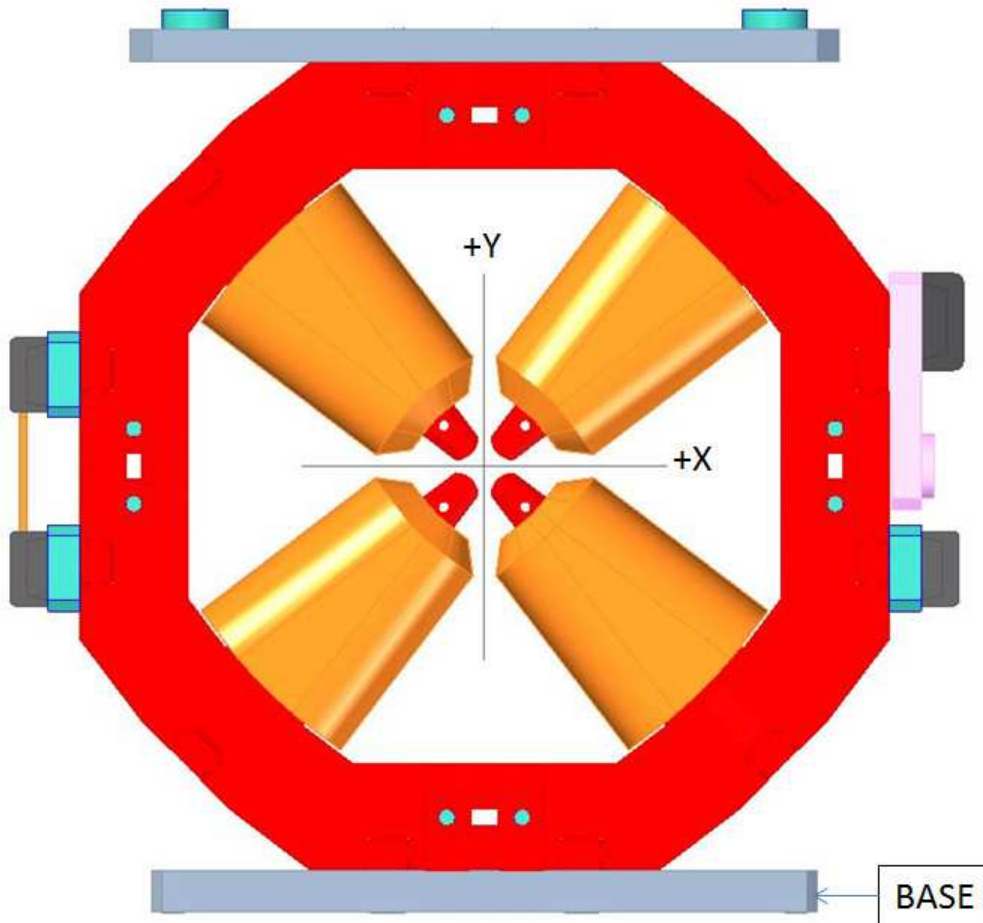
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00316	-0.00217	-0.00283	-0.00241
Max. Dev.	0.00009	0.00057	-0.00047	0.00076

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



Angle in Decimal Degrees ° :0.00483

Angle in Milliradians :0.08424

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