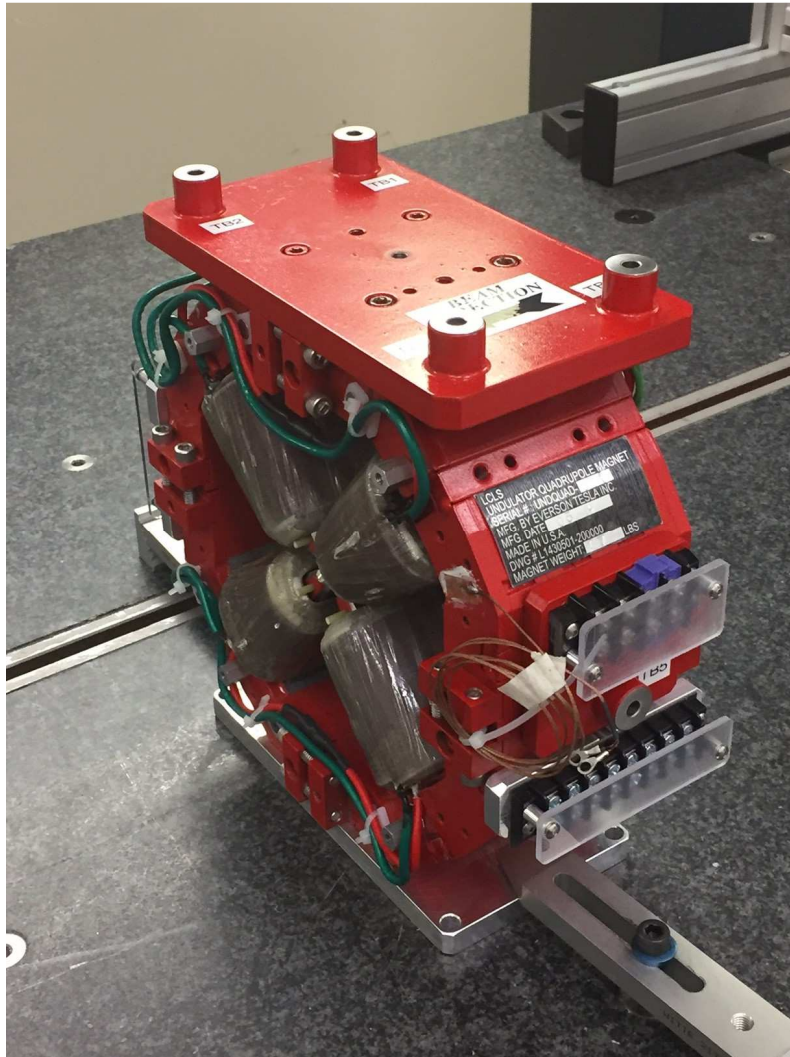


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4077
Mfg. S/N : 002

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.

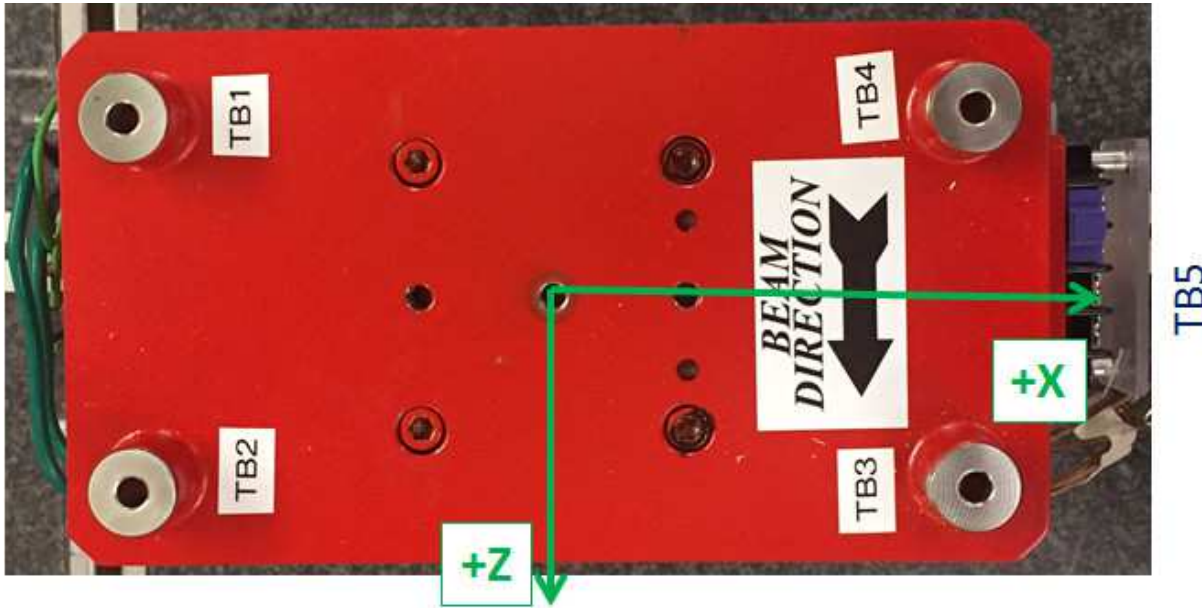
Coordinate Origins

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



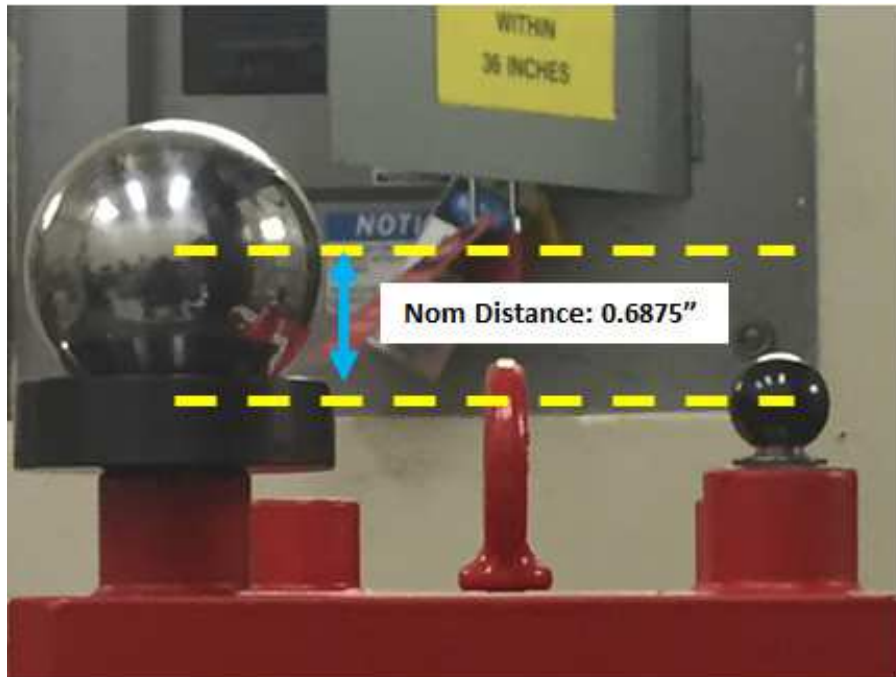
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36986	6.81734	-1.52630
TB 2	-3.36267	6.81211	1.47539
TB 3	3.38419	6.81144	1.45968
TB 4	3.37651	6.81372	-1.54193
TB 5	6.58685	0.12145	-0.04607
TB A	-3.36990	6.13019	-1.52485
TB B	-3.36385	6.12430	1.47525
TB C	3.38400	6.12525	1.45844
TB D	3.37672	6.12696	-1.54217
TB E	5.89994	0.12369	-0.04767

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



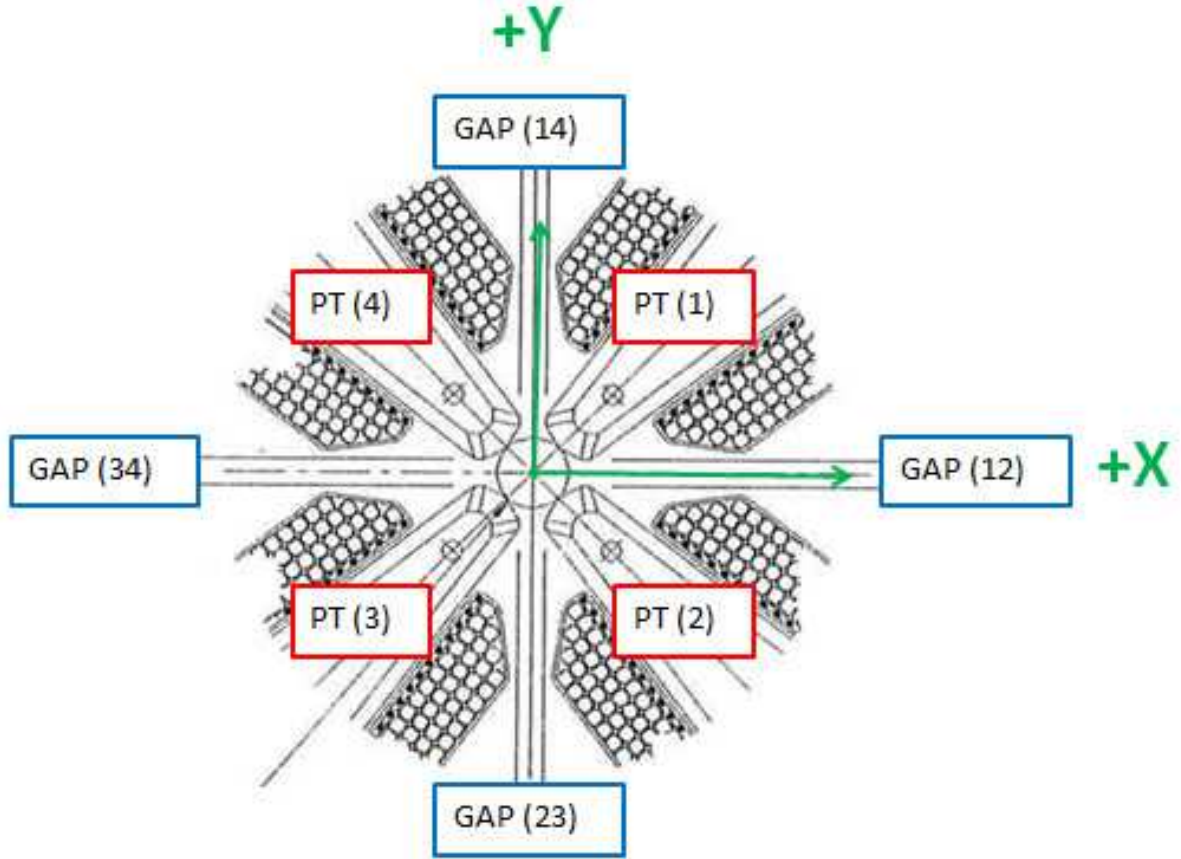
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68716
TB 2	0.6875 ± 0.001	0.68781
TB 3	0.6875 ± 0.001	0.6862
TB 4	0.6875 ± 0.001	0.68677
TB 5	0.6875 ± 0.001	0.68692

Dimensions in Inch

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Pole Tip Gap Measurements



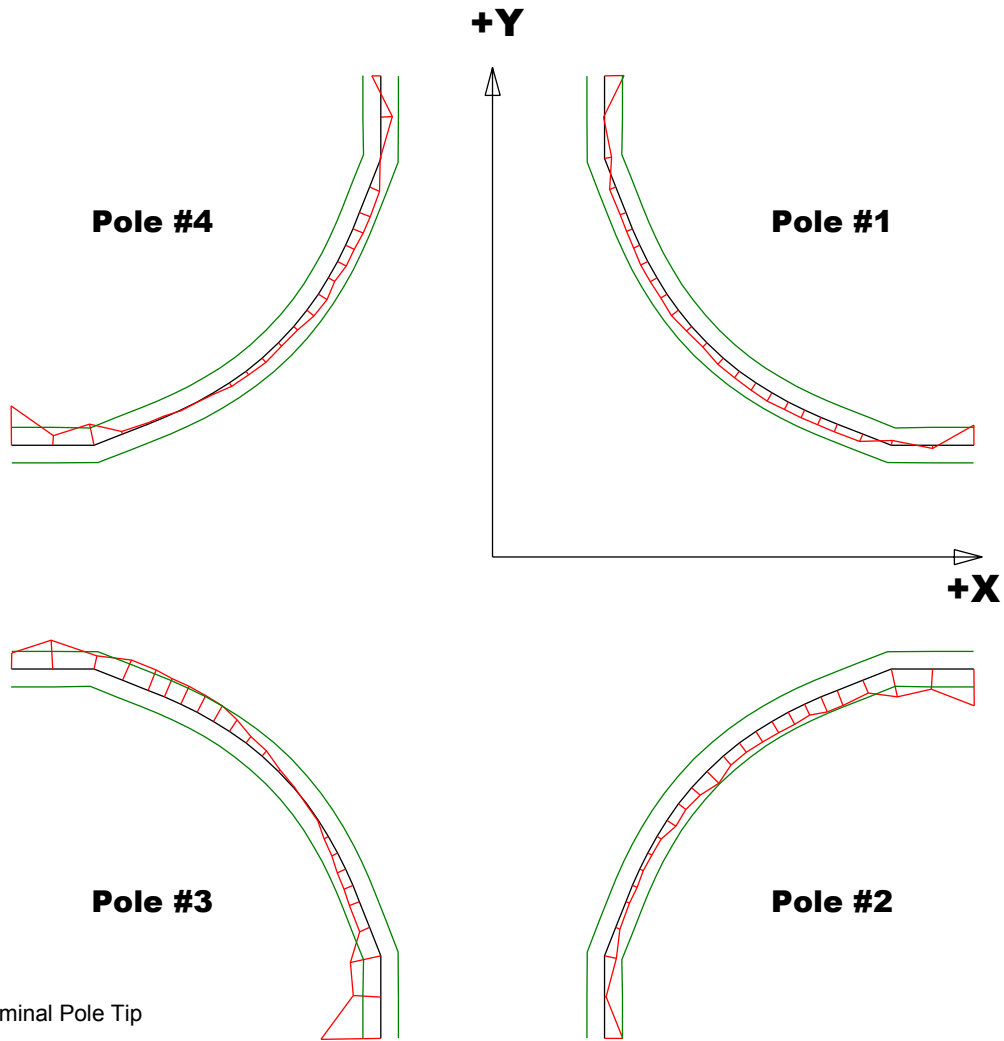
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43241	0.43383
Pole Tip Distance 2-4	0.433 ± .002	0.43373	0.43349
Gap 1-2	0.159 ± .002	0.16056	0.15854
Gap 2-3	0.159 ± .002	0.16149	0.16128
Gap 3-4	0.159 ± .002	0.15886	0.1636
Gap 4-1	0.159 ± .002	0.1586	0.15863

Dimensions in Inch

Barcode # : 4077

Mfg. S/N : 002

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

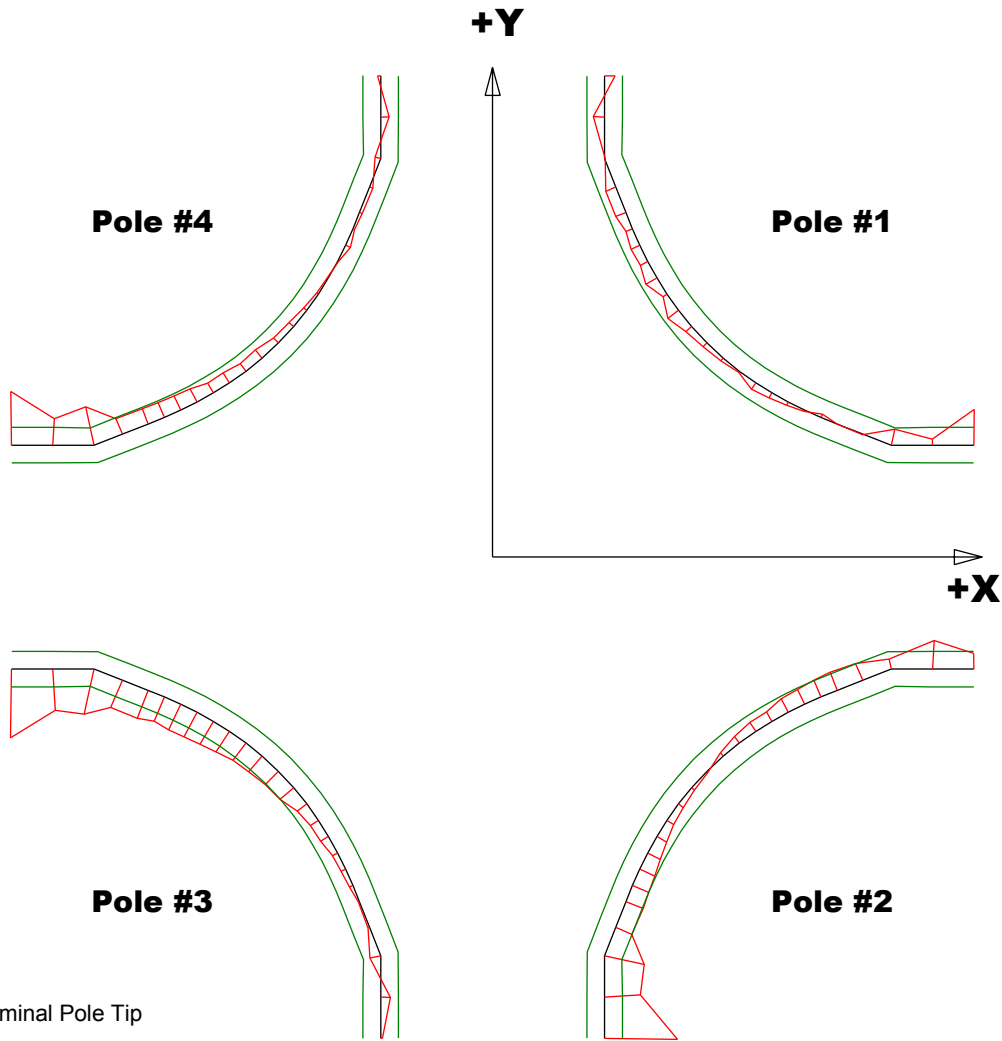
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00113	-0.00206	-0.00336	-0.00222
Max. Dev.	0.00054	-0.00008	0.00163	0.00066

Barcode # : 4077

Mfg. S/N : 002

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

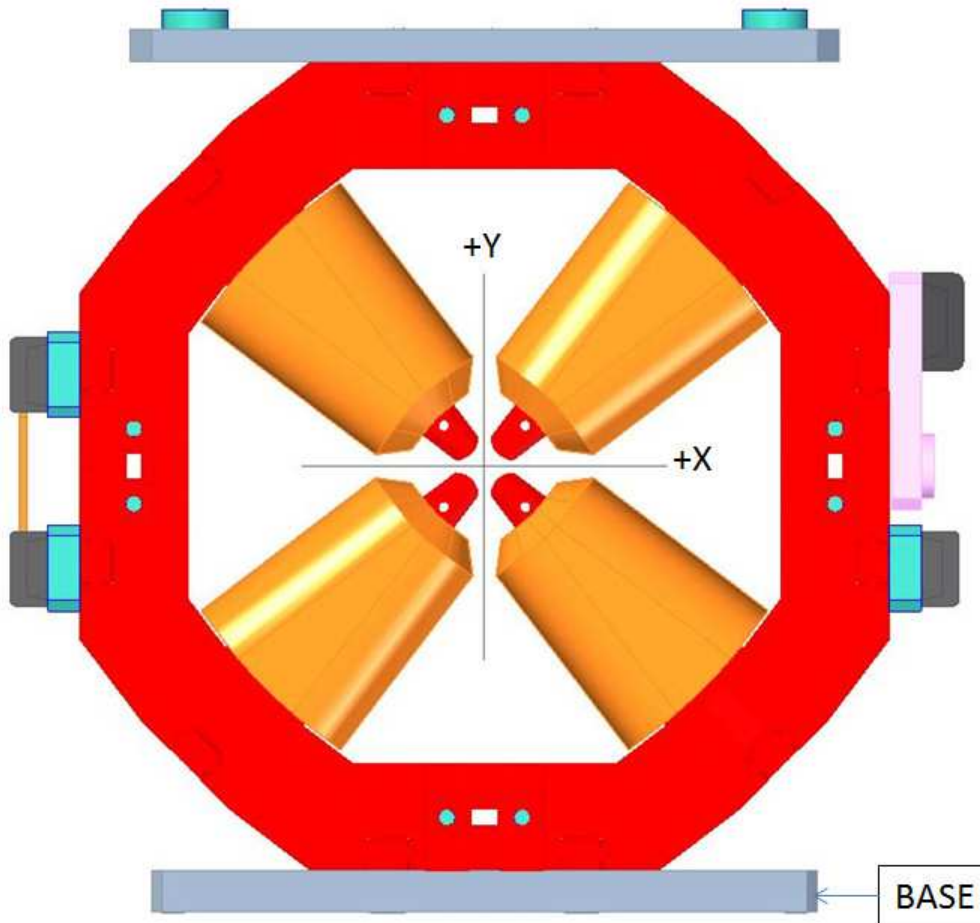
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00202	-0.0041	-0.00388	-0.00303
Max. Dev.	0.00075	0.0016	0.00055	0.00048

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



Angle in Decimal Degrees ° :0.06177

Angle in Milliradians :1.07803

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