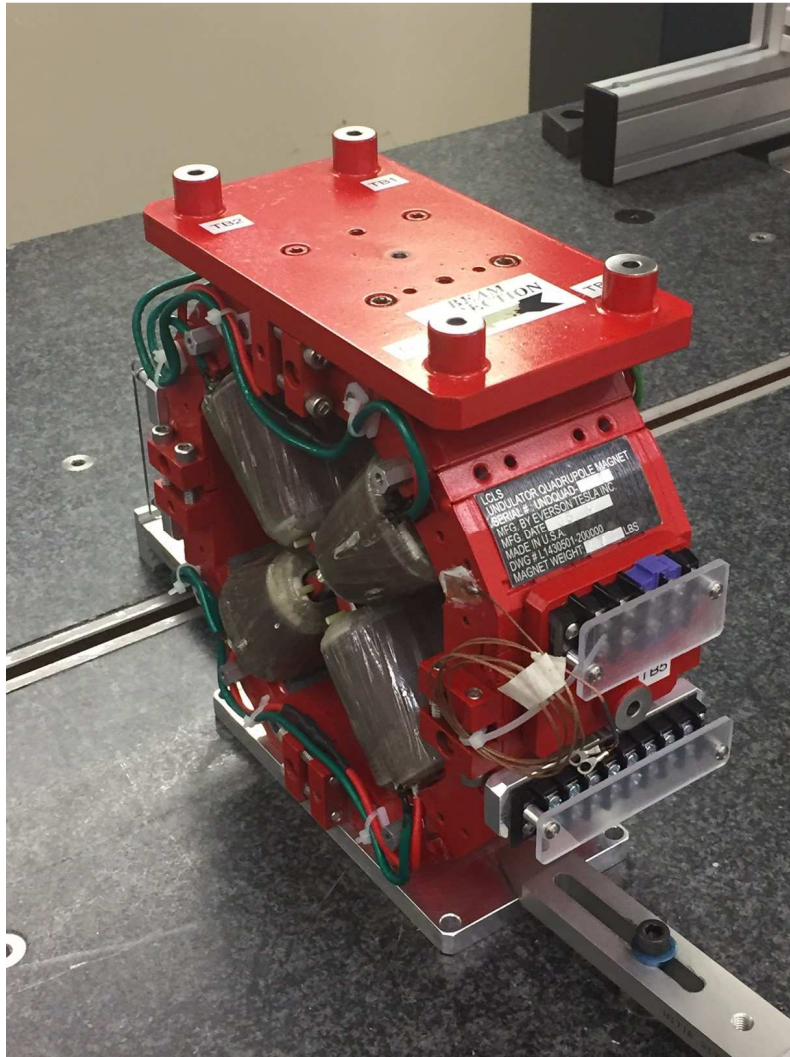


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4087
Mfg. S/N : 018

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.

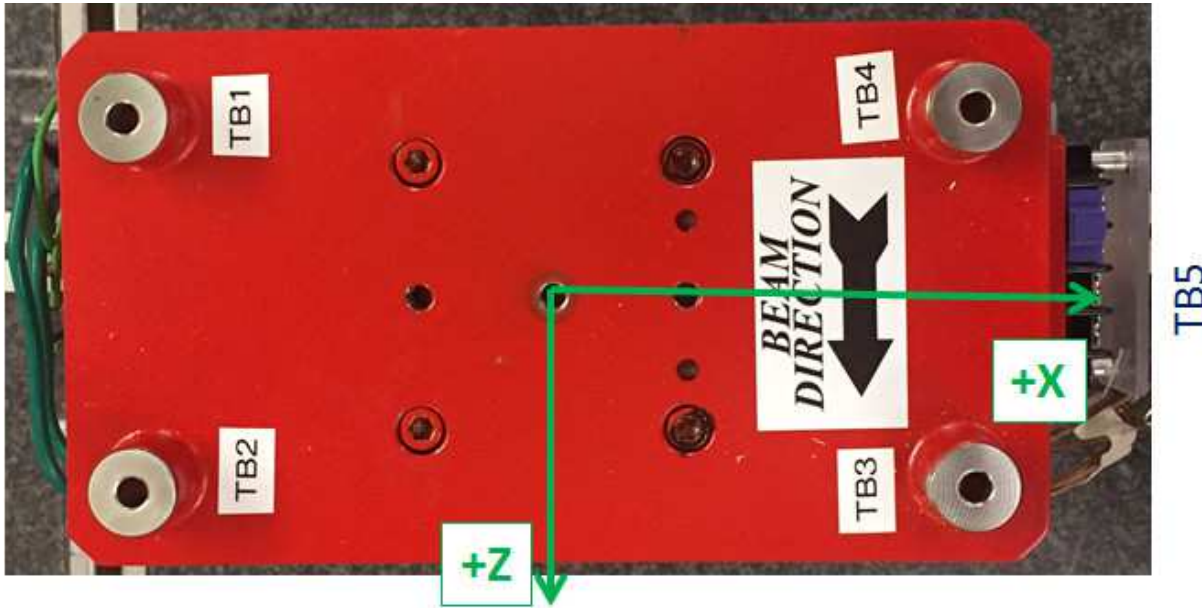
Coordinate Origins

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.

Barcode # : 4087

Mfg. S/N : 018

Tooling Ball Locations



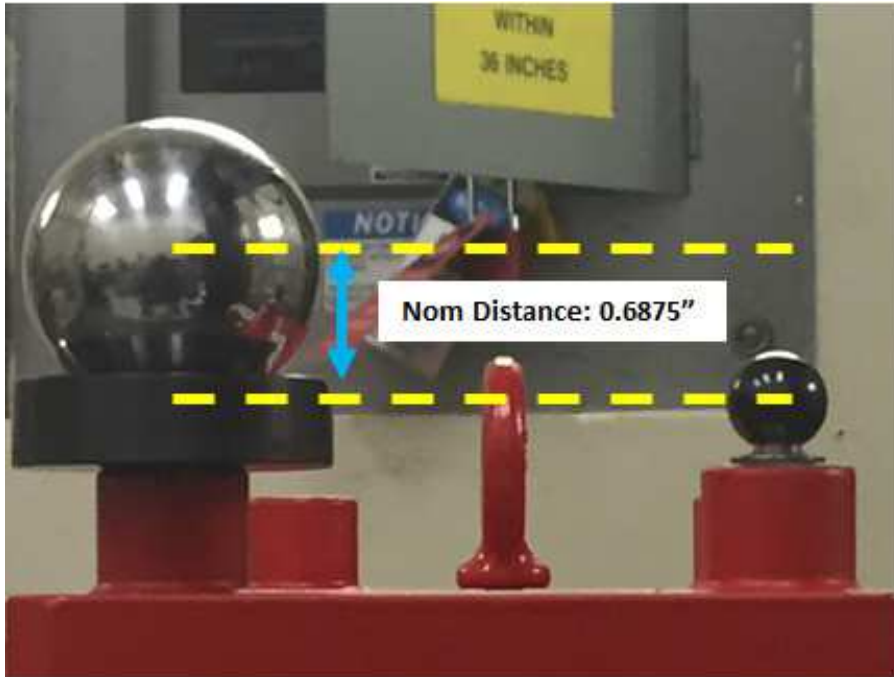
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36622	6.81868	-1.51963
TB 2	-3.36037	6.82056	1.48512
TB 3	3.38340	6.81008	1.47241
TB 4	3.37763	6.81045	-1.52804
TB 5	6.58687	0.11404	-0.02760
TB A	-3.36783	6.13186	-1.51751
TB B	-3.36243	6.13314	1.48407
TB C	3.38281	6.12317	1.47230
TB D	3.37760	6.12365	-1.52787
TB E	5.89933	0.11787	-0.02770

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



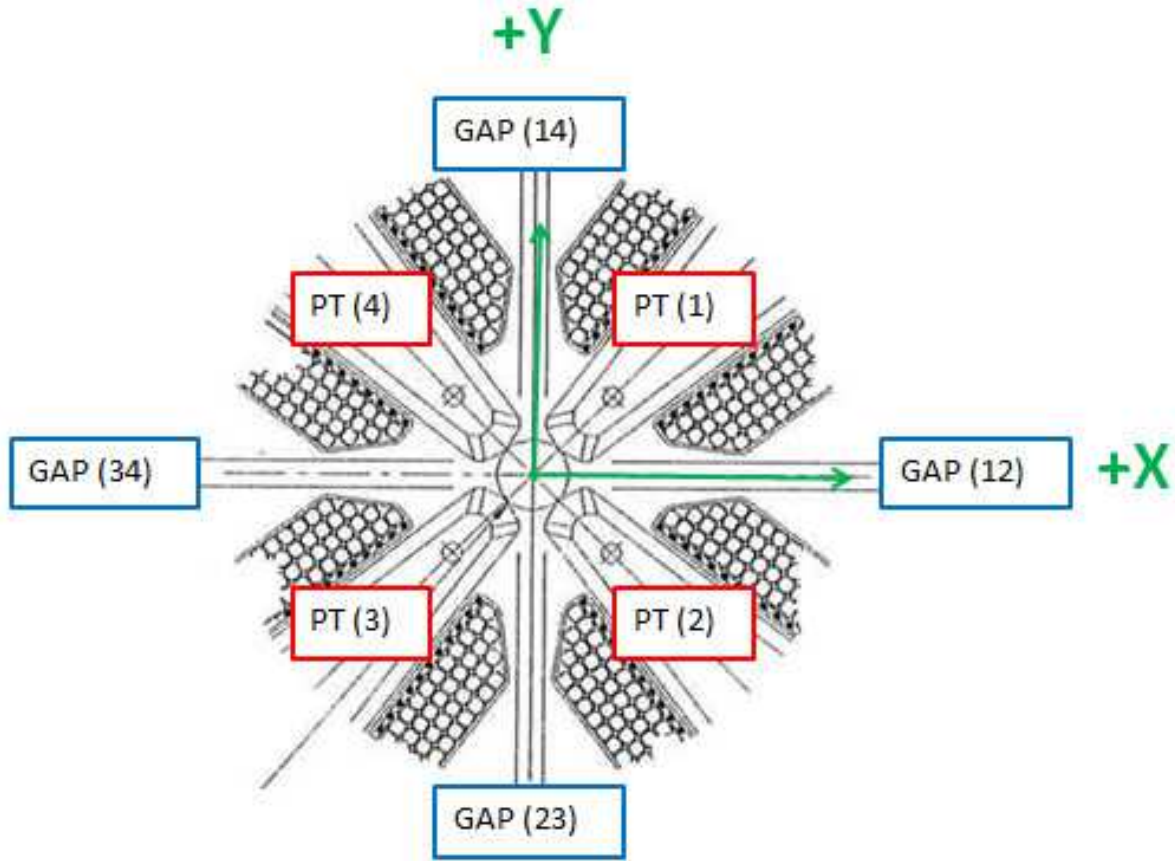
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68682
TB 2	0.6875 ± 0.001	0.68742
TB 3	0.6875 ± 0.001	0.68691
TB 4	0.6875 ± 0.001	0.6868
TB 5	0.6875 ± 0.001	0.68755

Dimensions in Inch

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Pole Tip Gap Measurements



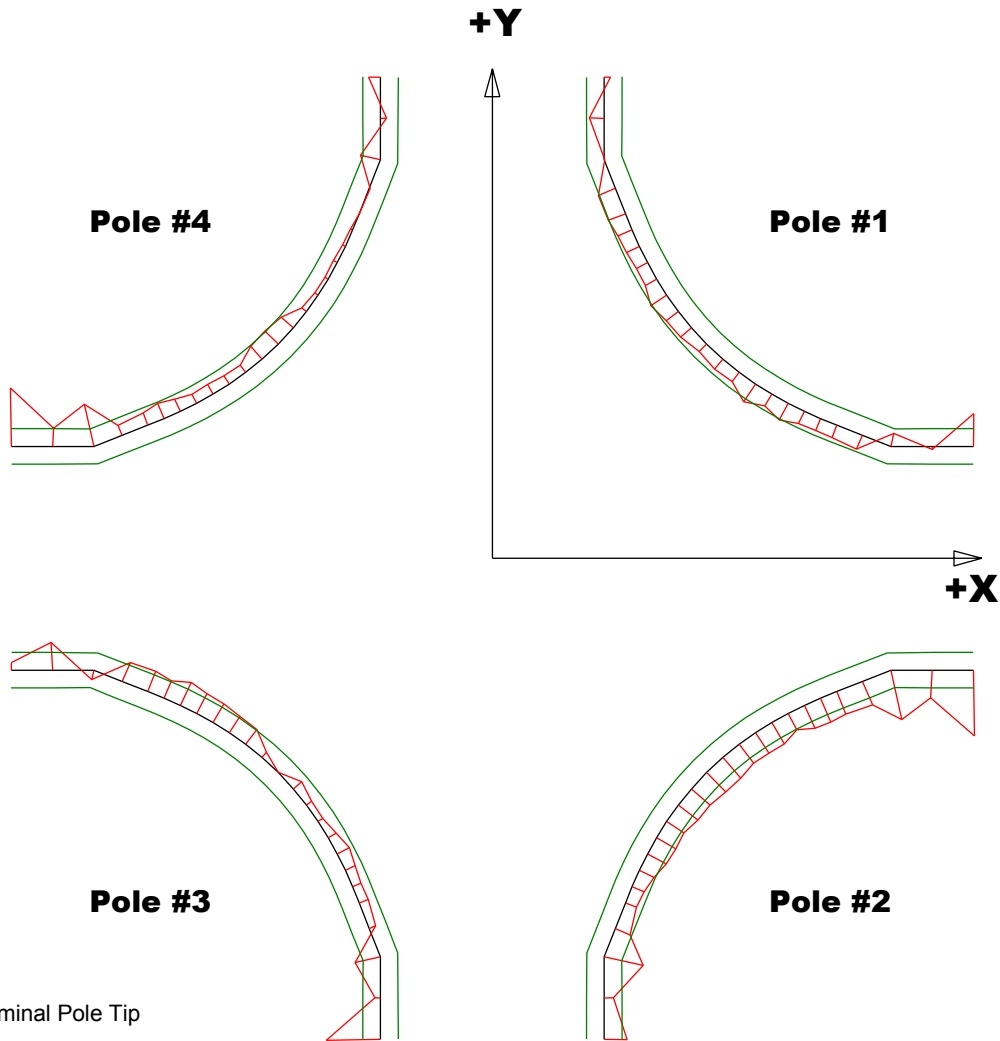
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43232	0.43275
Pole Tip Distance 2-4	0.433 ± .002	0.43555	0.43338
Gap 1-2	0.159 ± .002	0.1613	0.16009
Gap 2-3	0.159 ± .002	0.16067	0.15798
Gap 3-4	0.159 ± .002	0.15935	0.16223
Gap 4-1	0.159 ± .002	0.15856	0.15833

Dimensions in Inch

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Mfg. S/N : 018

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

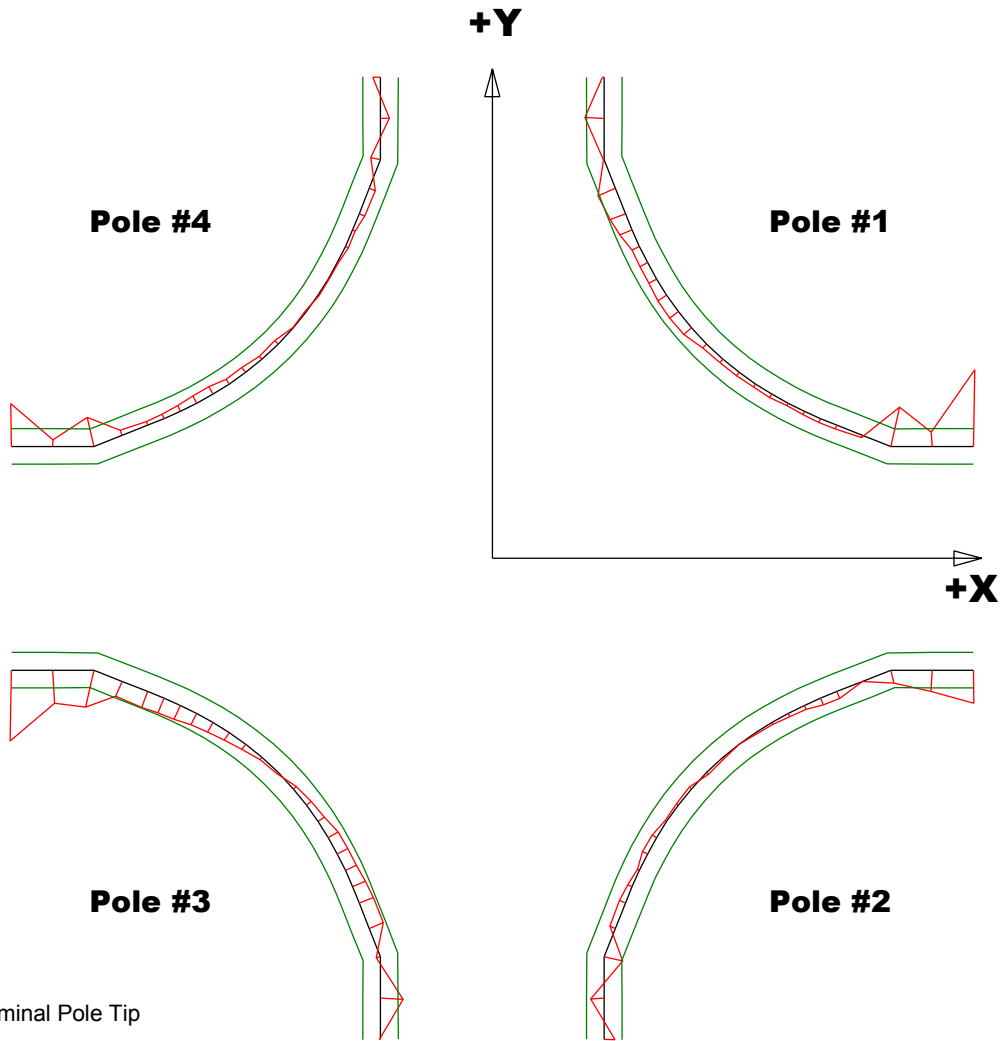
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00185	-0.0037	-0.00306	-0.0033
Max. Dev.	0.00119	-0.00051	0.00157	0.00033

Barcode # : 4087

Mfg. S/N : 018

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

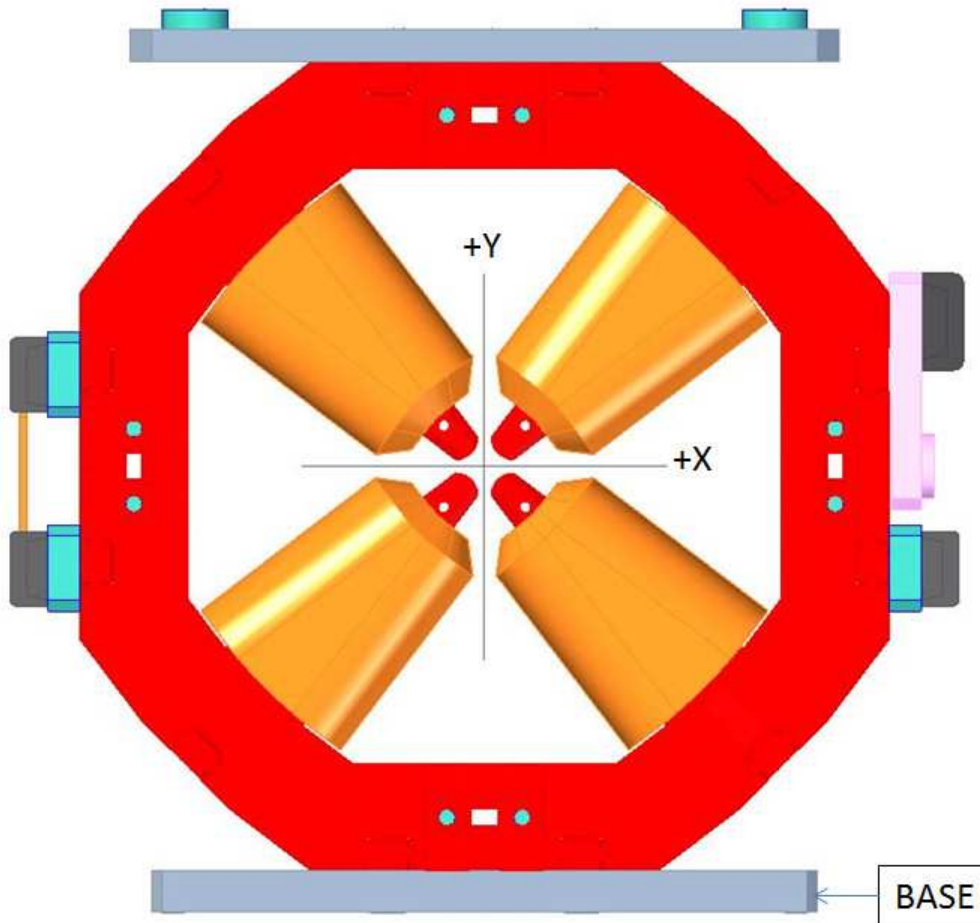
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00431	-0.00187	-0.00398	-0.0024
Max. Dev.	0.00109	0.00077	0.00128	0.0005

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



Angle in Decimal Degrees ° :0.07206

Angle in Milliradians :1.25764

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