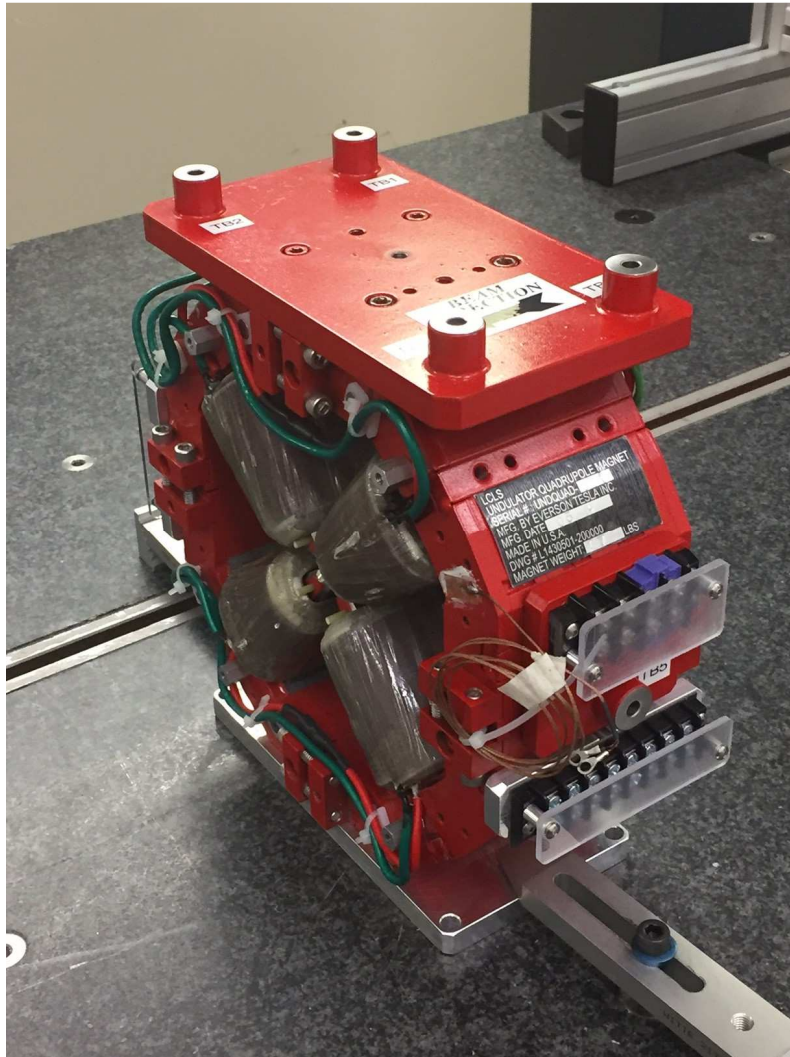


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4074
Mfg. S/N : 009

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.

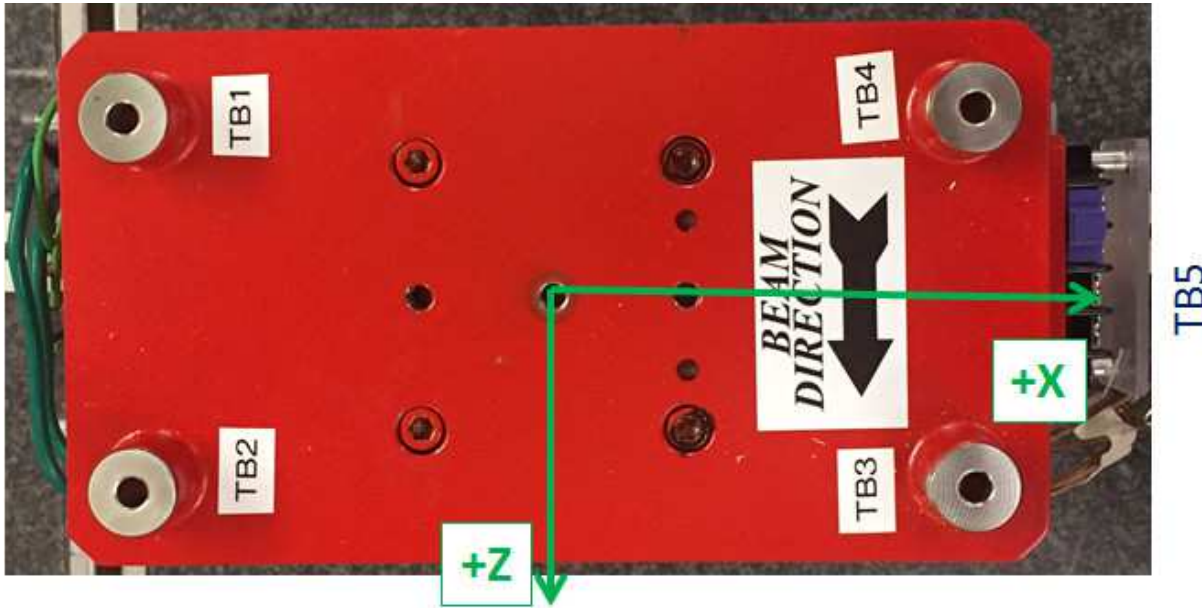
Coordinate Origins

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



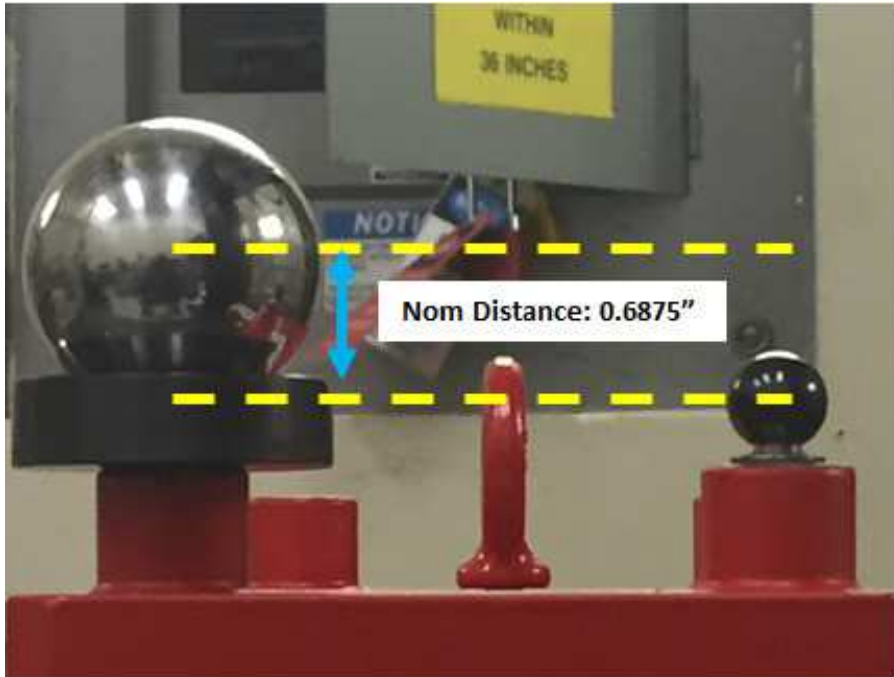
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37781	6.81865	-1.51645
TB 2	-3.36210	6.81622	1.48333
TB 3	3.38283	6.80445	1.45089
TB 4	3.36813	6.81368	-1.54754
TB 5	6.58760	0.12377	-0.03306
TB A	-3.37671	6.12927	-1.51737
TB B	-3.36277	6.12872	1.48358
TB C	3.38350	6.11679	1.45123
TB D	3.36972	6.12584	-1.54788
TB E	5.90027	0.12445	-0.03310

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



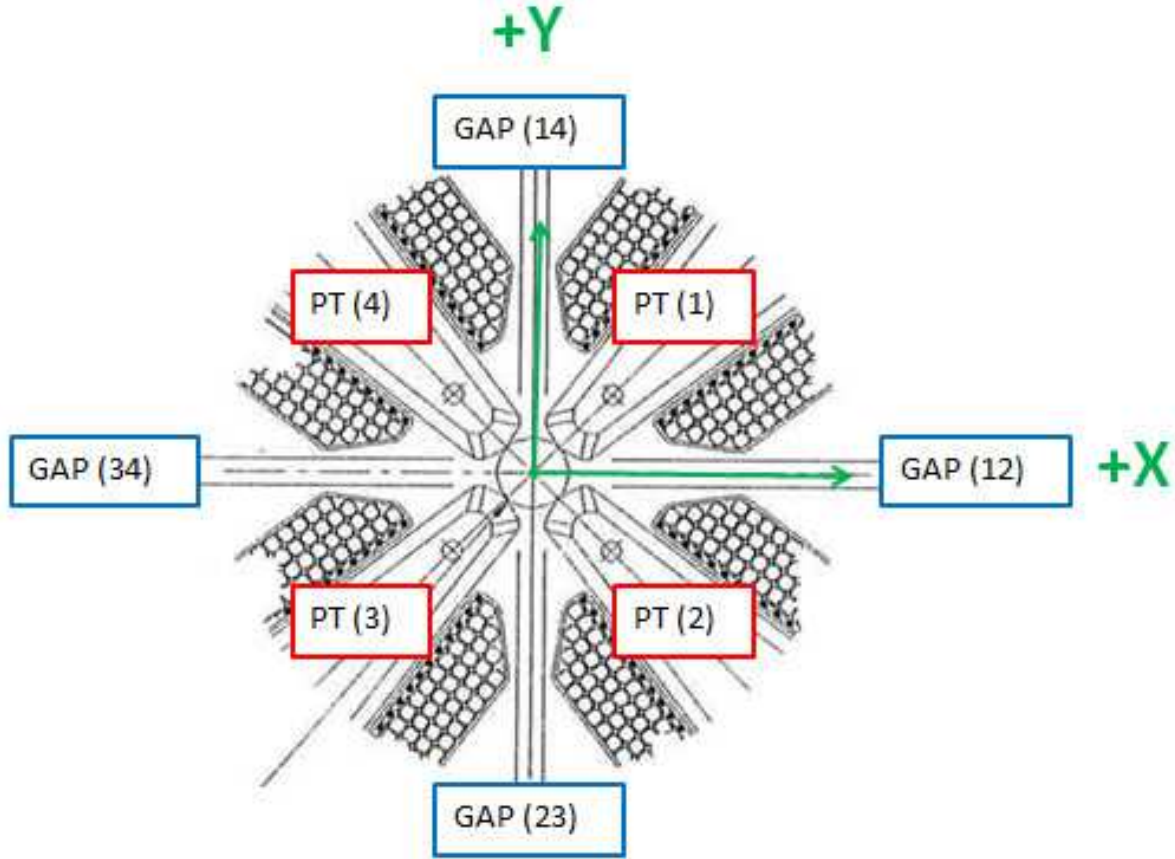
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68939
TB 2	0.6875 ± 0.001	0.68749
TB 3	0.6875 ± 0.001	0.68766
TB 4	0.6875 ± 0.001	0.68783
TB 5	0.6875 ± 0.001	0.68733

Dimensions in Inch

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Pole Tip Gap Measurements



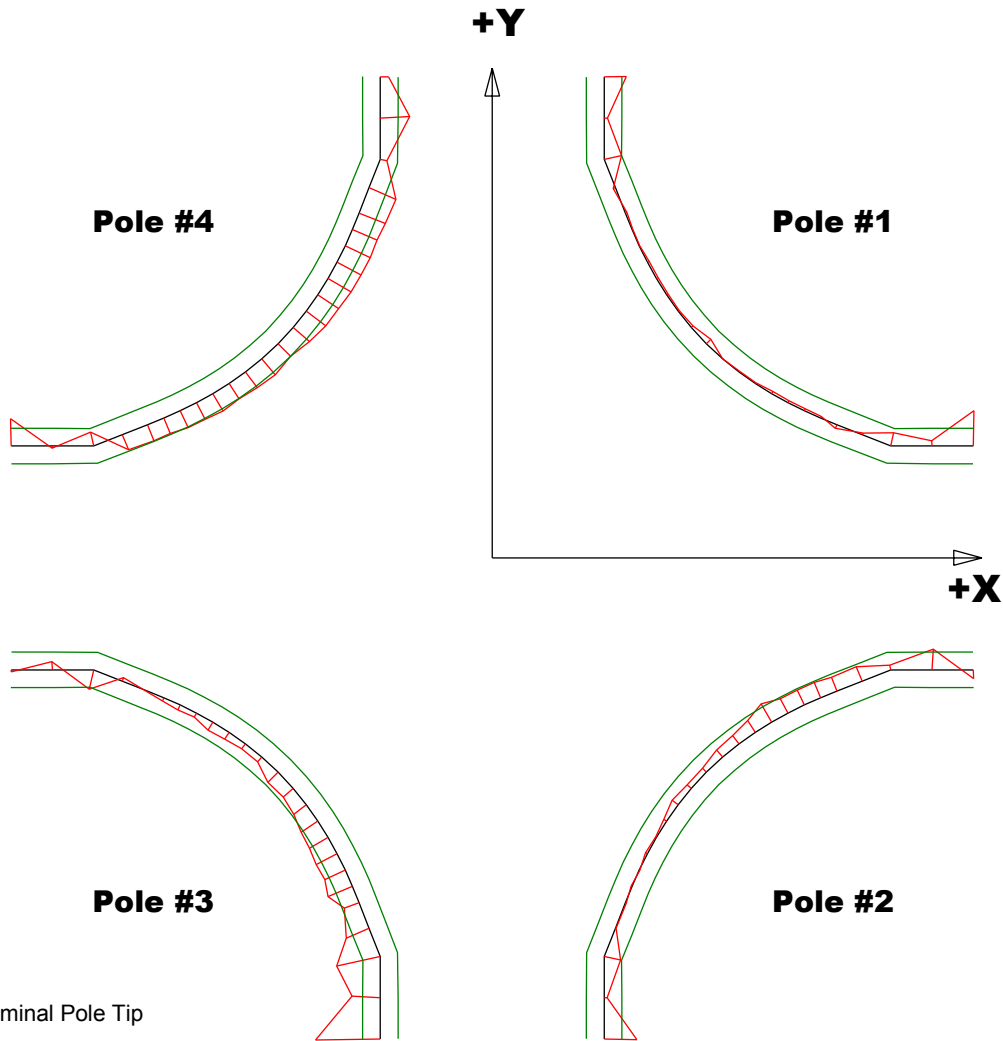
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43401	0.43308
Pole Tip Distance 2-4	0.433 ± .002	0.43166	0.43259
Gap 1-2	0.159 ± .002	0.15893	0.16097
Gap 2-3	0.159 ± .002	0.16156	0.1601
Gap 3-4	0.159 ± .002	0.15908	0.15869
Gap 4-1	0.159 ± .002	0.15835	0.15879

Dimensions in Inch

Barcode # : 4074

Mfg. S/N : 009

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

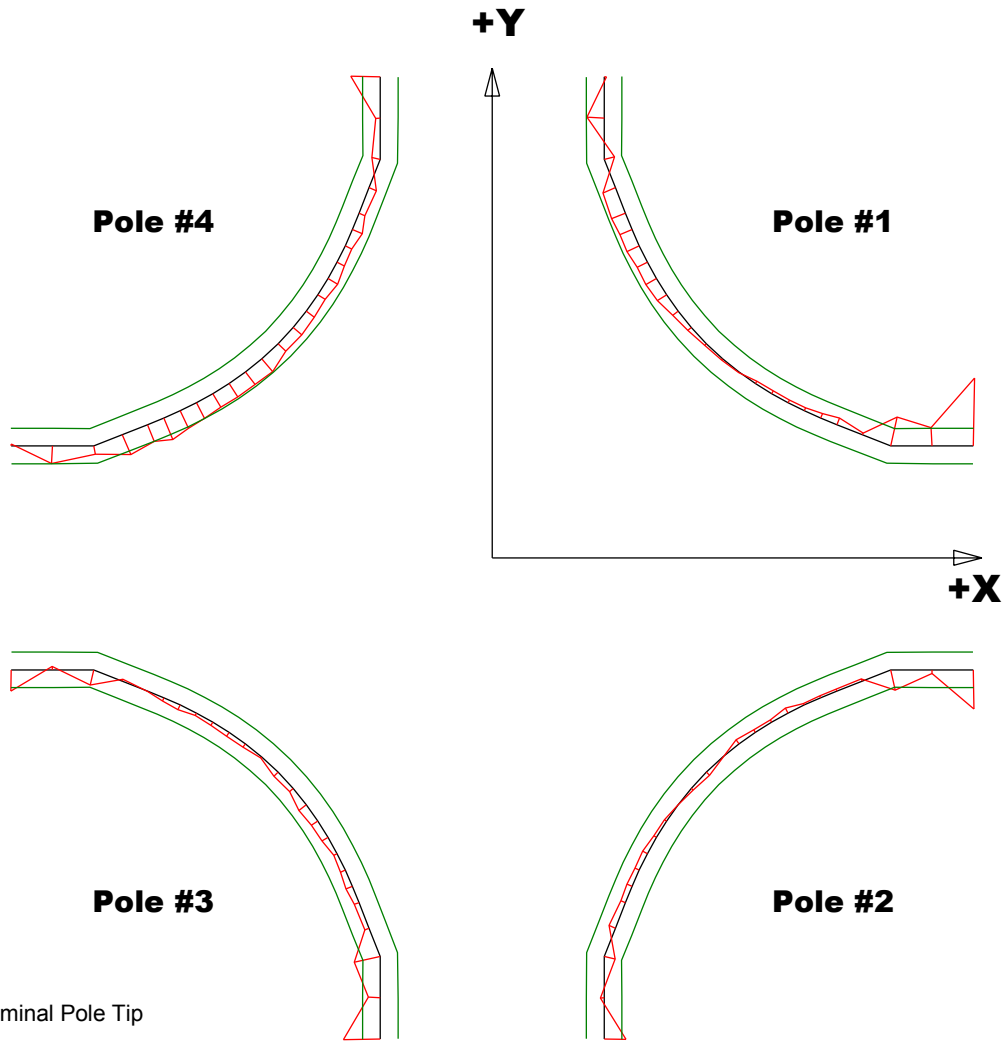
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.002	-0.00185	-0.00364	-0.00153
Max. Dev.	0.00022	0.00118	0.00046	0.00165

Barcode # : 4074

Mfg. S/N : 009

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

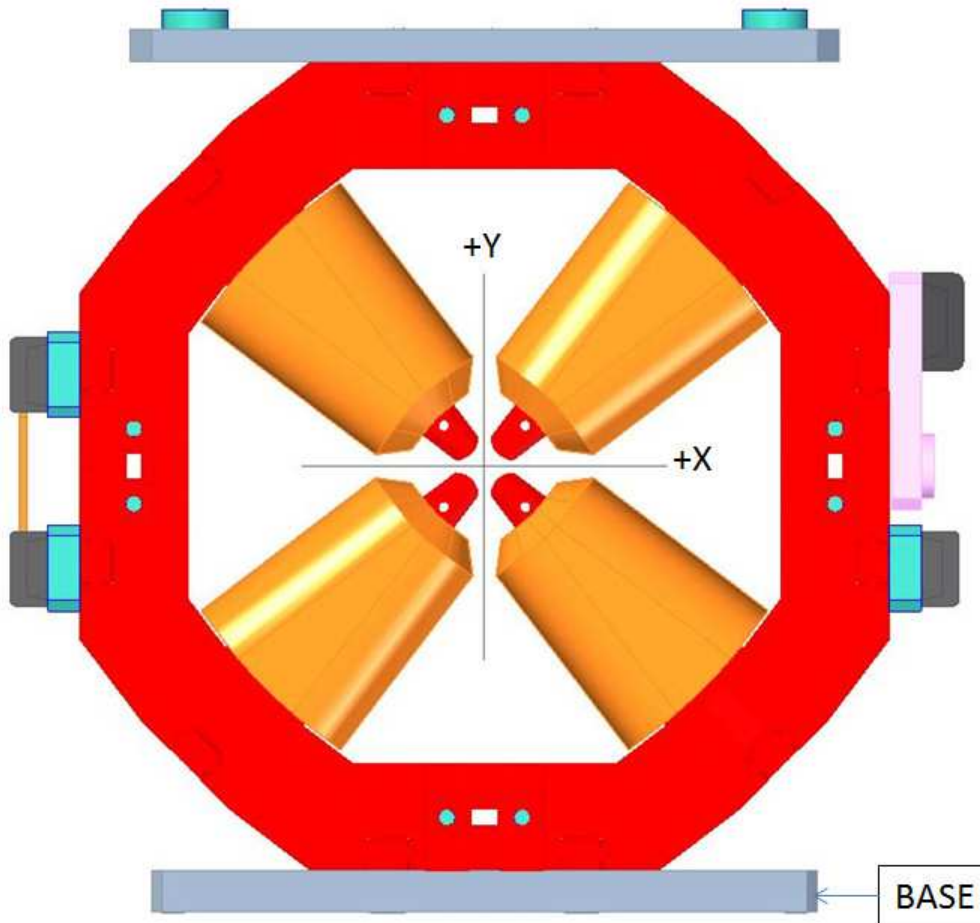
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00383	-0.00221	-0.00208	-0.00166
Max. Dev.	0.00097	0.0004	0.00018	0.00131

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



Angle in Decimal Degrees ° :0.04016

Angle in Milliradians :0.70094

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