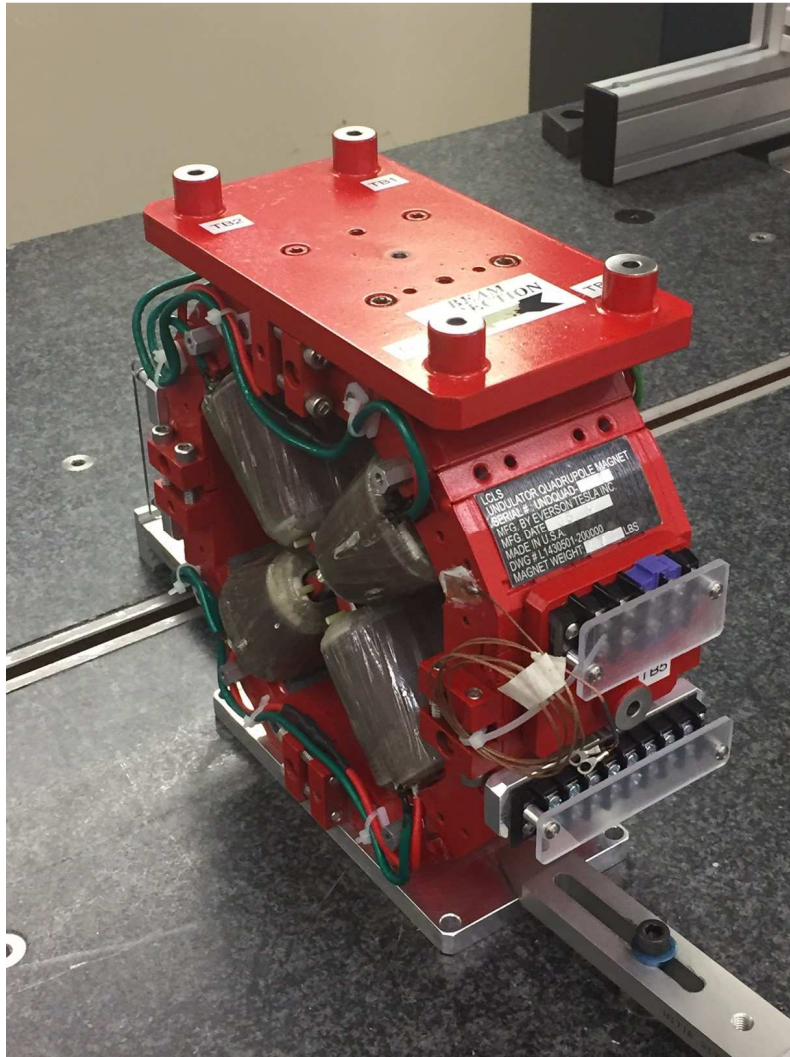


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4095
Mfg. S/N : 026

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.

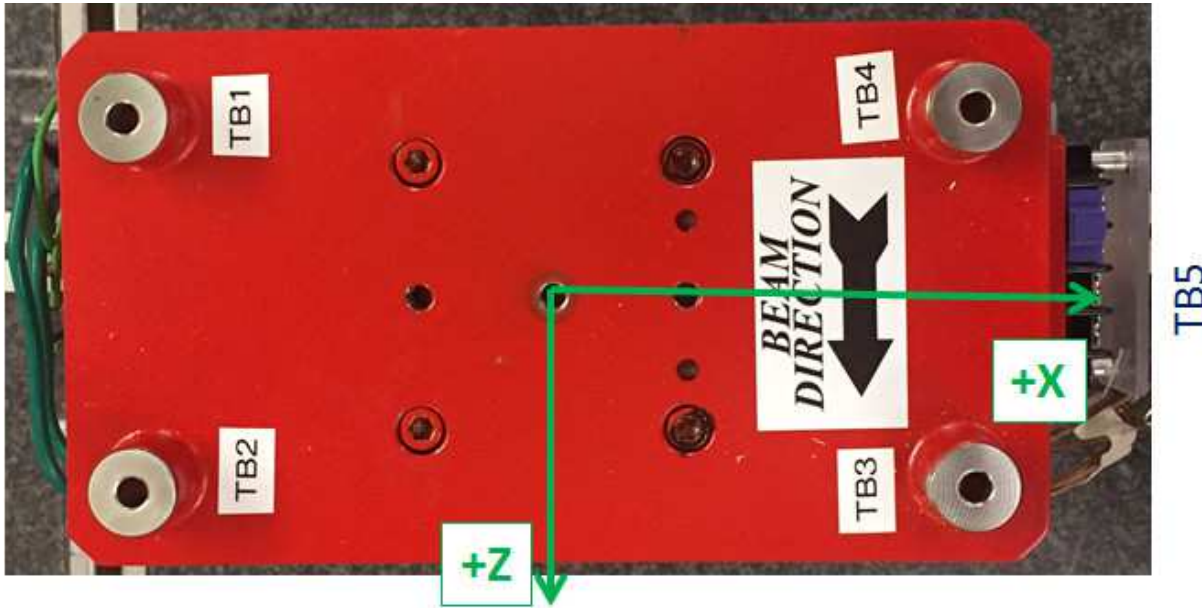
Coordinate Origins

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



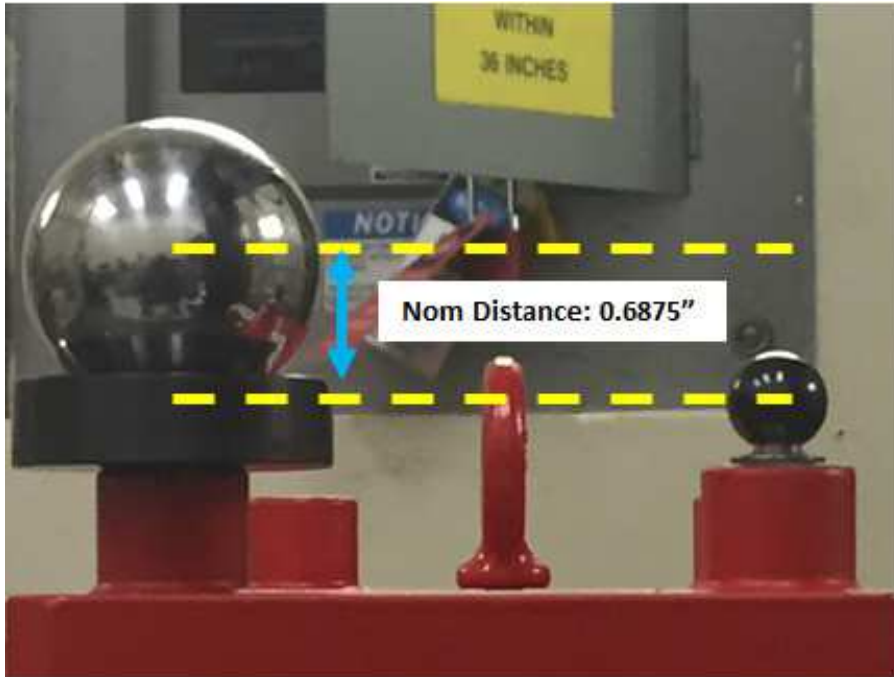
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37563	6.81500	-1.48449
TB 2	-3.37811	6.81639	1.51495
TB 3	3.36792	6.81947	1.51767
TB 4	3.37143	6.81590	-1.48069
TB 5	6.58762	0.12897	0.01585
TB A	-3.37595	6.12802	-1.48414
TB B	-3.37863	6.12923	1.51638
TB C	3.36854	6.13234	1.51977
TB D	3.37115	6.12937	-1.48064
TB E	5.90016	0.13033	0.01518

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



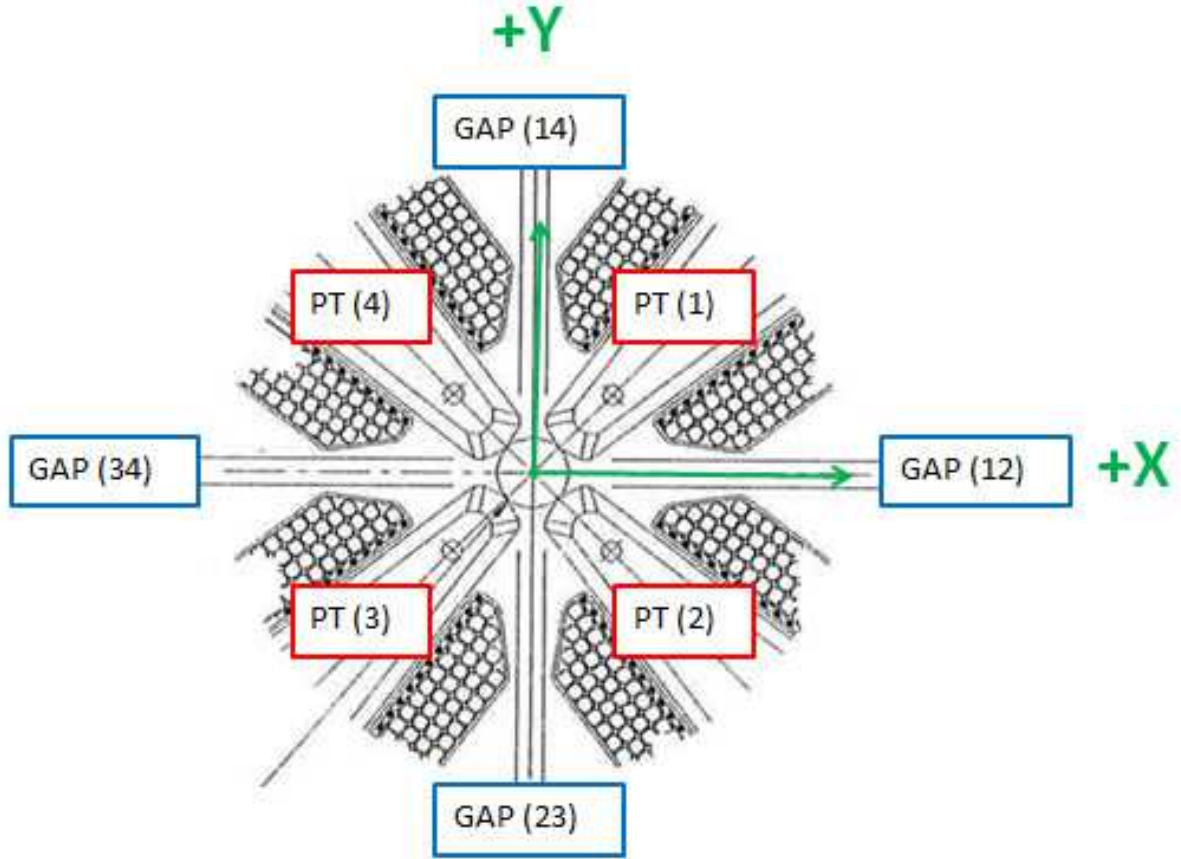
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68698
TB 2	0.6875 ± 0.001	0.68716
TB 3	0.6875 ± 0.001	0.68713
TB 4	0.6875 ± 0.001	0.68654
TB 5	0.6875 ± 0.001	0.68746

Dimensions in Inch

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Pole Tip Gap Measurements



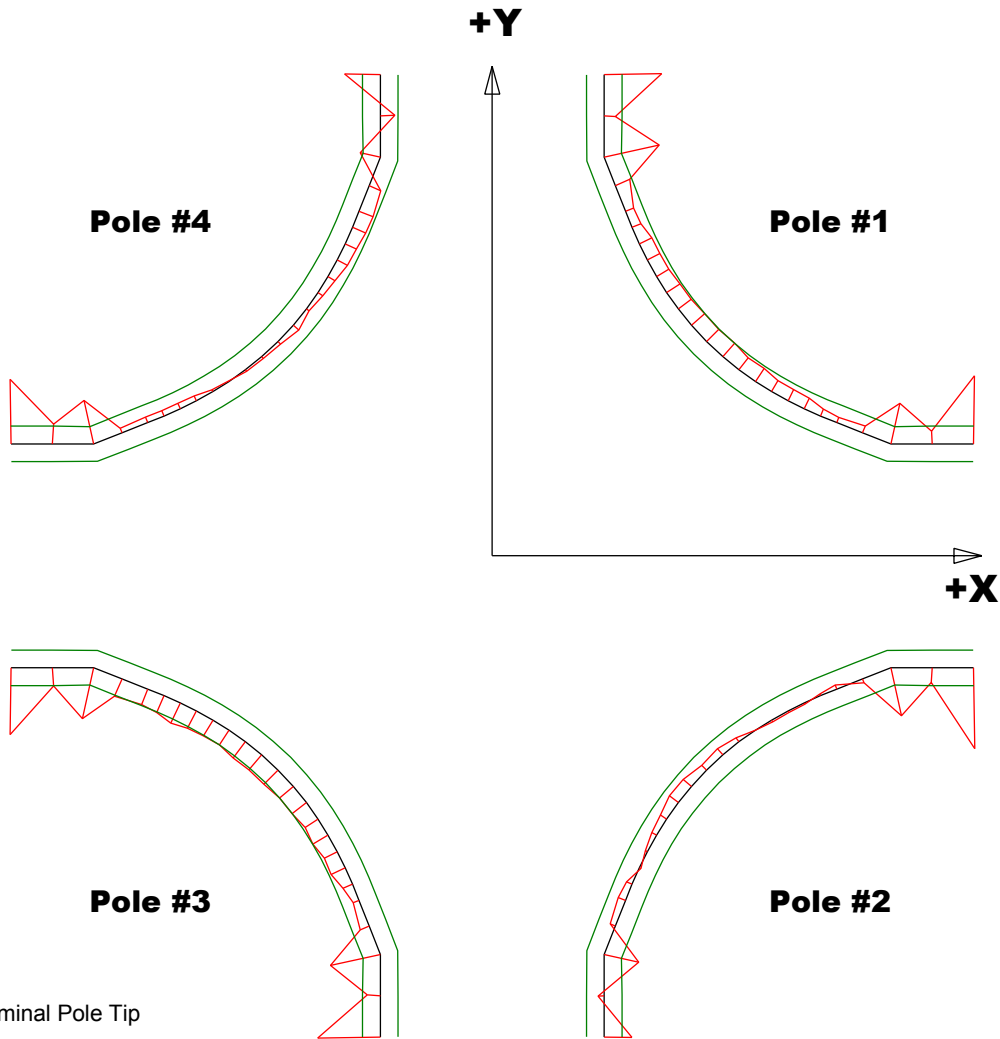
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43518	0.43515
Pole Tip Distance 2-4	0.433 ± .002	0.43239	0.43338
Gap 1-2	0.159 ± .002	0.16137	0.16027
Gap 2-3	0.159 ± .002	0.16033	0.16231
Gap 3-4	0.159 ± .002	0.16202	0.16101
Gap 4-1	0.159 ± .002	0.1598	0.1607

Dimensions in Inch

Barcode # : 4095

Mfg. S/N : 026

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

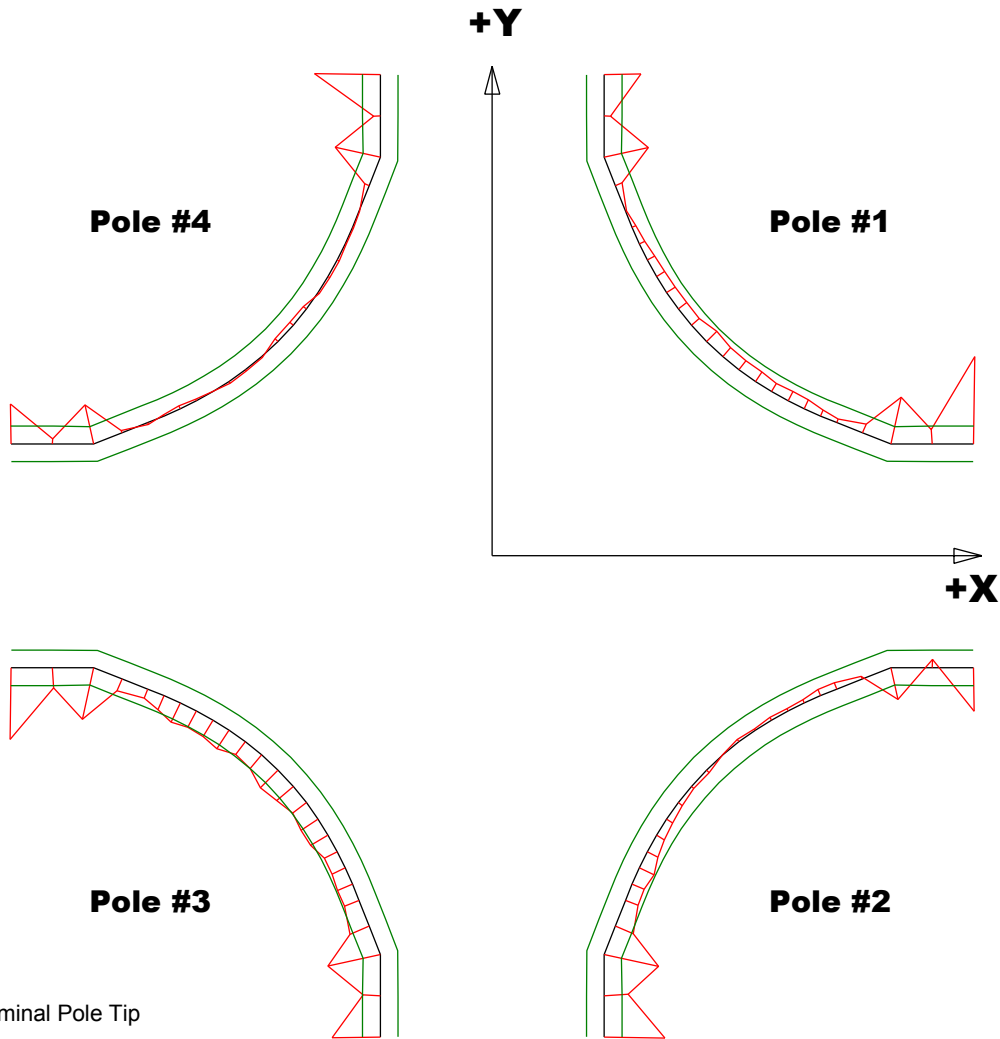
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00384	-0.00456	-0.00377	-0.00364
Max. Dev.	-0.0003	0.00063	-0.00035	0.00085

Barcode # : 4095

Mfg. S/N : 026

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

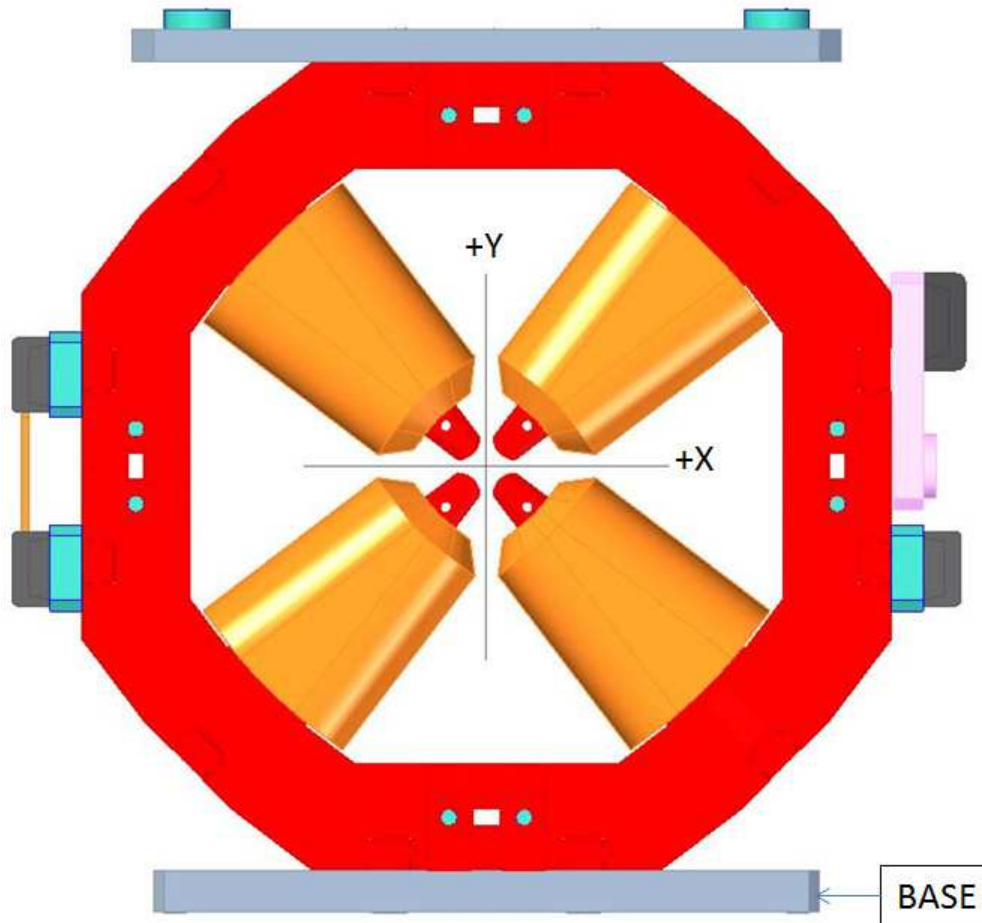
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00491	-0.00341	-0.00403	-0.0037
Max. Dev.	-0.00006	0.00047	-0.00056	0.00013

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



Angle in Decimal Degrees ° :-0.02555

Angle in Milliradians :-0.44588

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