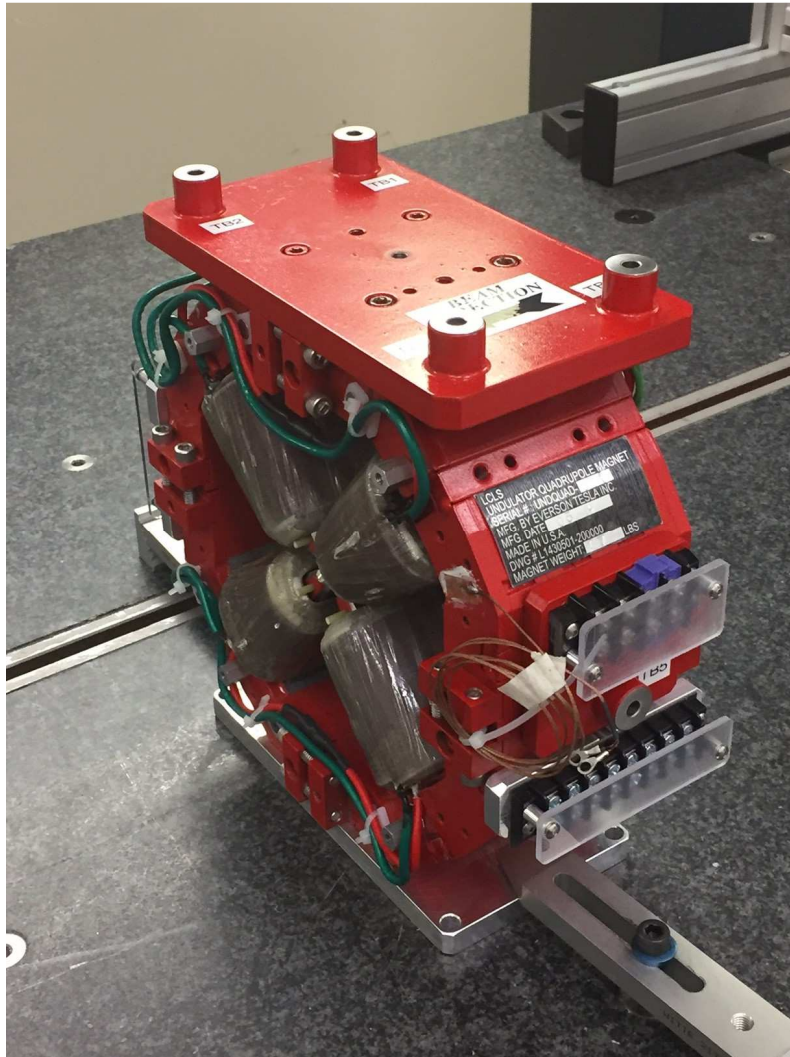


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4065
Mfg. S/N : 029

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.

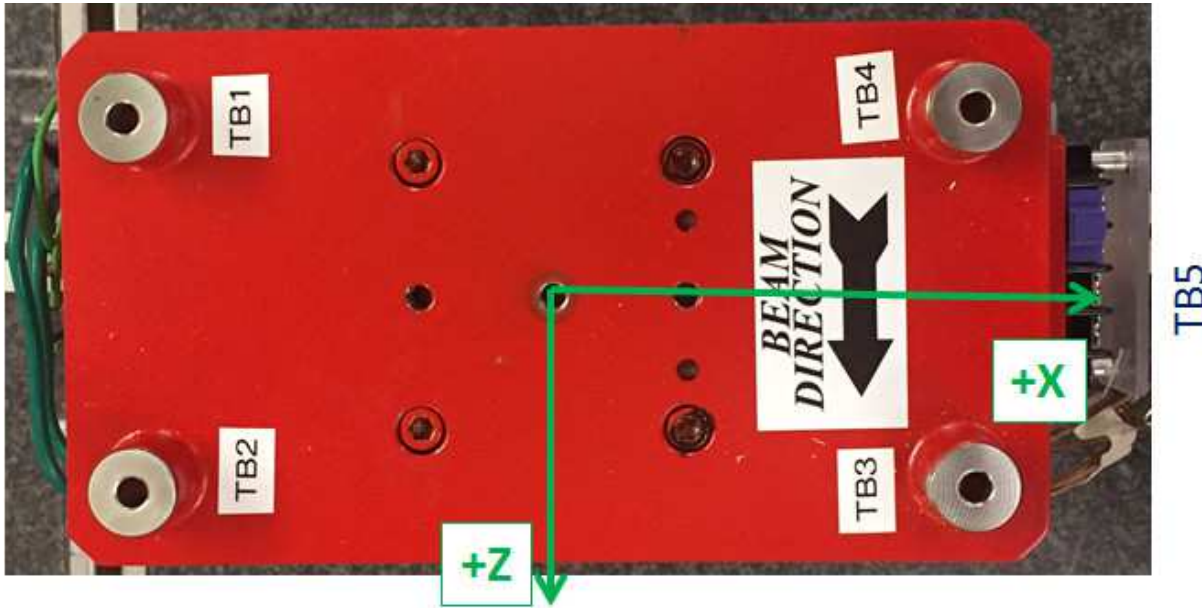
Coordinate Origins

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



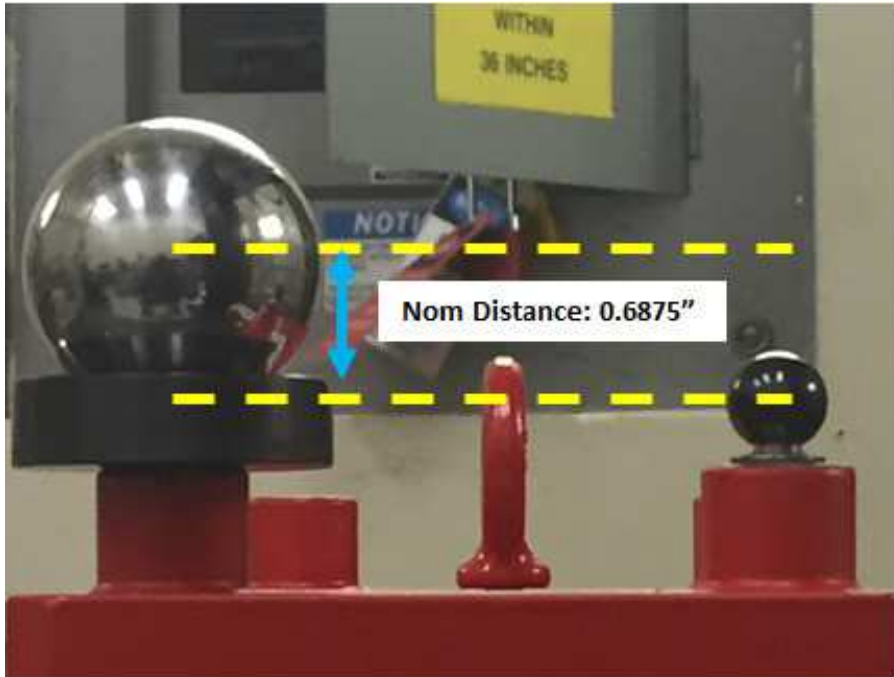
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36177	6.82411	-1.49016
TB 2	-3.36997	6.81901	1.50762
TB 3	3.37598	6.81789	1.51583
TB 4	3.38141	6.81452	-1.48347
TB 5	6.58847	0.12184	0.01698
TB A	-3.36515	6.13535	-1.49235
TB B	-3.37073	6.13195	1.50653
TB C	3.37668	6.12957	1.51465
TB D	3.38183	6.12724	-1.48421
TB E	5.90078	0.12386	0.01836

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



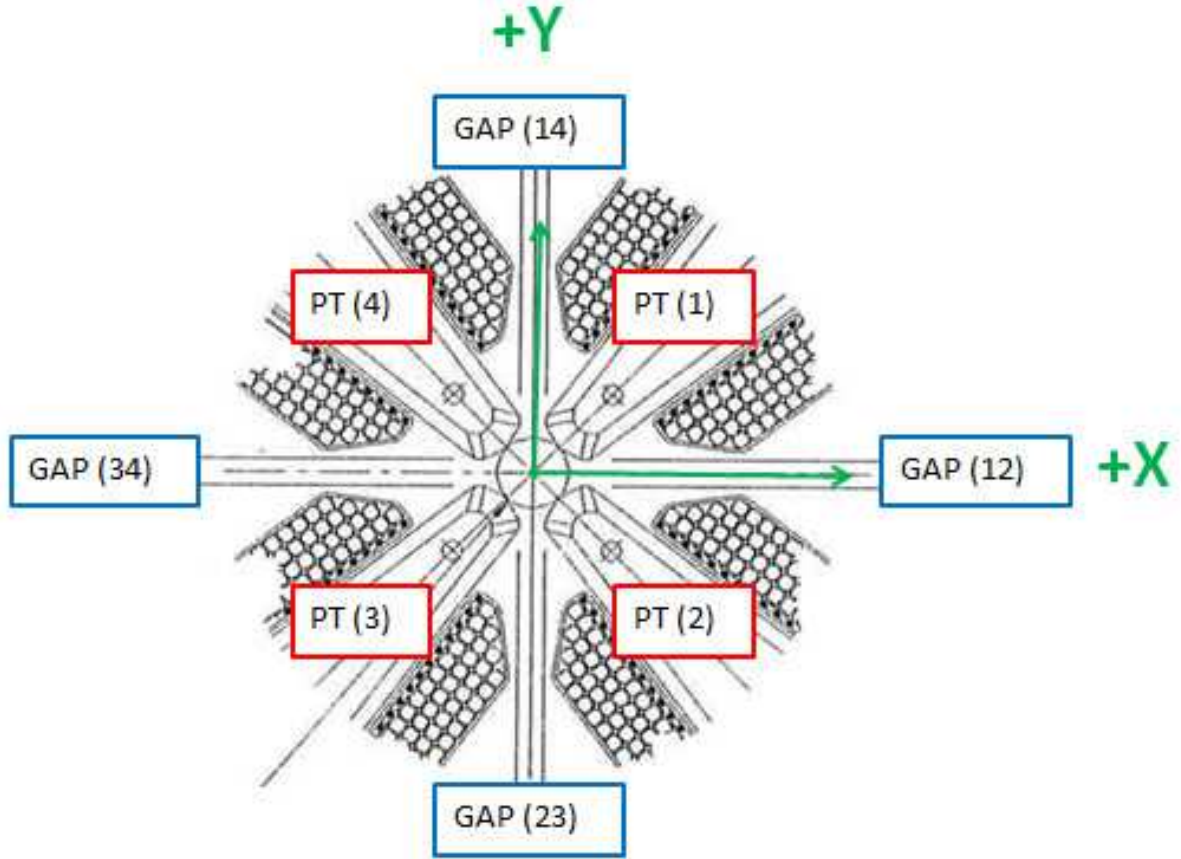
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68877
TB 2	0.6875 ± 0.001	0.68705
TB 3	0.6875 ± 0.001	0.68832
TB 4	0.6875 ± 0.001	0.68728
TB 5	0.6875 ± 0.001	0.68769

Dimensions in Inch

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Pole Tip Gap Measurements



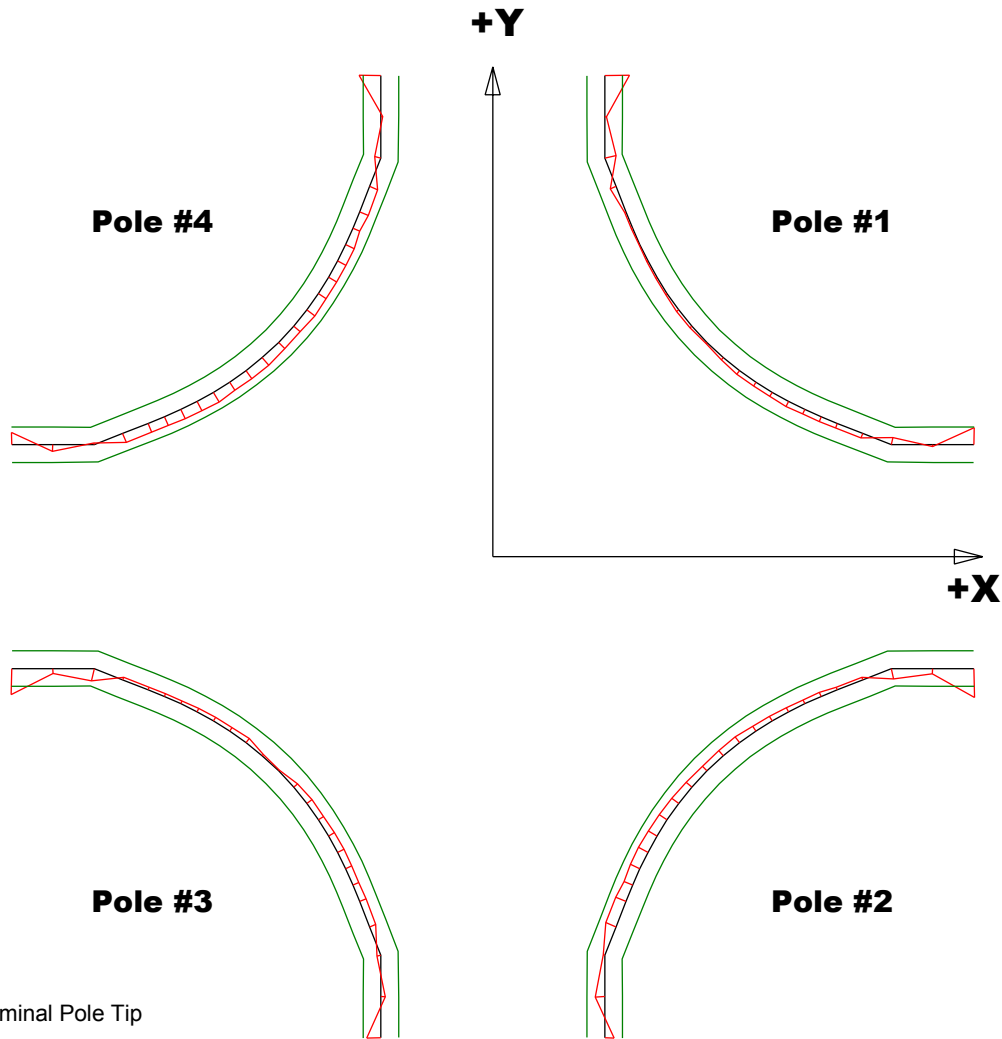
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43285	0.43167
Pole Tip Distance 2-4	0.433 ± .002	0.43217	0.43402
Gap 1-2	0.159 ± .002	0.16002	0.15655
Gap 2-3	0.159 ± .002	0.15906	0.16094
Gap 3-4	0.159 ± .002	0.15965	0.15973
Gap 4-1	0.159 ± .002	0.15989	0.16213

Dimensions in Inch

Barcode # : 4065

Mfg. S/N : 029

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

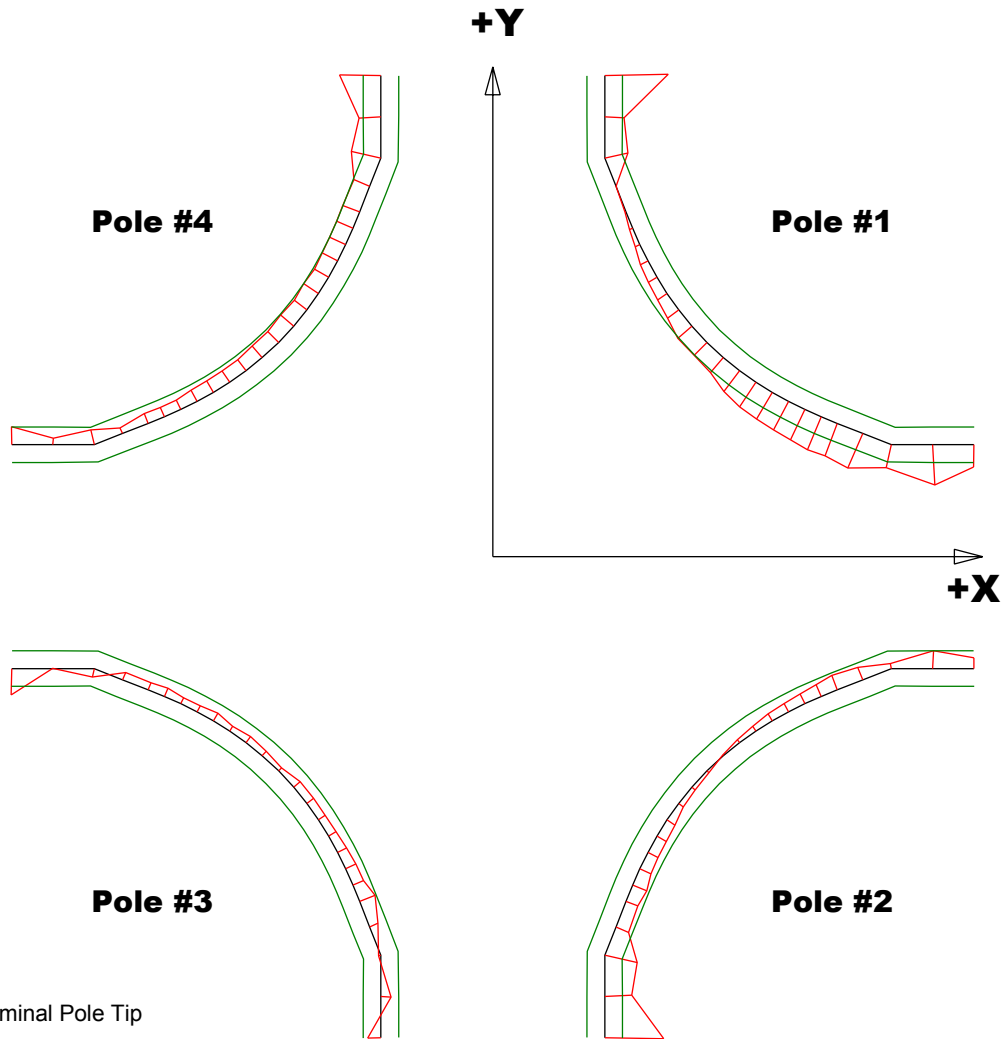
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00141	-0.00162	-0.00146	-0.00123
Max. Dev.	0.00035	0.00062	0.0004	0.00063

Barcode # : 4065

Mfg. S/N : 029

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

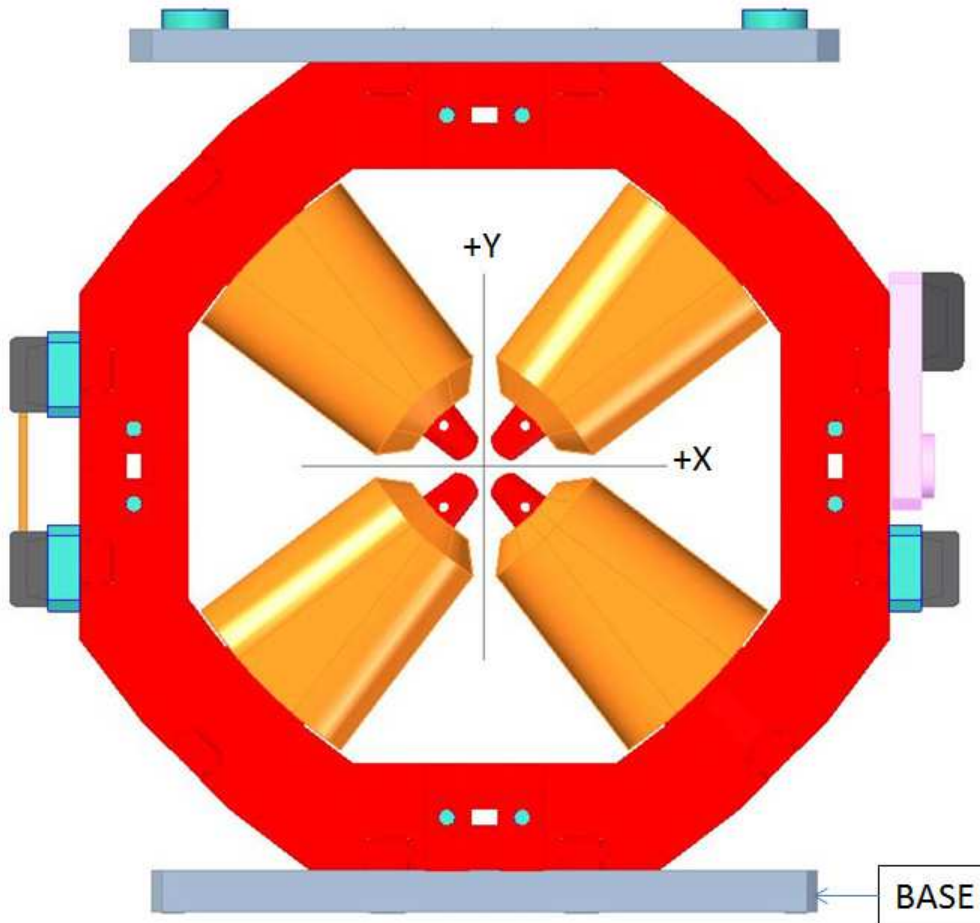
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00357	-0.00333	-0.00149	-0.00232
Max. Dev.	0.00227	0.001	0.00094	-0.00035

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



Angle in Decimal Degrees ° :0.02540

Angle in Milliradians :0.44336

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