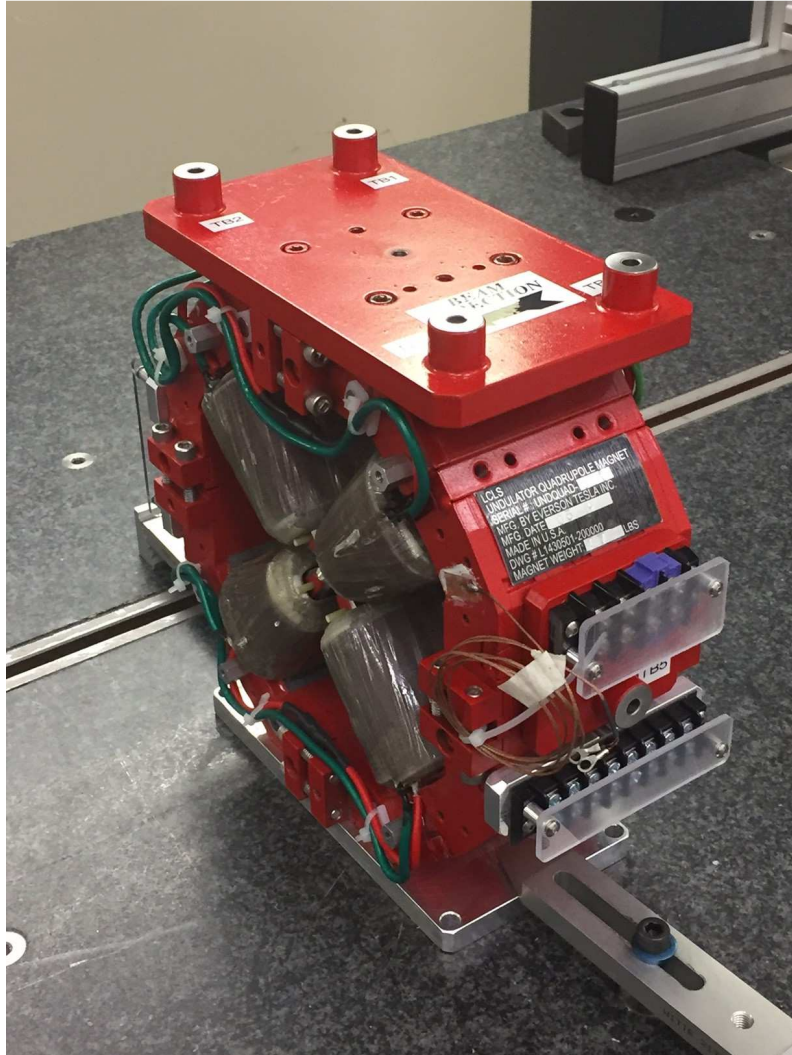


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4070
Mfg. S/N : 001

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.

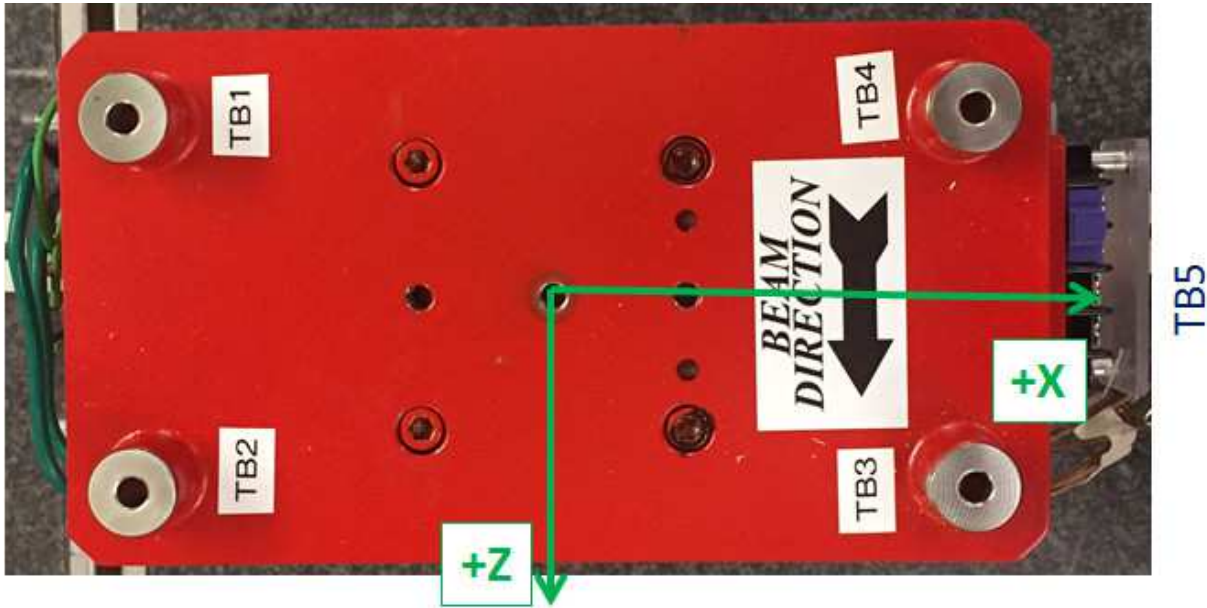
Coordinate Origins

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



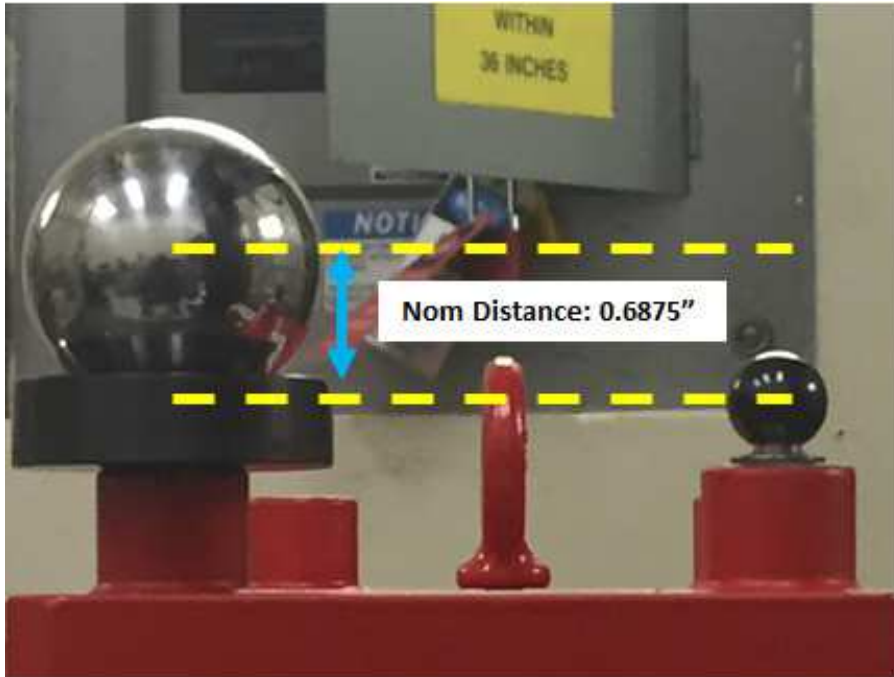
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36187	6.81399	-1.51858
TB 2	-3.37670	6.81287	1.48674
TB 3	3.36826	6.81289	1.51619
TB 4	3.38400	6.80657	-1.48554
TB 5	6.58808	0.12341	0.01282
TB A	-3.36071	6.12655	-1.51753
TB B	-3.37562	6.12311	1.48374
TB C	3.37103	6.12577	1.51710
TB D	3.38442	6.11802	-1.48439
TB E	5.90041	0.12653	0.01157

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



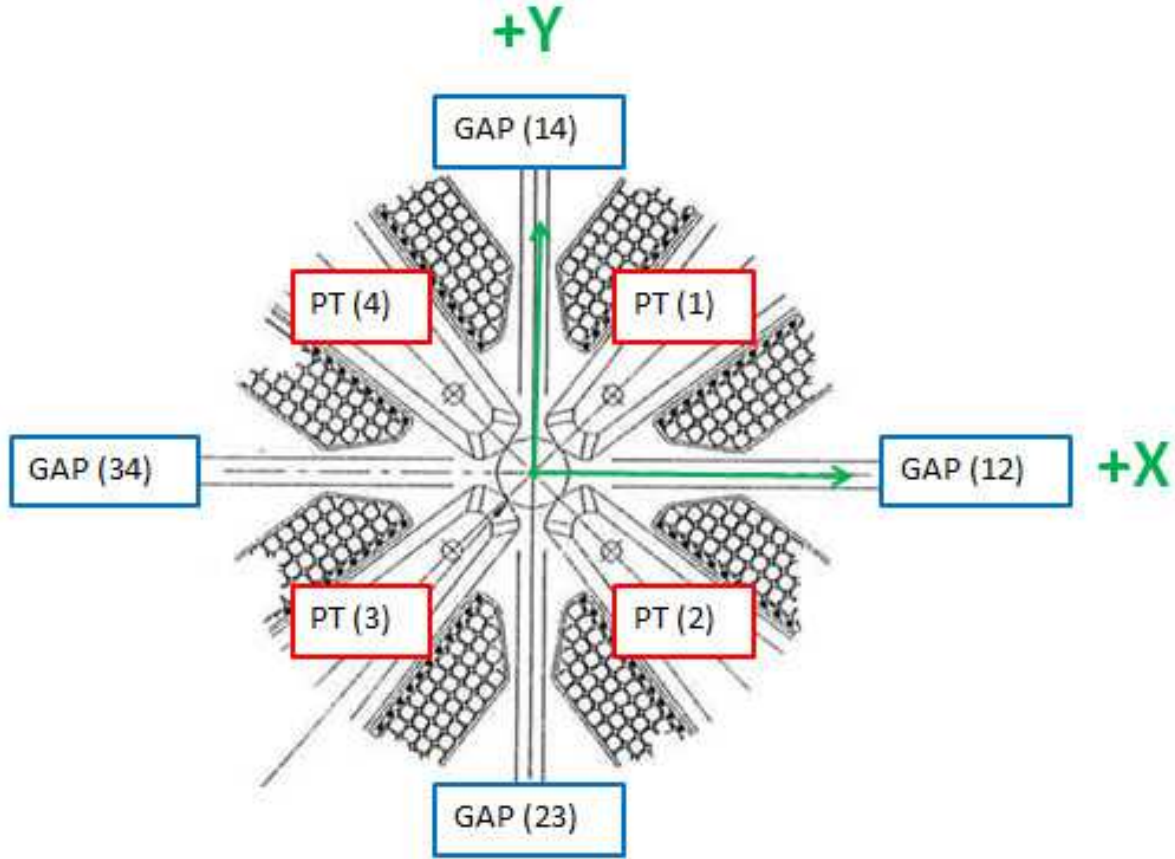
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68744
TB 2	0.6875 ± 0.001	0.68977
TB 3	0.6875 ± 0.001	0.68713
TB 4	0.6875 ± 0.001	0.68855
TB 5	0.6875 ± 0.001	0.68767

Dimensions in Inch

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Pole Tip Gap Measurements



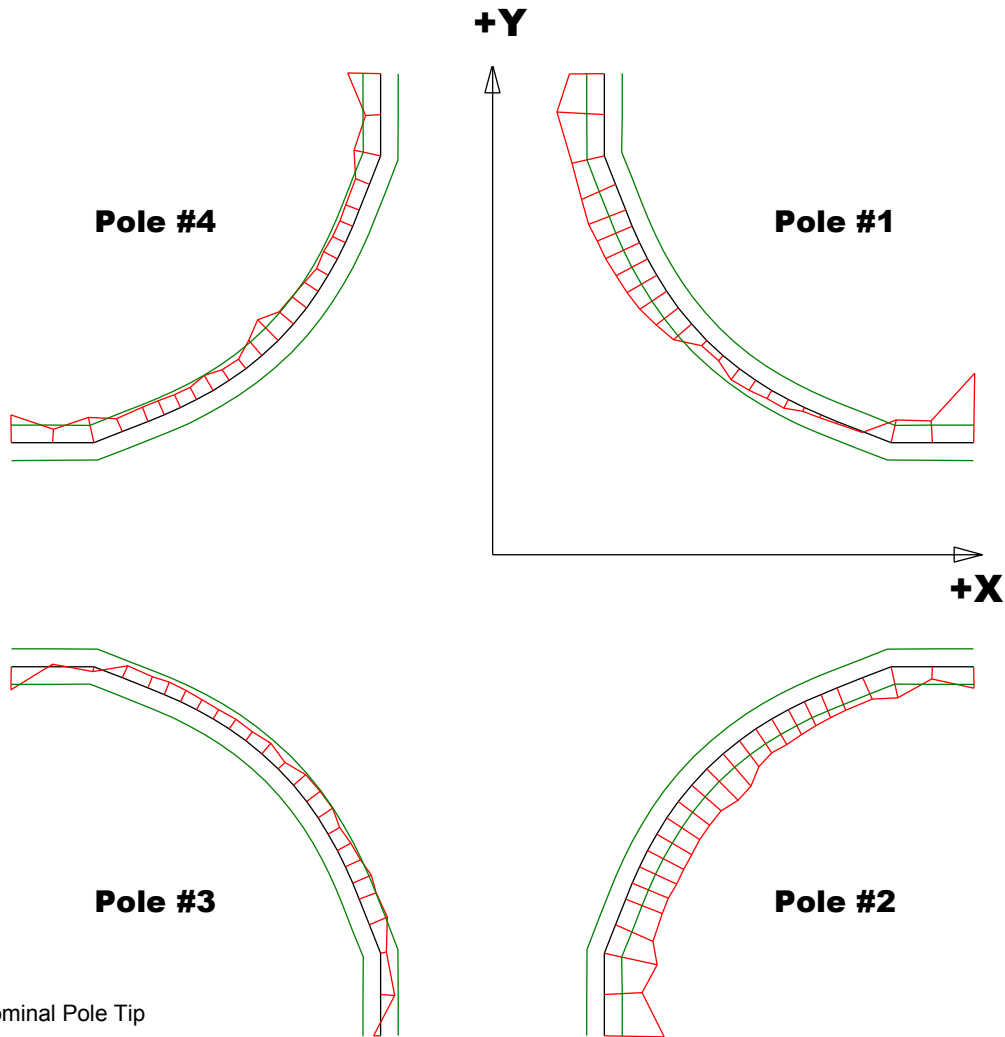
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43193	0.43684
Pole Tip Distance 2-4	0.433 ± .002	0.43695	0.43098
Gap 1-2	0.159 ± .002	0.16115	0.16118
Gap 2-3	0.159 ± .002	0.16091	0.15853
Gap 3-4	0.159 ± .002	0.16019	0.16106
Gap 4-1	0.159 ± .002	0.15791	0.15788

Dimensions in Inch

Barcode # : 4070

Mfg. S/N : 001

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

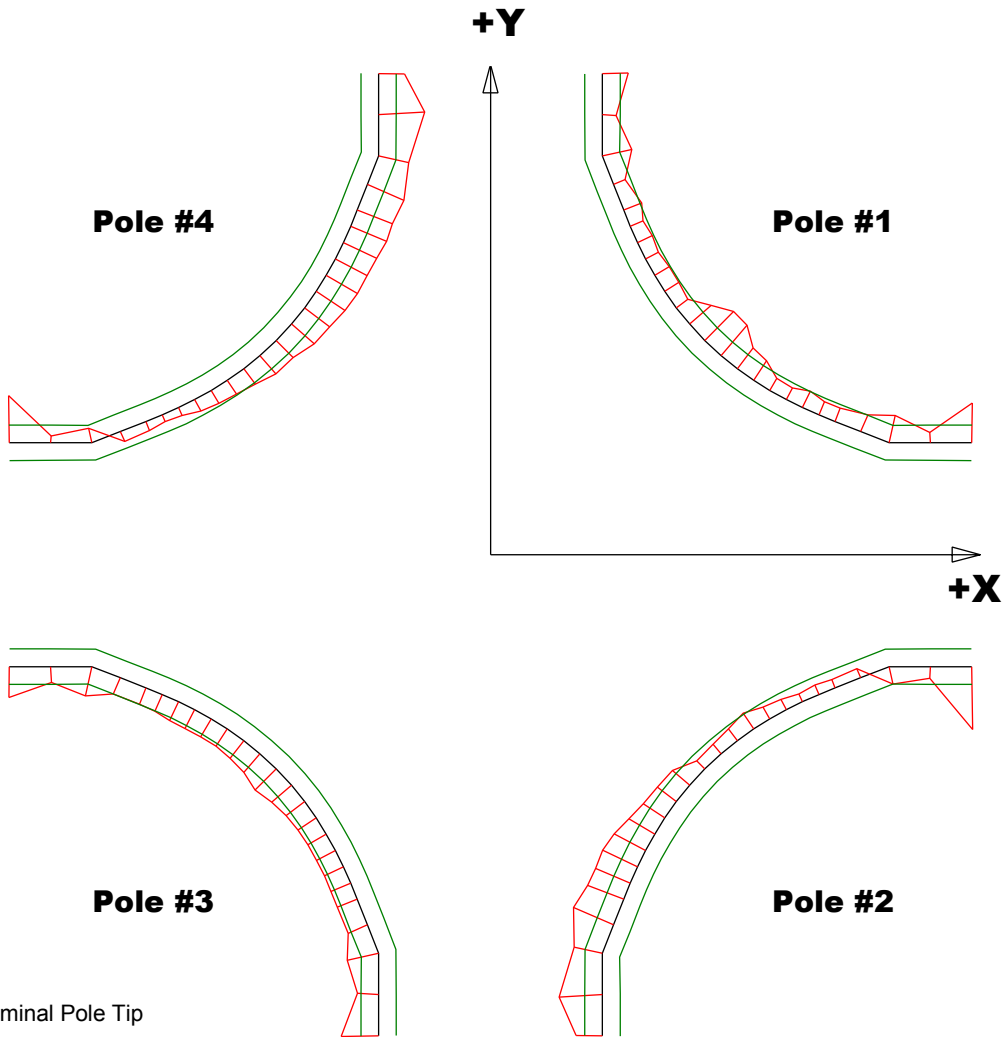
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00391	-0.00337	-0.00131	-0.00185
Max. Dev.	0.00267	-0.00069	0.00114	-0.00067

Barcode # : 4070

Mfg. S/N : 001

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

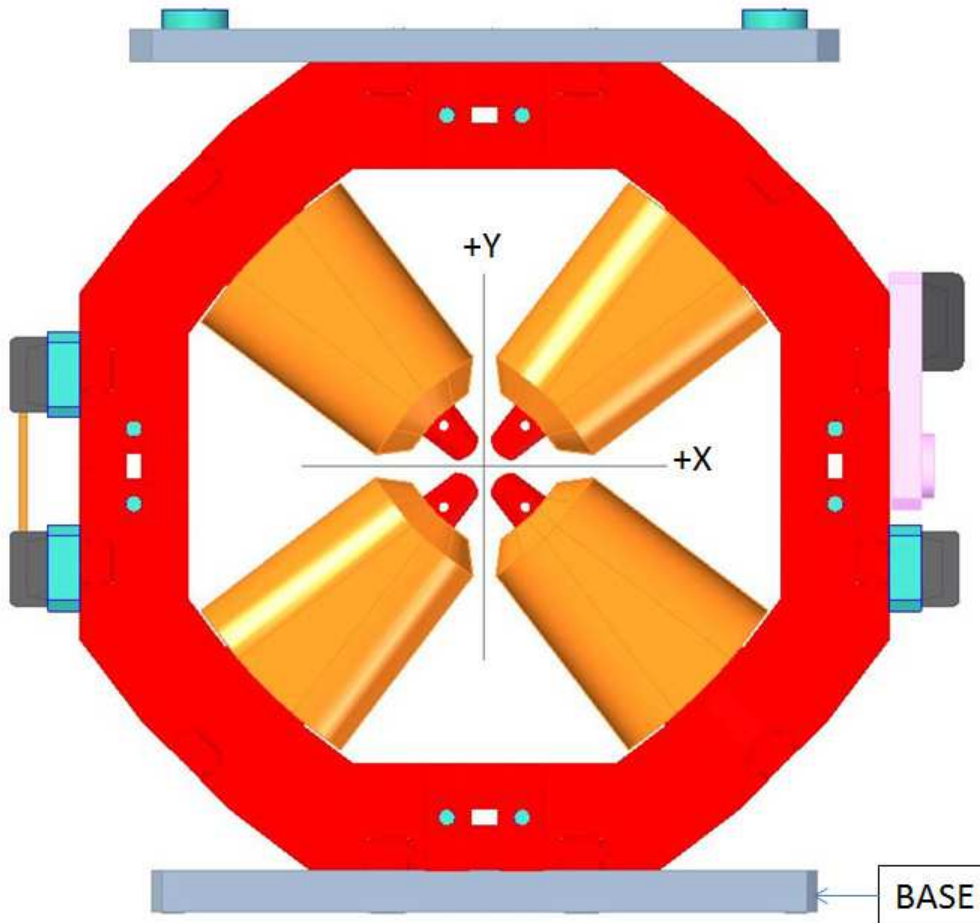
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00231	-0.00354	-0.0021	-0.00265
Max. Dev.	-0.00057	0.00246	-0.0009	0.00261

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



Angle in Decimal Degrees ° :0.02980

Angle in Milliradians :0.52017

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