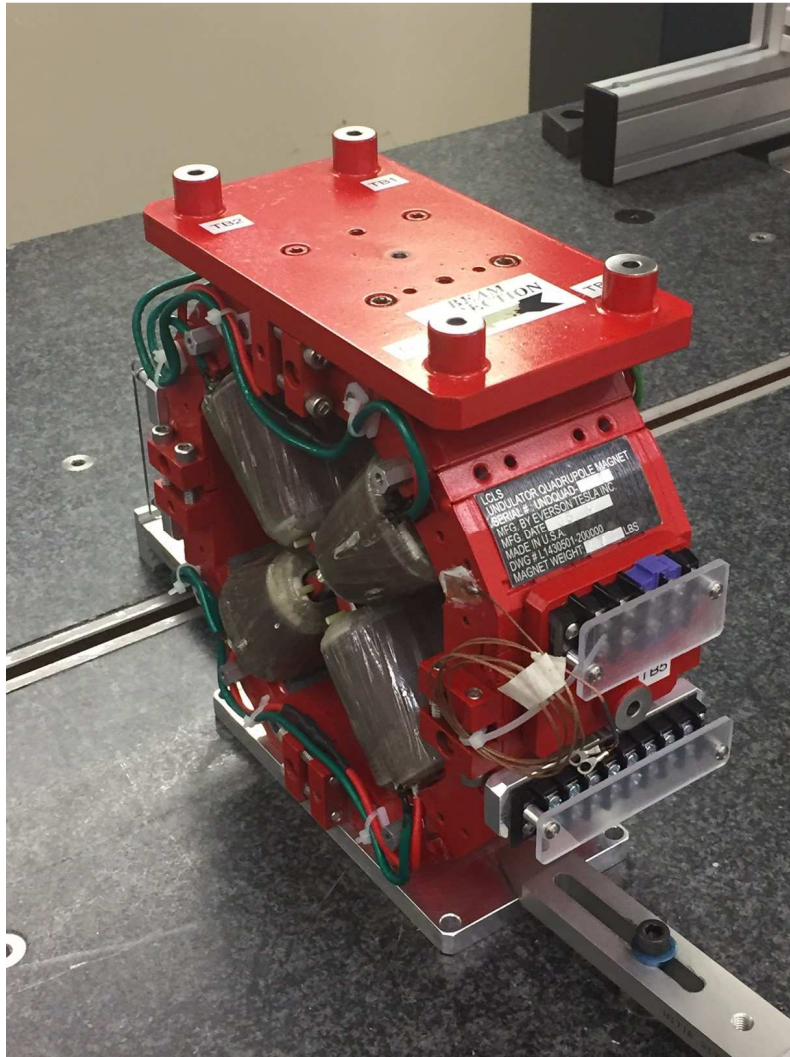


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4096
Mfg. S/N : 028

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.

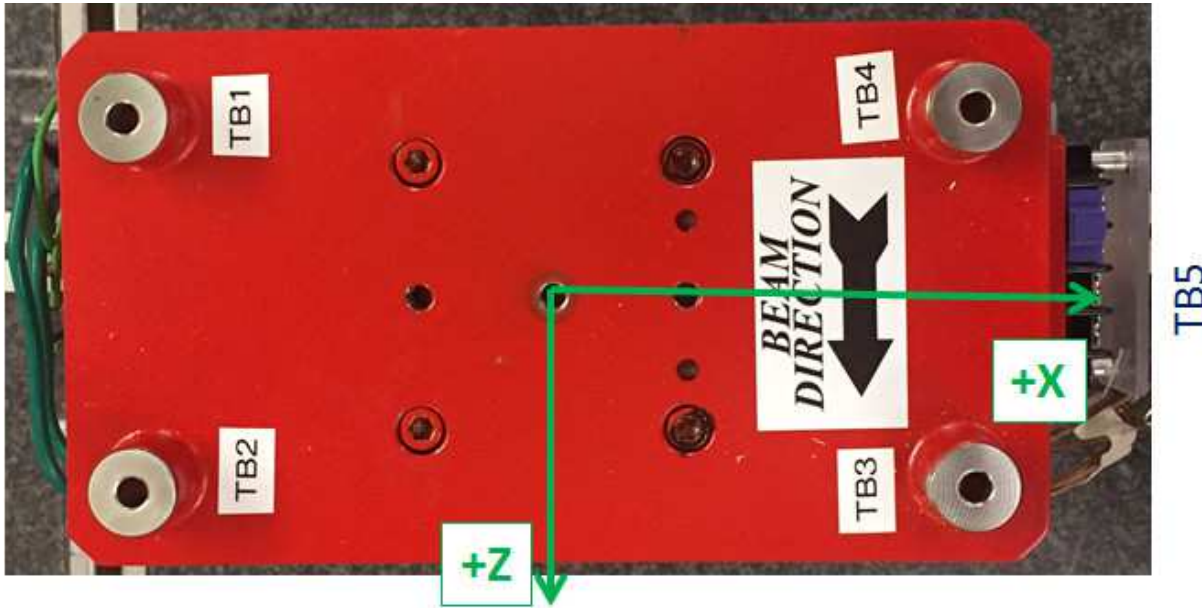
Coordinate Origins

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



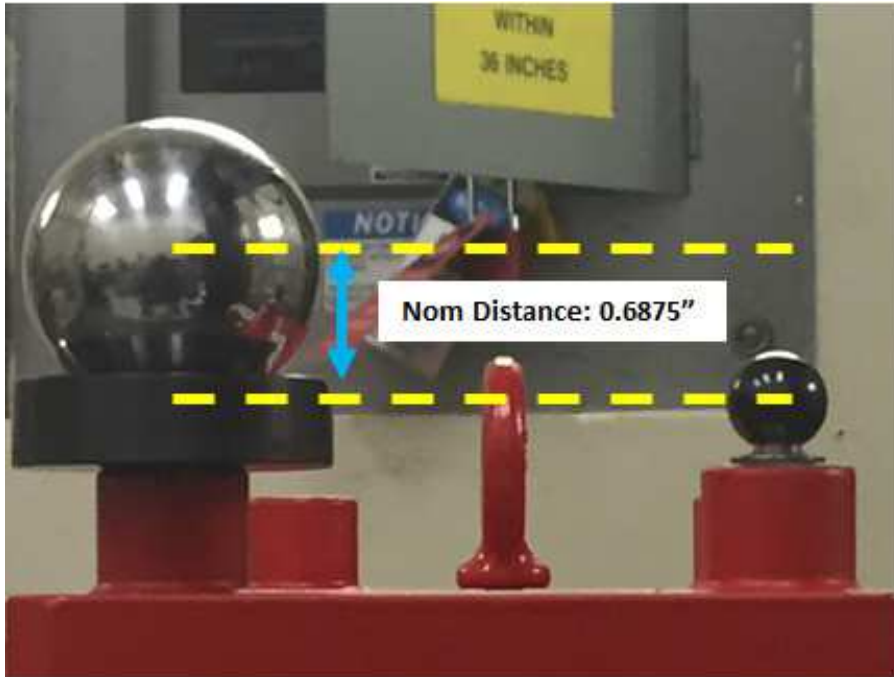
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37812	6.81195	-1.47817
TB 2	-3.37876	6.81288	1.52251
TB 3	3.36673	6.81704	1.52495
TB 4	3.36725	6.81669	-1.47200
TB 5	6.58769	0.13077	0.01723
TB A	-3.37802	6.12519	-1.47705
TB B	-3.37886	6.12617	1.52290
TB C	3.36809	6.13002	1.52417
TB D	3.36895	6.12870	-1.47607
TB E	5.89973	0.13328	0.01715

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



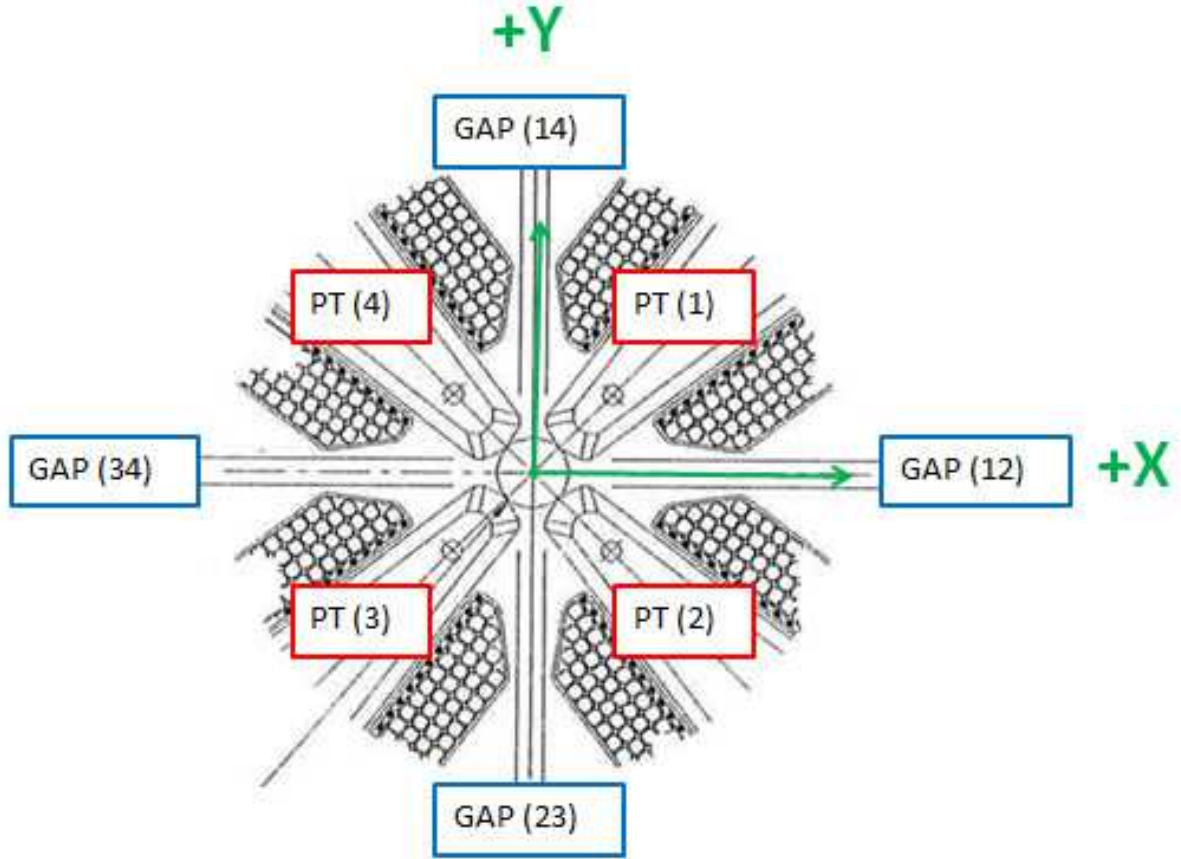
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68676
TB 2	0.6875 ± 0.001	0.68672
TB 3	0.6875 ± 0.001	0.68703
TB 4	0.6875 ± 0.001	0.68801
TB 5	0.6875 ± 0.001	0.68796

Dimensions in Inch

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Pole Tip Gap Measurements



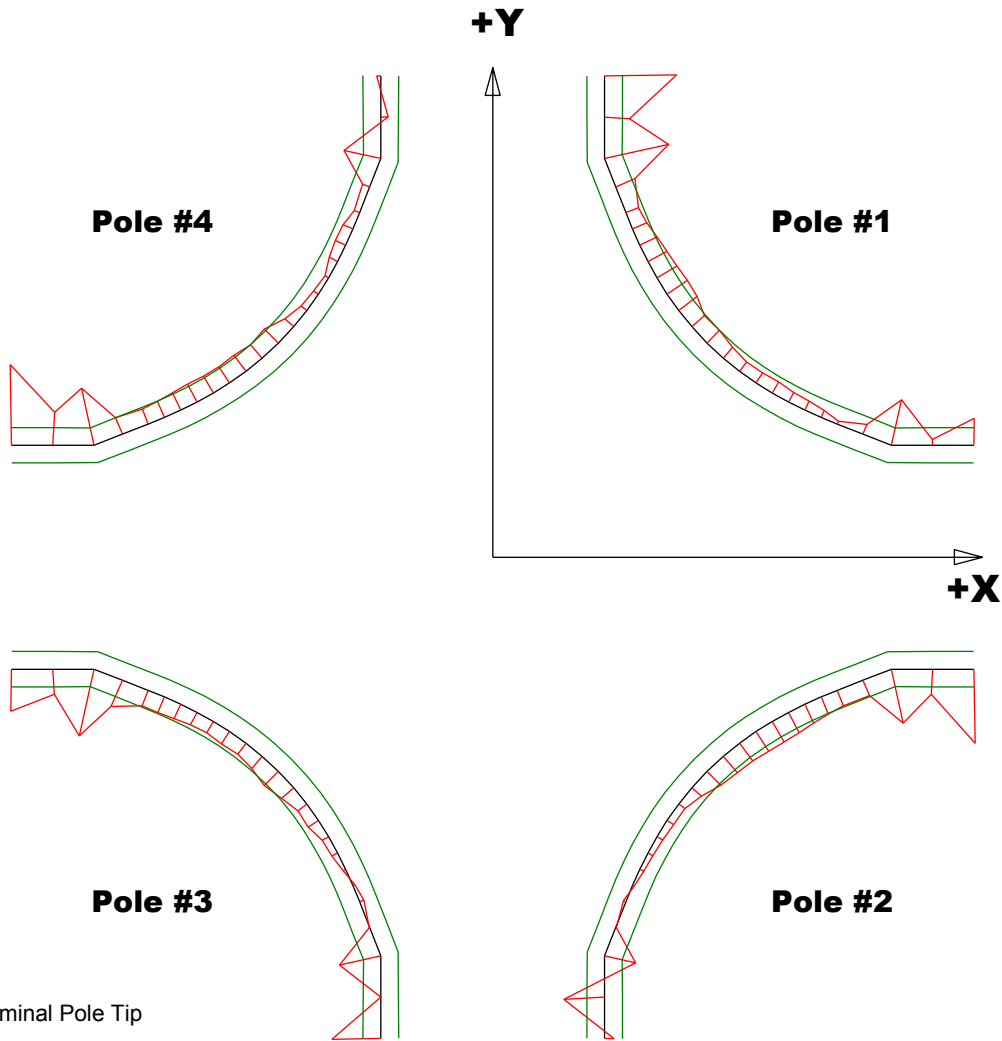
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43507	0.43425
Pole Tip Distance 2-4	0.433 ± .002	0.43518	0.43393
Gap 1-2	0.159 ± .002	0.16152	0.16098
Gap 2-3	0.159 ± .002	0.15761	0.16152
Gap 3-4	0.159 ± .002	0.16321	0.15999
Gap 4-1	0.159 ± .002	0.16076	0.15963

Dimensions in Inch

Barcode # : 4096

Mfg. S/N : 028

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

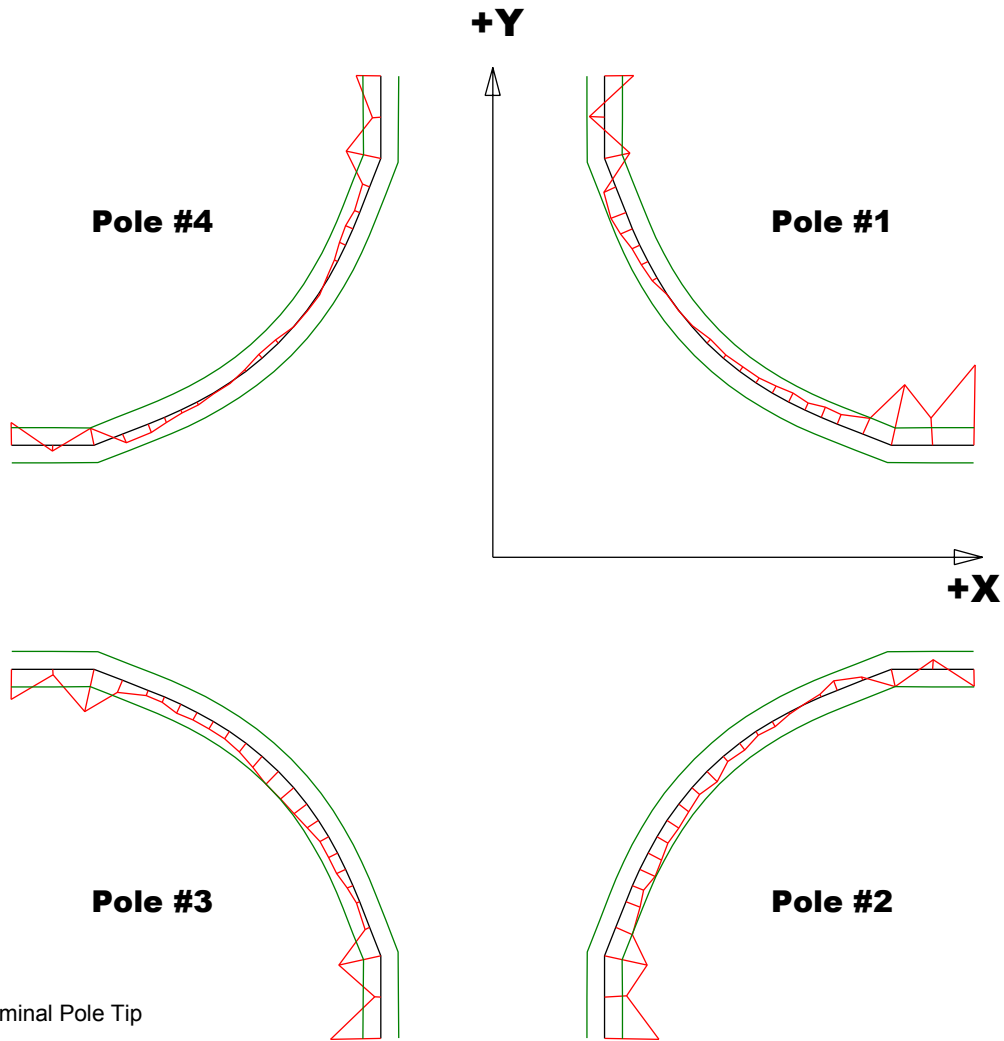
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00405	-0.00417	-0.00385	-0.00453
Max. Dev.	-0.00018	0.00229	0.00026	0.00041

Barcode # : 4096

Mfg. S/N : 028

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

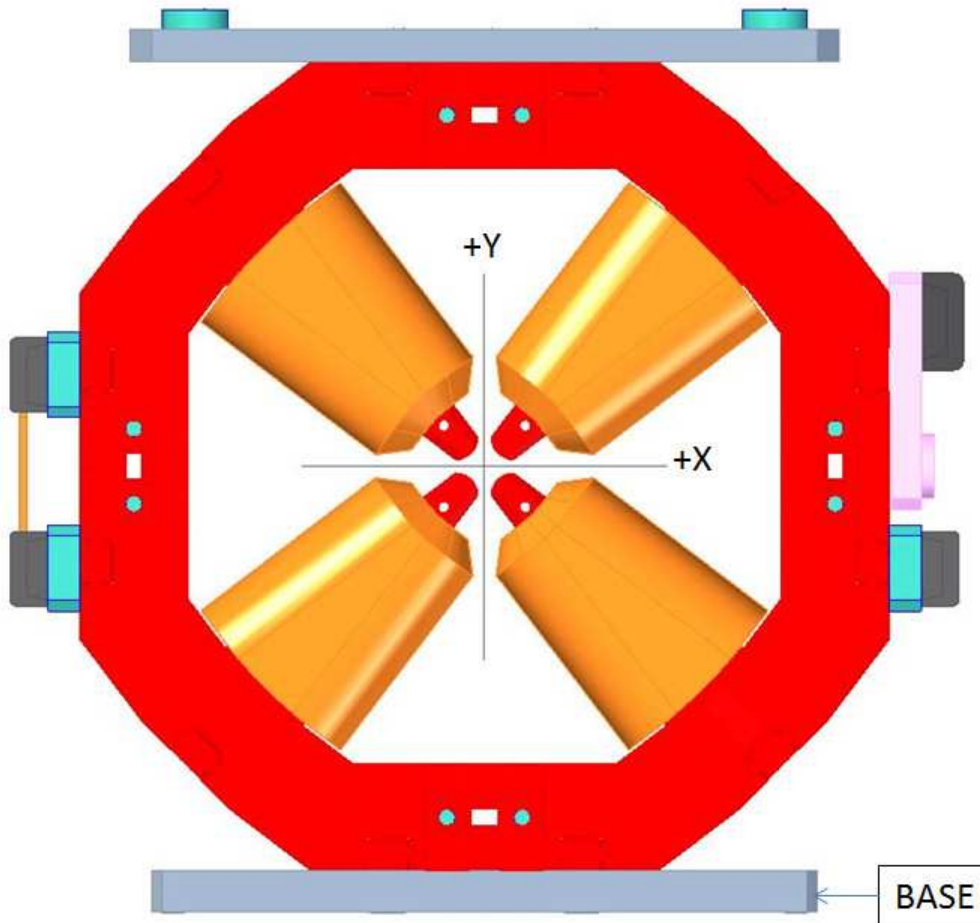
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00452	-0.00305	-0.00282	-0.00198
Max. Dev.	0.00091	0.00057	-0.00018	0.00054

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



Angle in Decimal Degrees ° :-0.01427

Angle in Milliradians :-0.24900

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