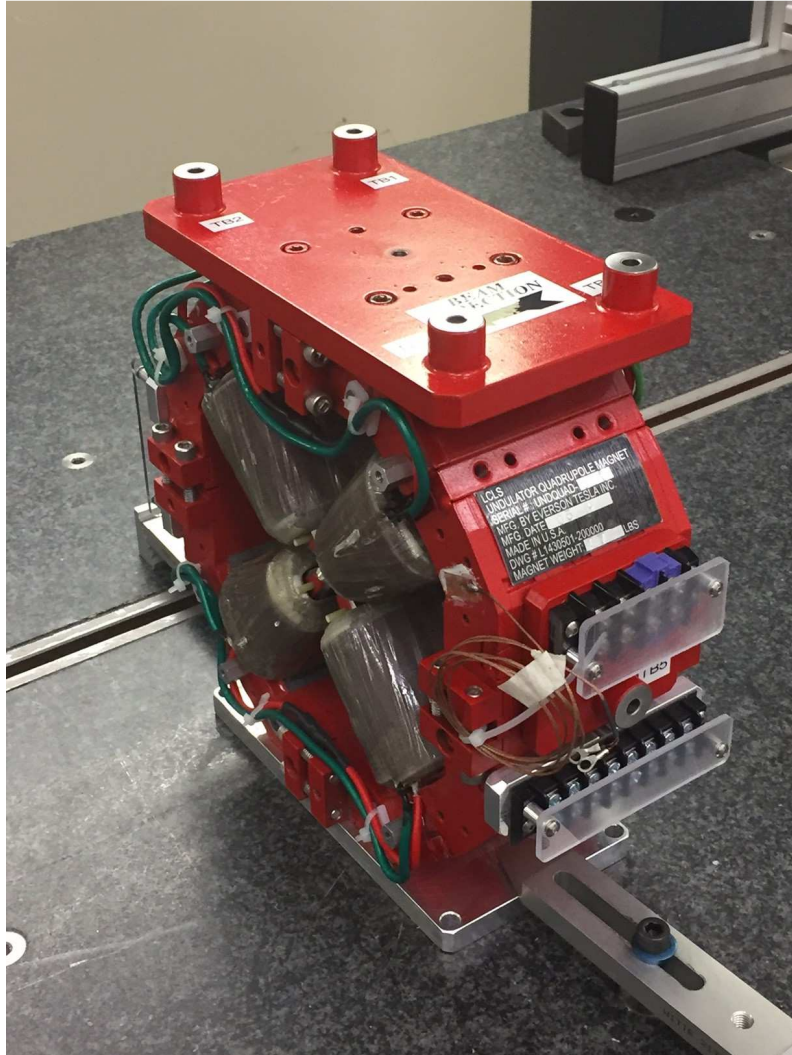


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4075
Mfg. S/N : 005

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 the 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.

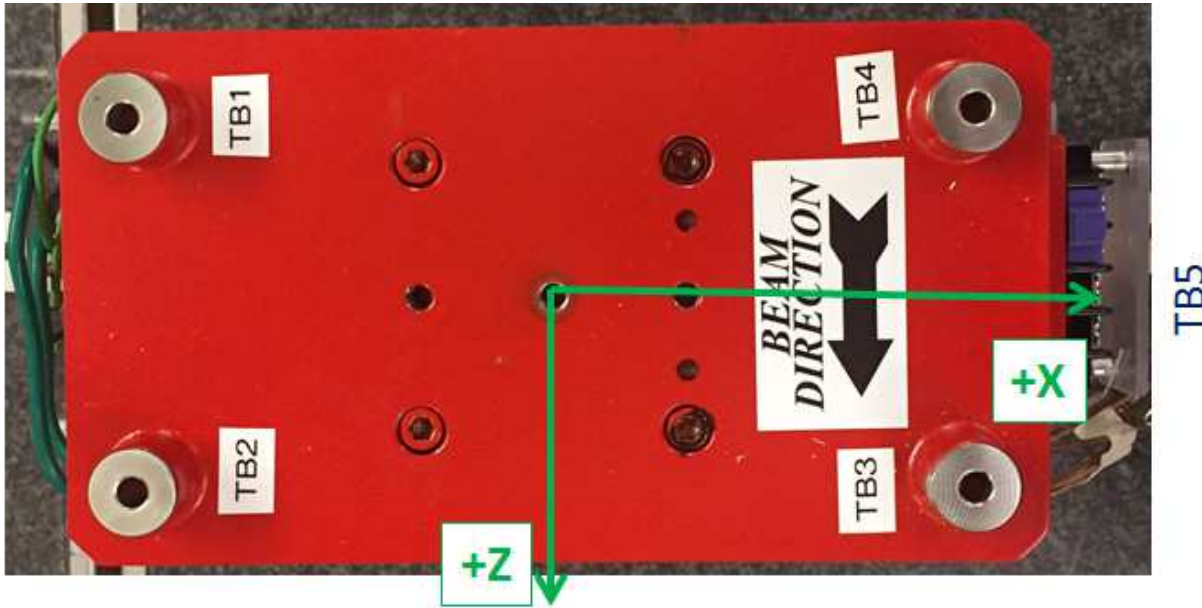
Coordinate Origins

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



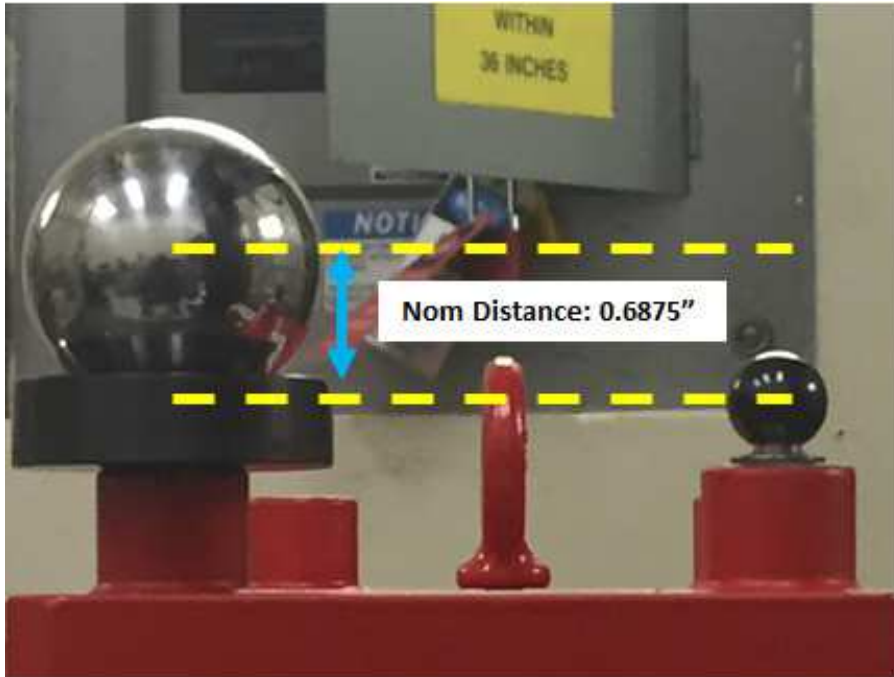
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.38317	6.81126	-1.50418
TB 2	-3.37792	6.81125	1.49695
TB 3	3.37025	6.82043	1.48121
TB 4	3.36463	6.82035	-1.51842
TB 5	6.59100	0.13384	-0.00936
TB A	-3.38254	6.12466	-1.50392
TB B	-3.37642	6.12457	1.49699
TB C	3.37060	6.13429	1.48072
TB D	3.36556	6.13437	-1.51909
TB E	5.90276	0.13372	-0.00864

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

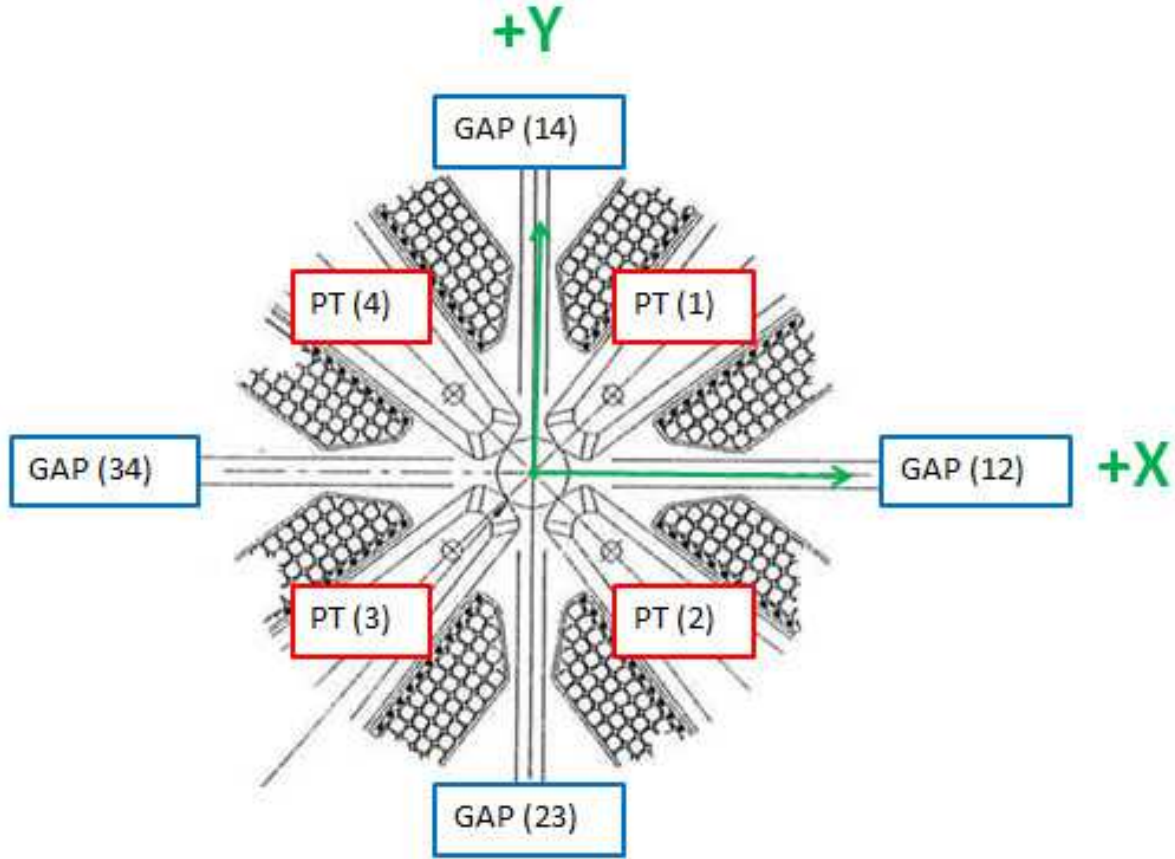


Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.6866
TB 2	0.6875 ± 0.001	0.68667
TB 3	0.6875 ± 0.001	0.68614
TB 4	0.6875 ± 0.001	0.68598
TB 5	0.6875 ± 0.001	0.68824

Dimensions in Inch

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Pole Tip Gap Measurements



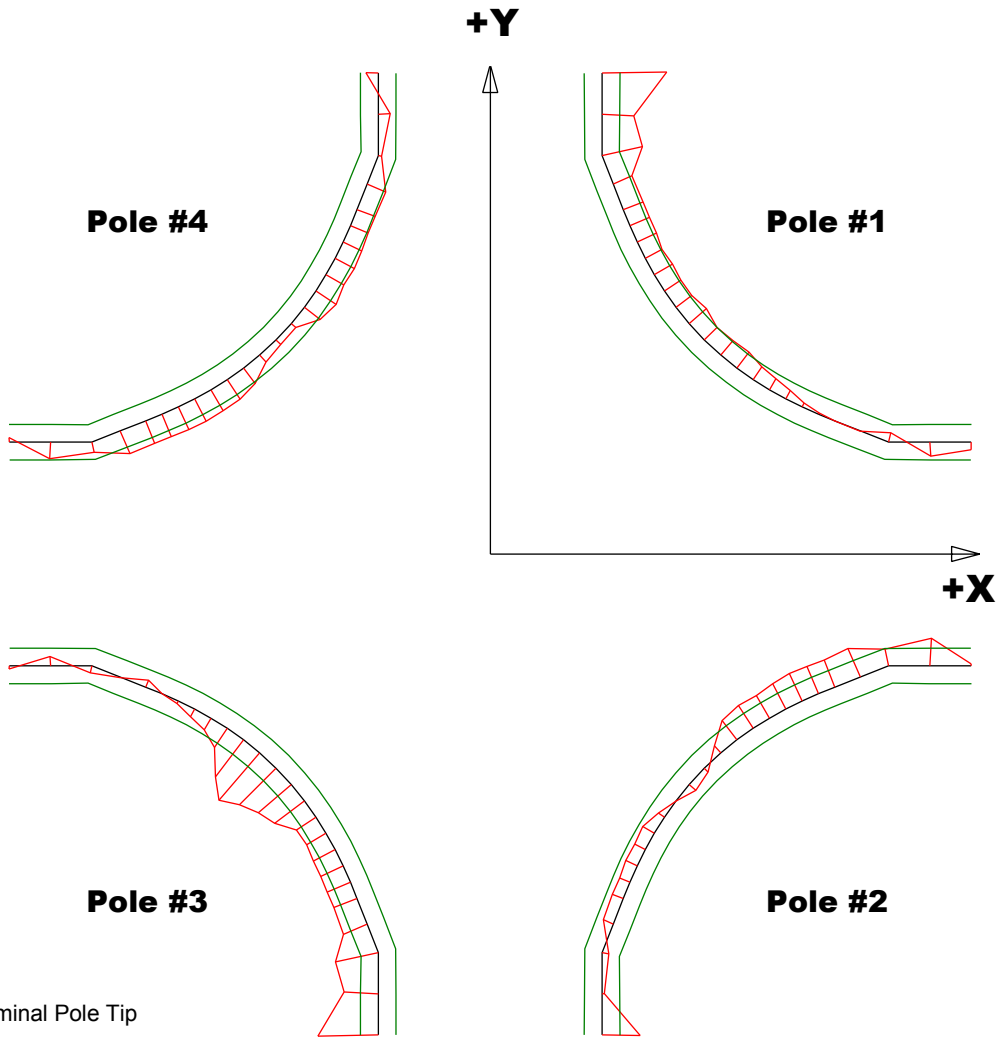
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43686	0.43663
Pole Tip Distance 2-4	0.433 ± .002	0.43294	0.43391
Gap 1-2	0.159 ± .002	0.15654	0.1605
Gap 2-3	0.159 ± .002	0.16173	0.1601
Gap 3-4	0.159 ± .002	0.15811	0.15944
Gap 4-1	0.159 ± .002	0.16093	0.15791

Dimensions in Inch

Barcode # : 4075

Mfg. S/N : 005

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

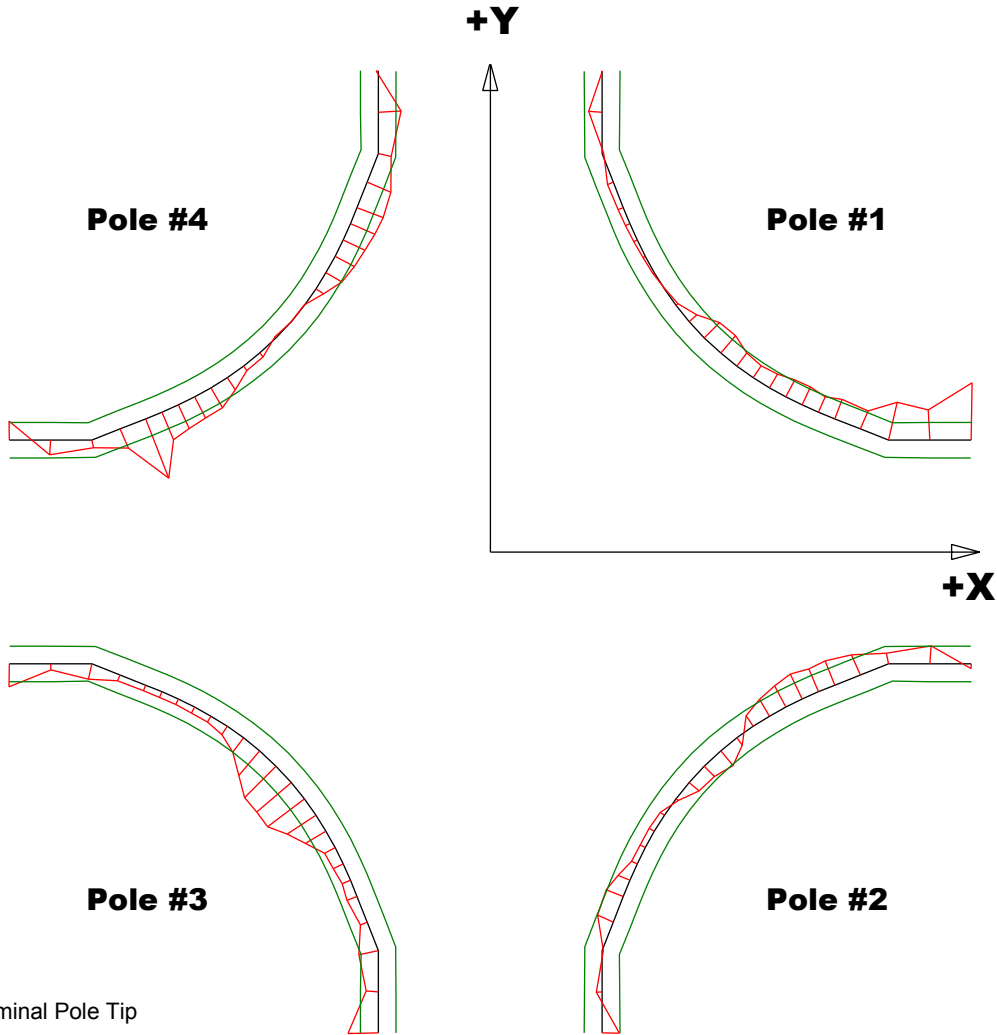
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00365	-0.00214	-0.00351	-0.00071
Max. Dev.	0.00079	0.00175	0.00054	0.00142

Barcode # : 4075

Mfg. S/N : 005

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

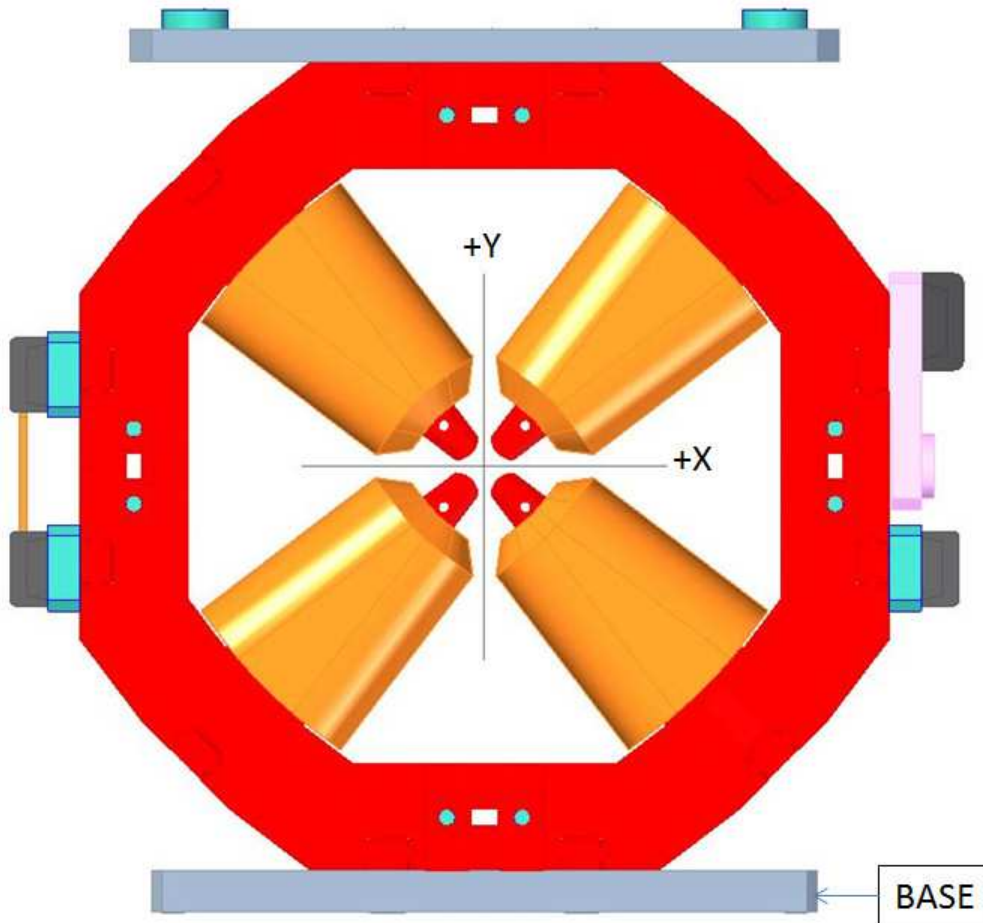
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00322	-0.00108	-0.0026	-0.00106
Max. Dev.	0.00075	0.00155	-0.00033	0.00358

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



Angle in Decimal Degrees ° :-0.10415

Angle in Milliradians :-1.81776

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