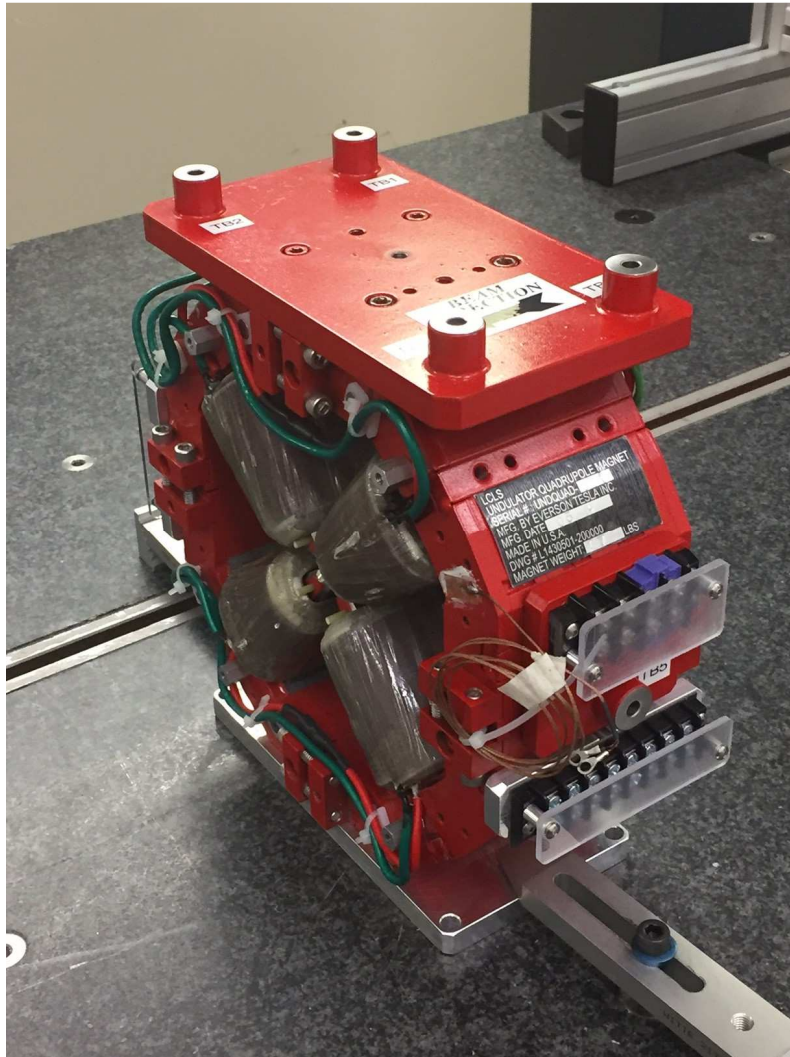


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4080
Mfg. S/N : 011

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.

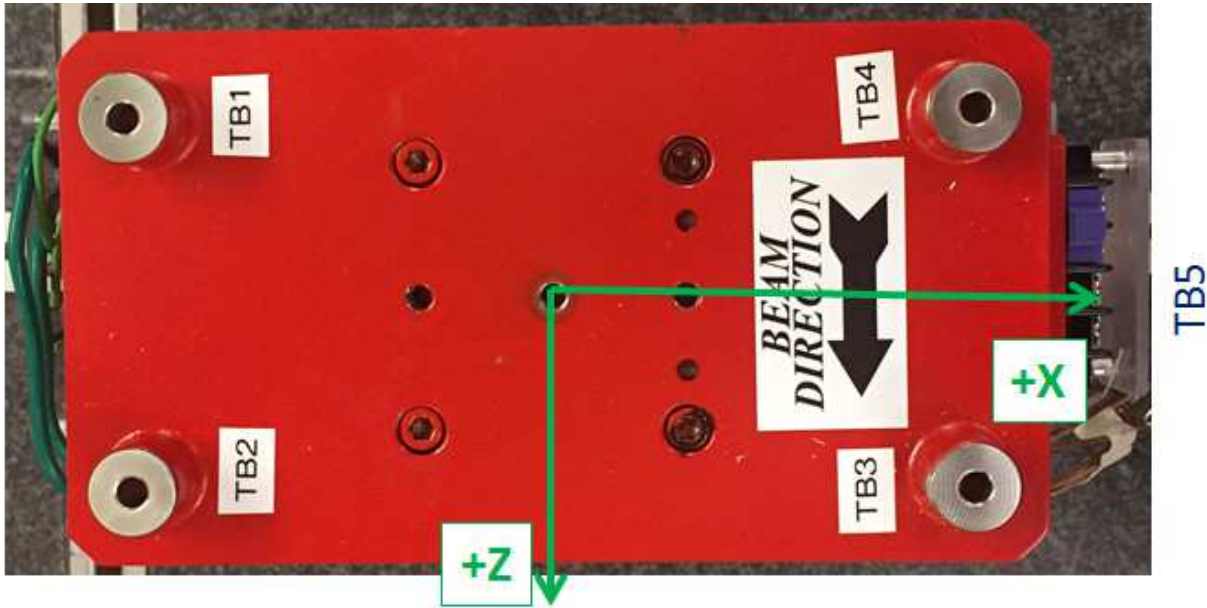
Coordinate Origins

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



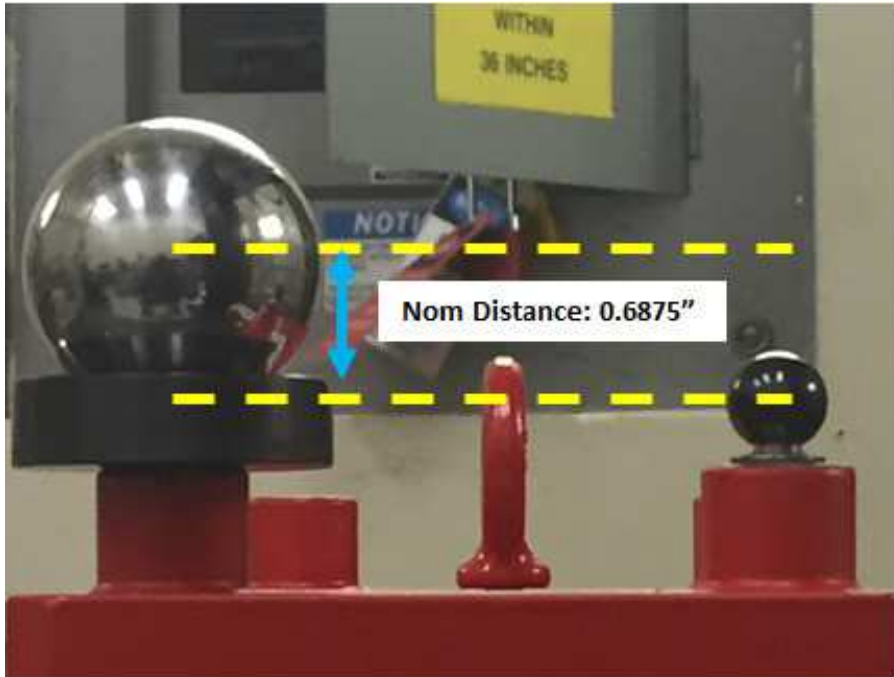
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36524	6.81112	-1.48945
TB 2	-3.37849	6.81511	1.50968
TB 3	3.37071	6.81458	1.53184
TB 4	3.37965	6.80971	-1.46954
TB 5	6.58659	0.12761	0.02672
TB A	-3.36615	6.12414	-1.48819
TB B	-3.37791	6.12814	1.51137
TB C	3.37010	6.12695	1.53512
TB D	3.38056	6.12228	-1.46628
TB E	5.89884	0.12961	0.02711

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



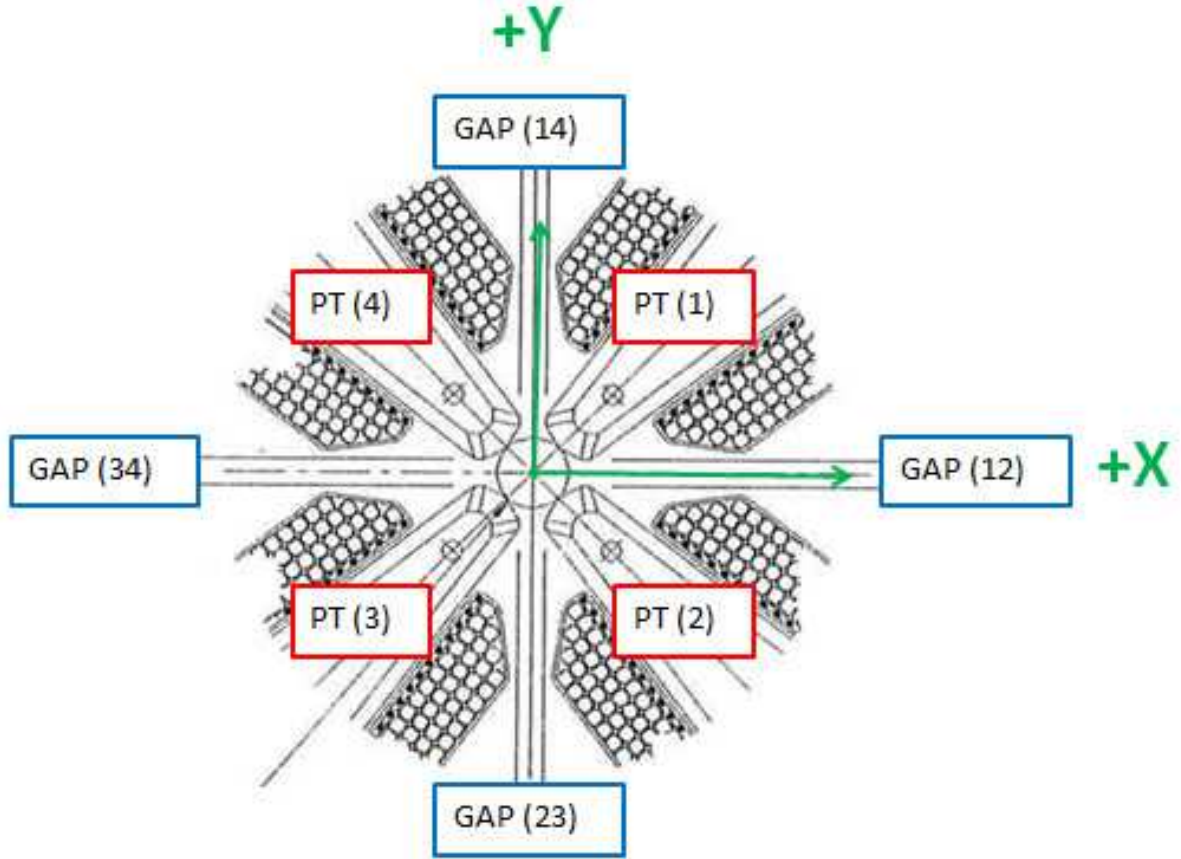
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68698
TB 2	0.6875 ± 0.001	0.68697
TB 3	0.6875 ± 0.001	0.68764
TB 4	0.6875 ± 0.001	0.68744
TB 5	0.6875 ± 0.001	0.68776

Dimensions in Inch

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Pole Tip Gap Measurements



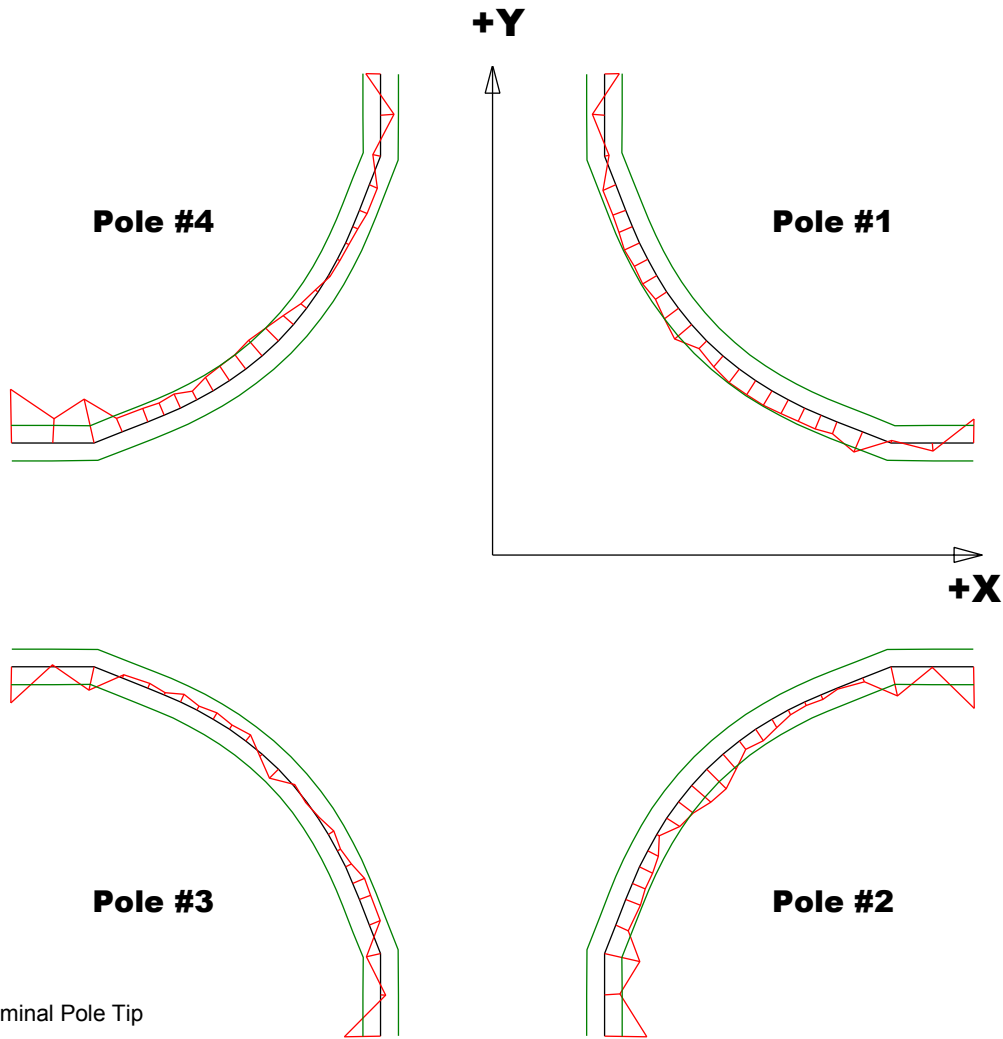
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43298	0.43422
Pole Tip Distance 2-4	0.433 ± .002	0.43557	0.43181
Gap 1-2	0.159 ± .002	0.15921	0.15723
Gap 2-3	0.159 ± .002	0.16036	0.16166
Gap 3-4	0.159 ± .002	0.16123	0.15783
Gap 4-1	0.159 ± .002	0.15842	0.15854

Dimensions in Inch

Barcode # : 4080

Mfg. S/N : 011

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

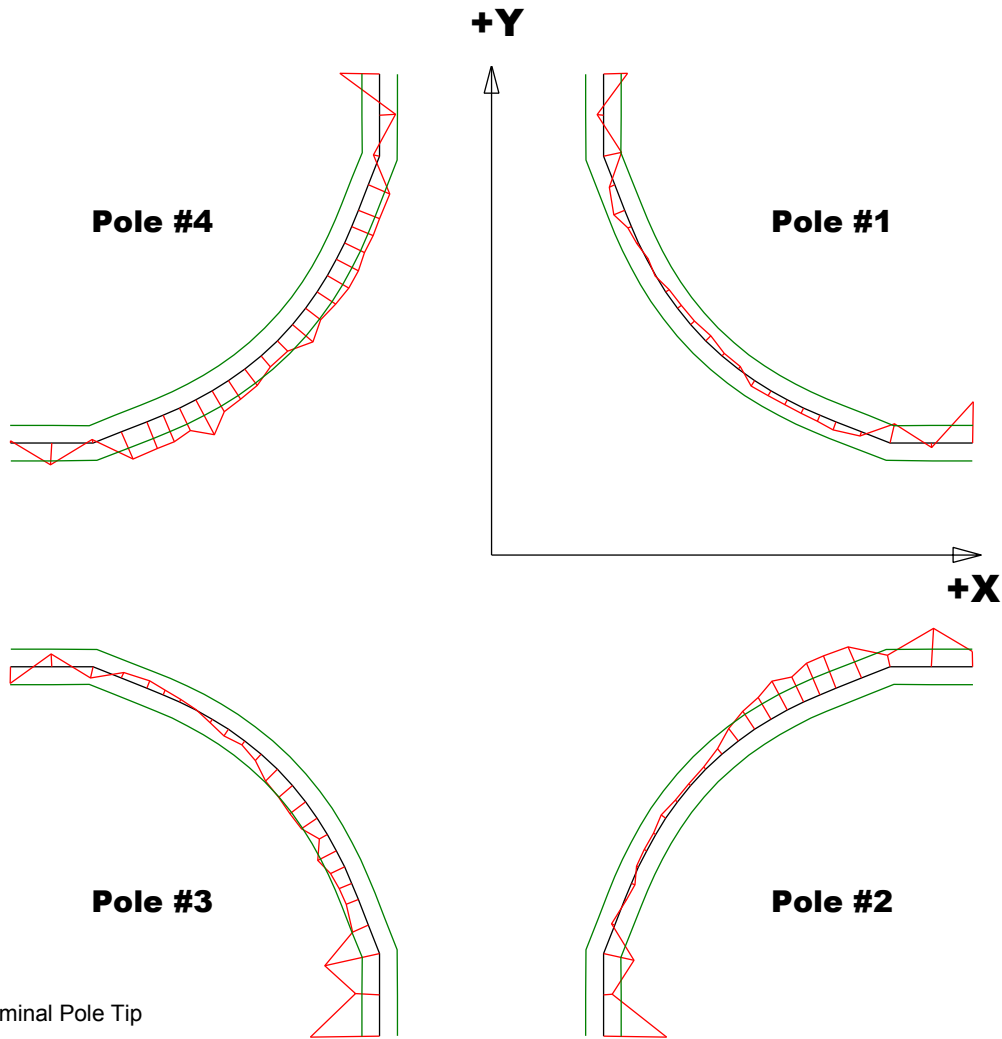
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00135	-0.00238	-0.00204	-0.00302
Max. Dev.	0.00126	-0.00002	0.00073	0.00075

Barcode # : 4080

Mfg. S/N : 011

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

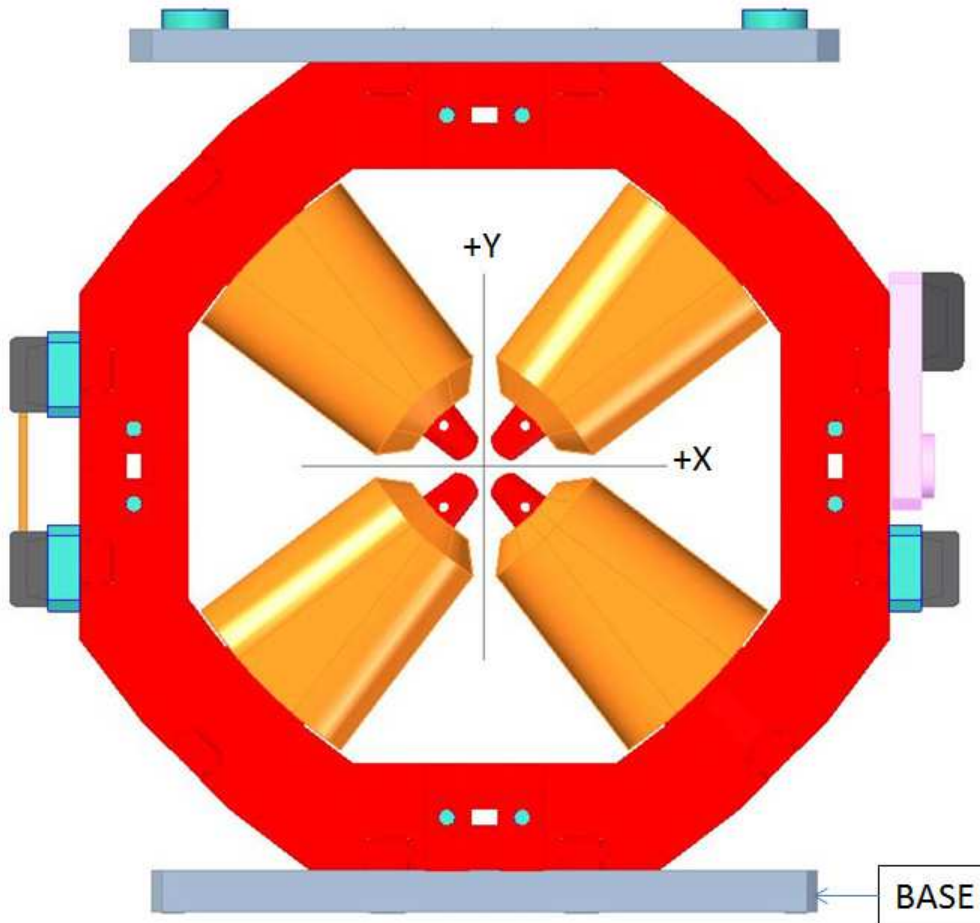
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00232	-0.00355	-0.0039	-0.00224
Max. Dev.	0.00067	0.00218	0.00072	0.00223

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



Angle in Decimal Degrees ° :-0.04225

Angle in Milliradians :-0.73747

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