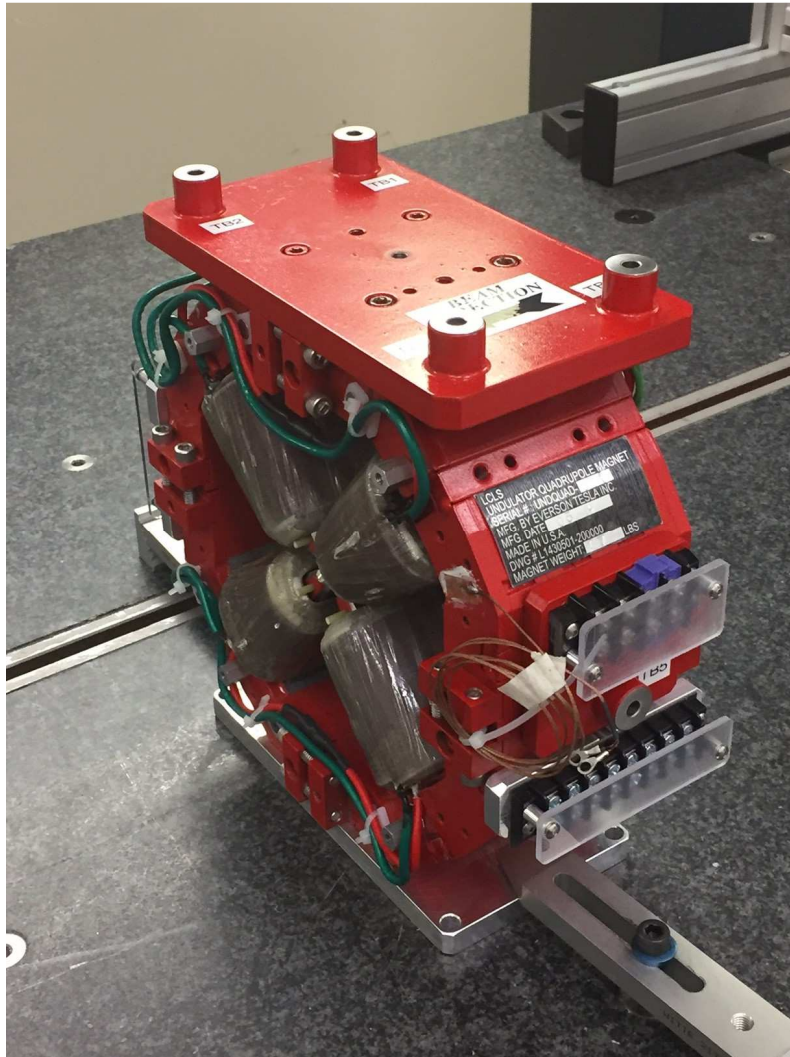


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4072
Mfg. S/N : 007

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.

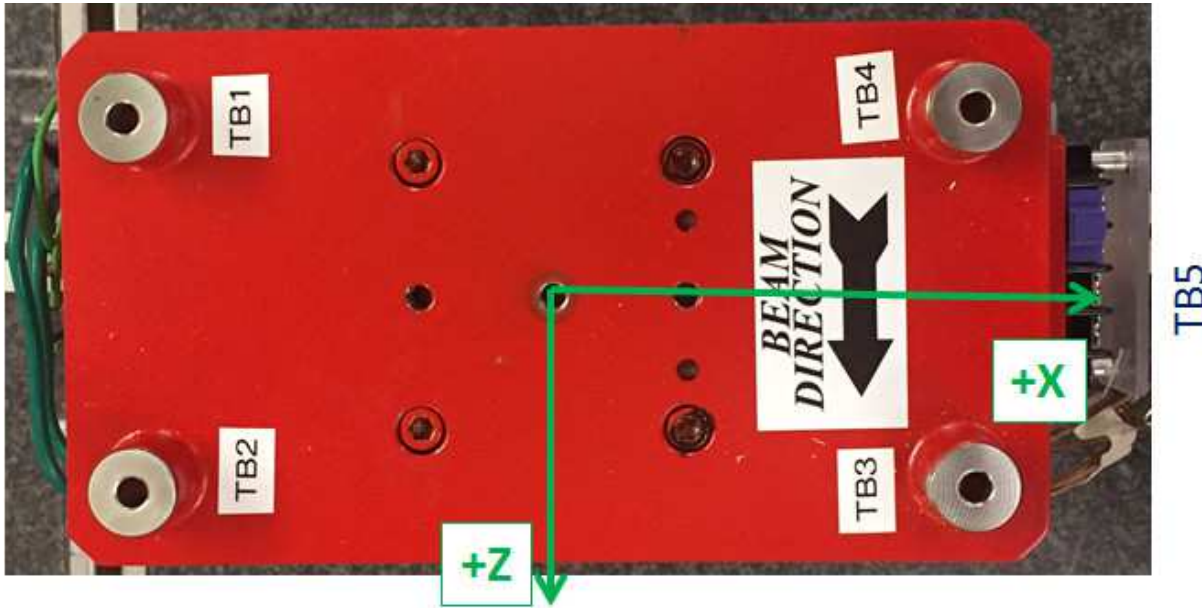
Coordinate Origins

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



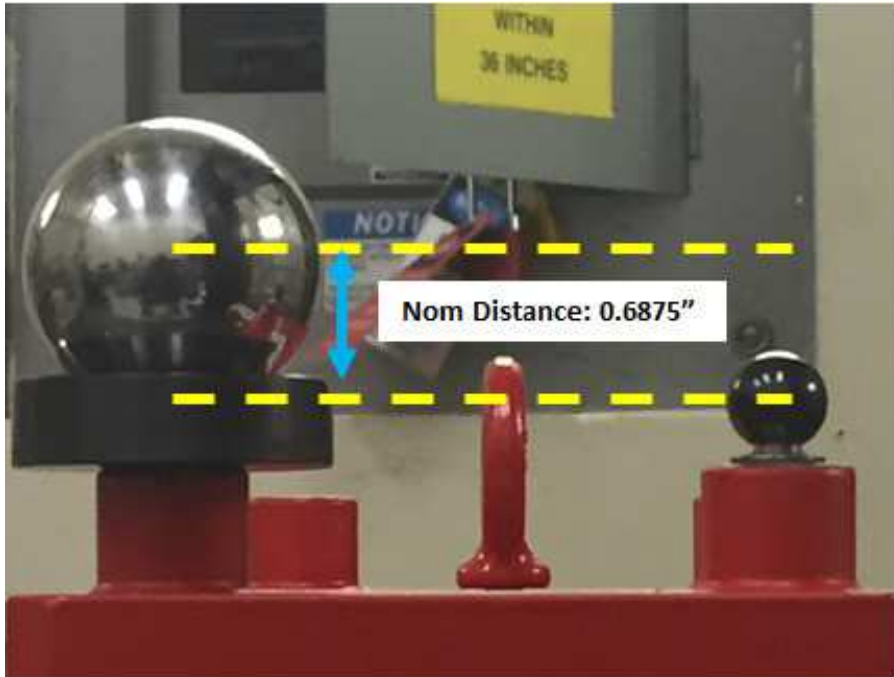
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36964	6.81635	-1.48094
TB 2	-3.37842	6.81682	1.51825
TB 3	3.36955	6.81475	1.53514
TB 4	3.37635	6.81460	-1.46595
TB 5	6.58859	0.12363	0.02819
TB A	-3.37046	6.12920	-1.48105
TB B	-3.37849	6.12928	1.51867
TB C	3.36959	6.12798	1.53481
TB D	3.37661	6.12774	-1.46575
TB E	5.90131	0.12537	0.02583

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



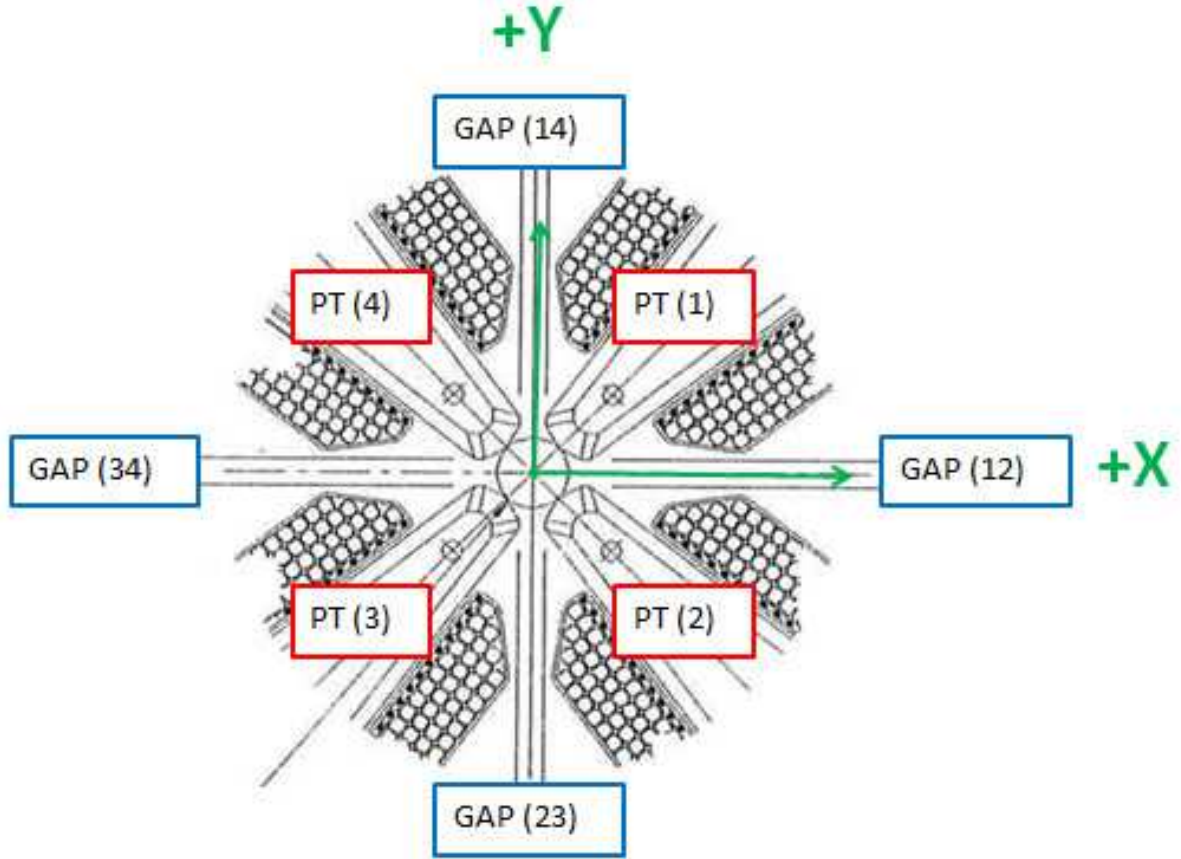
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68716
TB 2	0.6875 ± 0.001	0.68754
TB 3	0.6875 ± 0.001	0.68677
TB 4	0.6875 ± 0.001	0.68686
TB 5	0.6875 ± 0.001	0.68728

Dimensions in Inch

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Pole Tip Gap Measurements



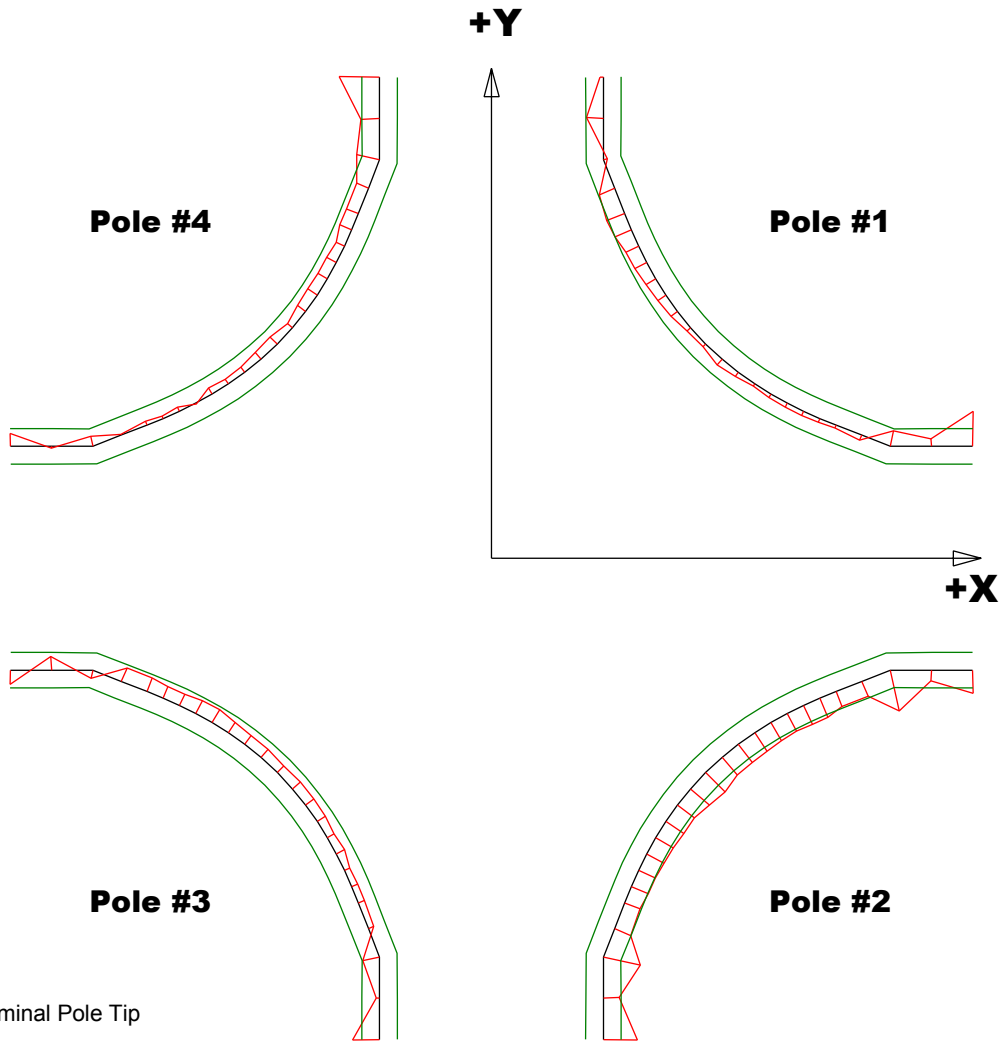
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43227	0.24946
Pole Tip Distance 2-4	0.433 ± .002	0.43511	0.43296
Gap 1-2	0.159 ± .002	0.16081	0.15838
Gap 2-3	0.159 ± .002	0.16086	0.16043
Gap 3-4	0.159 ± .002	0.15895	0.15702
Gap 4-1	0.159 ± .002	0.16002	0.15981

Dimensions in Inch

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Mfg. S/N : 007

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

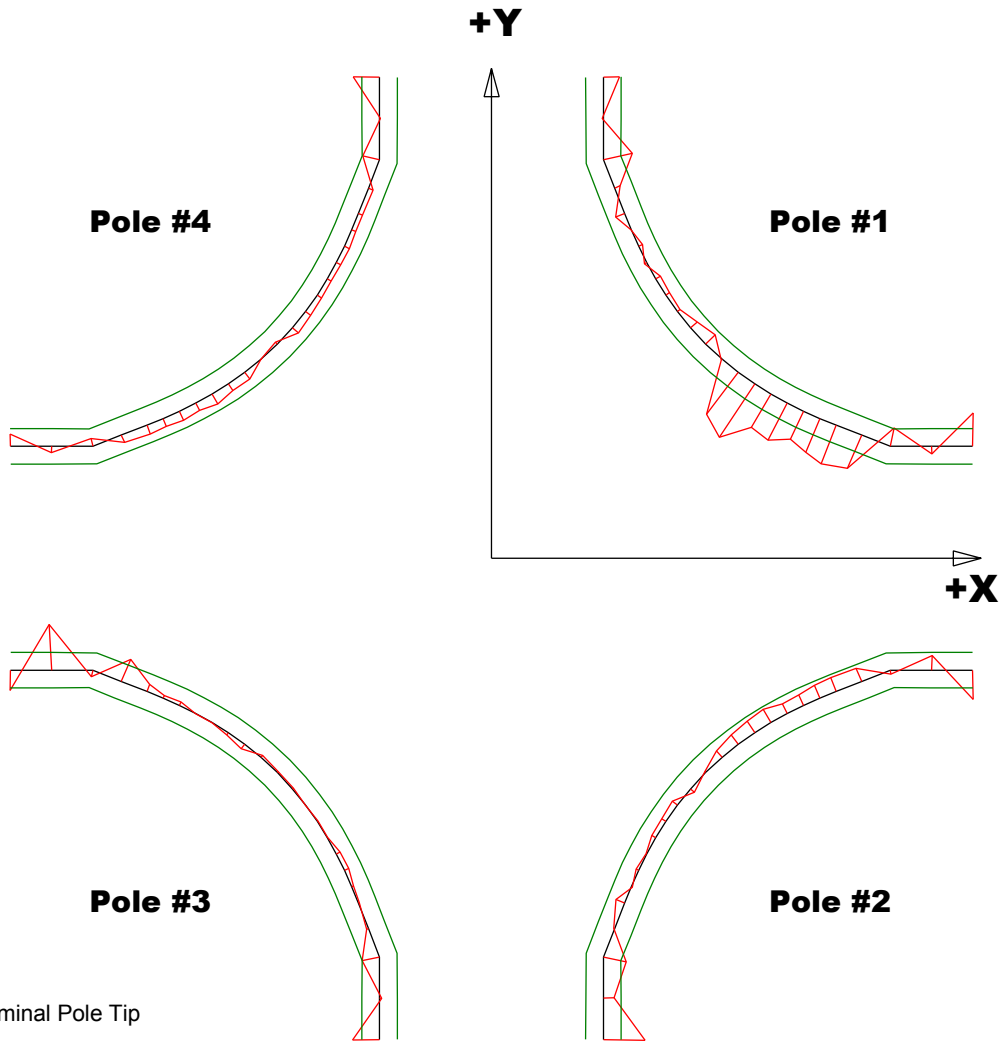
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00197	-0.00235	-0.00153	-0.00228
Max. Dev.	0.00108	-0.00059	0.00085	0.0001

Barcode # : 4072

Mfg. S/N : 007

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

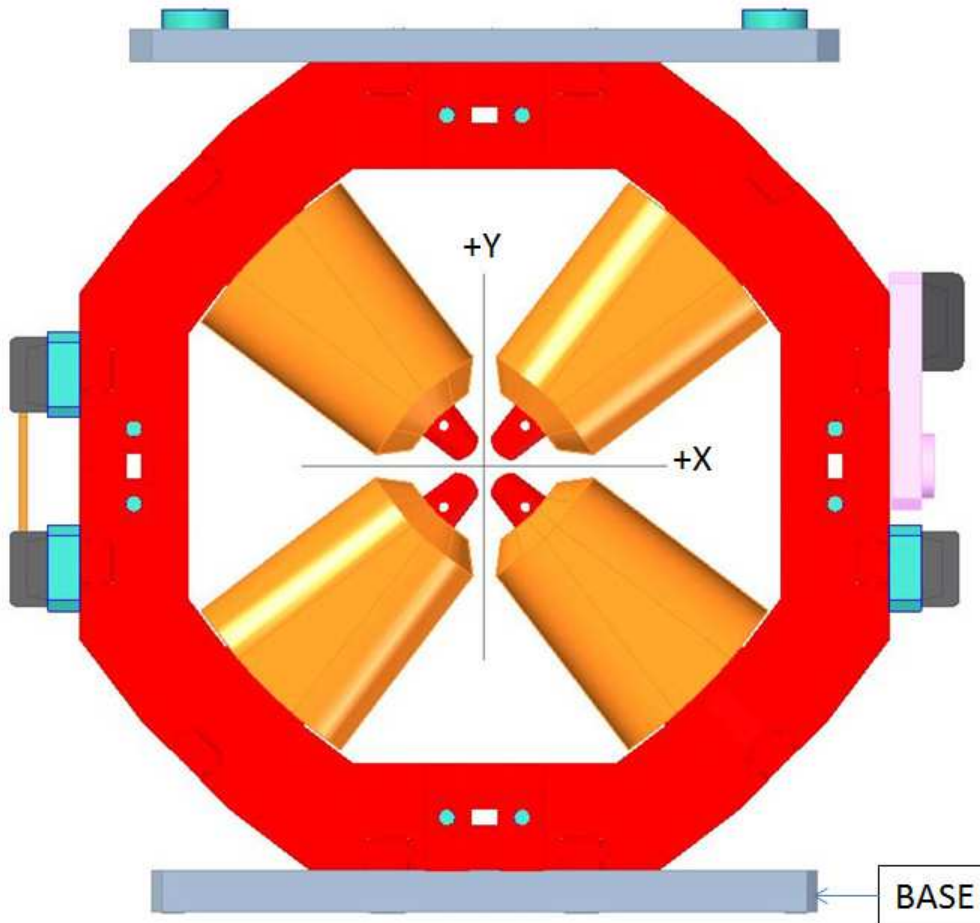
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00188	-0.00235	-0.00152	-0.00149
Max. Dev.	0.00359	0.00086	0.00258	0.00064

Barcode # : 4072

Mfg. S/N : 007

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



Angle in Decimal Degrees ° :0.01359

Angle in Milliradians :0.23713

Barcode # : 4072

Mfg. S/N : 007