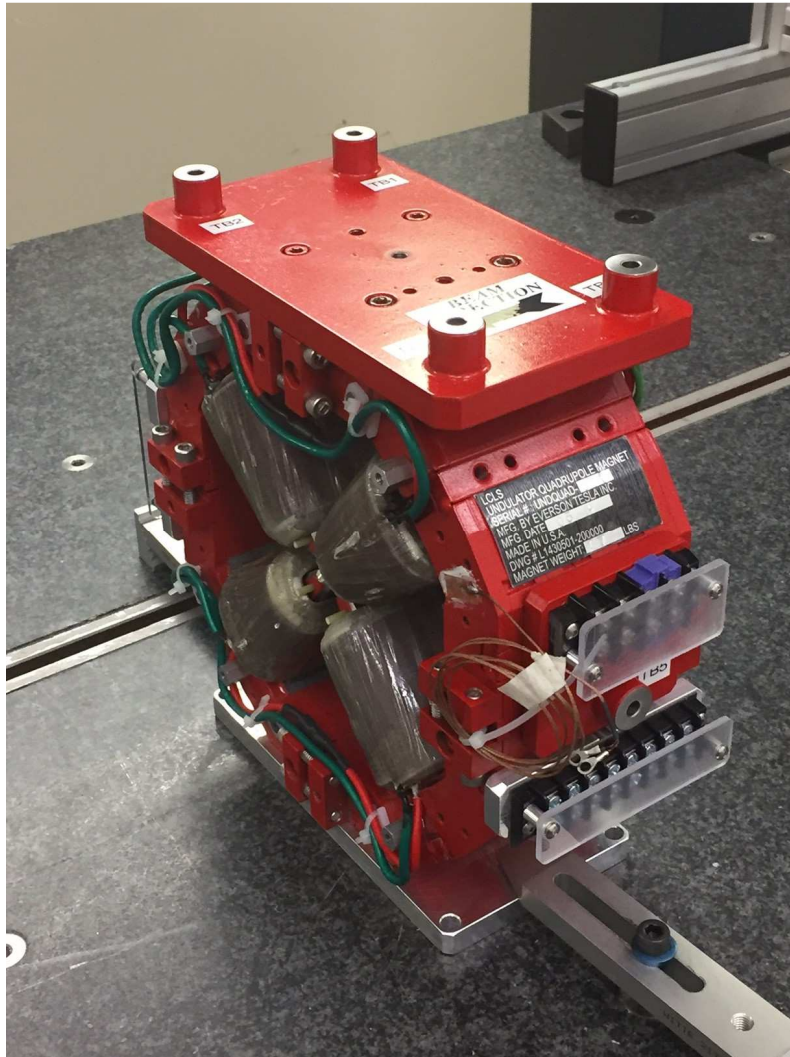


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4076
Mfg. S/N : 004

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.

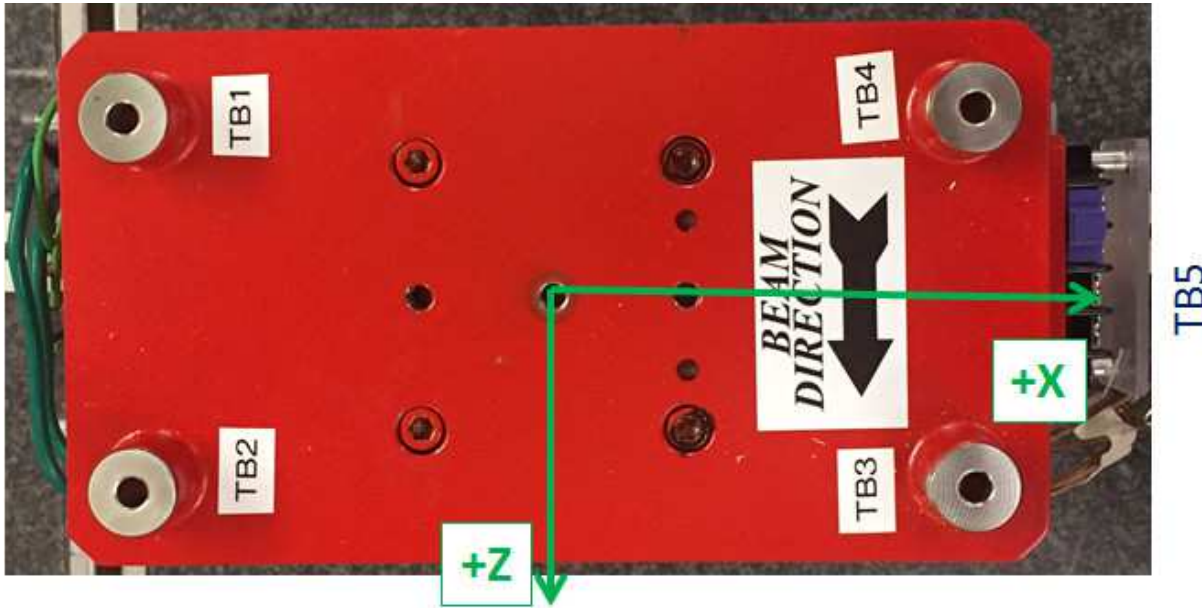
Coordinate Origins

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



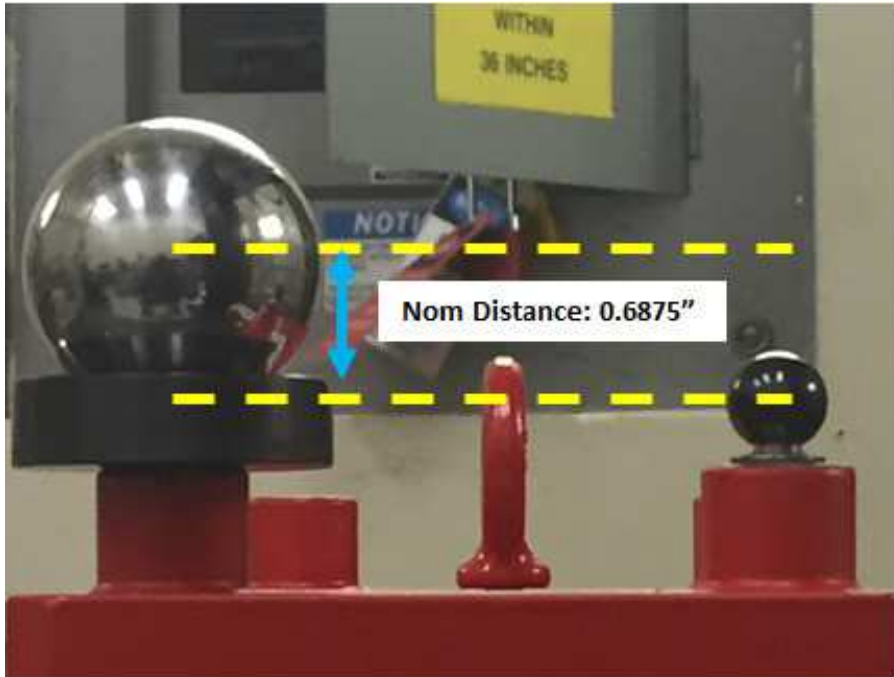
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37257	6.79835	-1.49763
TB 2	-3.38616	6.80767	1.49907
TB 3	3.36001	6.81771	1.53641
TB 4	3.37550	6.81572	-1.46225
TB 5	6.58704	0.12577	0.03607
TB A	-3.37214	6.10972	-1.49622
TB B	-3.38594	6.11959	1.50325
TB C	3.36136	6.12947	1.53754
TB D	3.37551	6.12765	-1.46266
TB E	5.89882	0.12838	0.03615

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



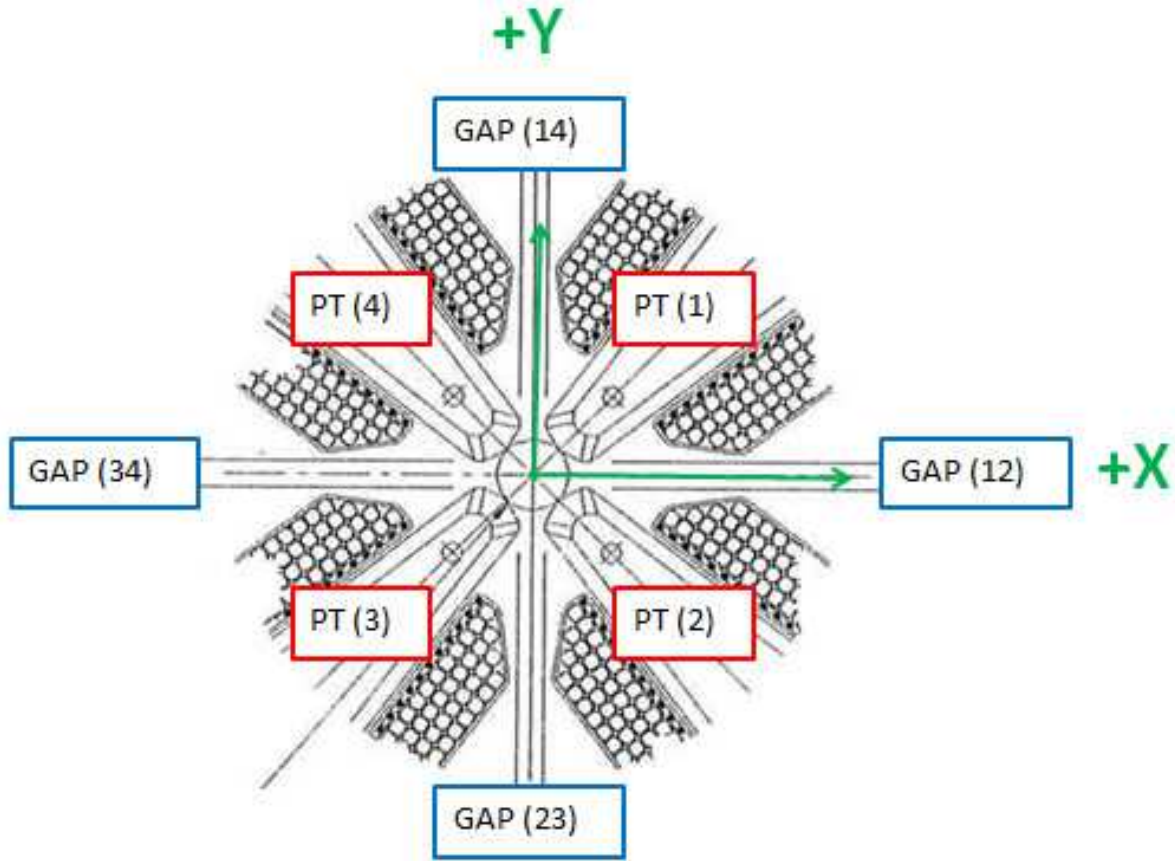
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68863
TB 2	0.6875 ± 0.001	0.68809
TB 3	0.6875 ± 0.001	0.68824
TB 4	0.6875 ± 0.001	0.68807
TB 5	0.6875 ± 0.001	0.68822

Dimensions in Inch

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Pole Tip Gap Measurements



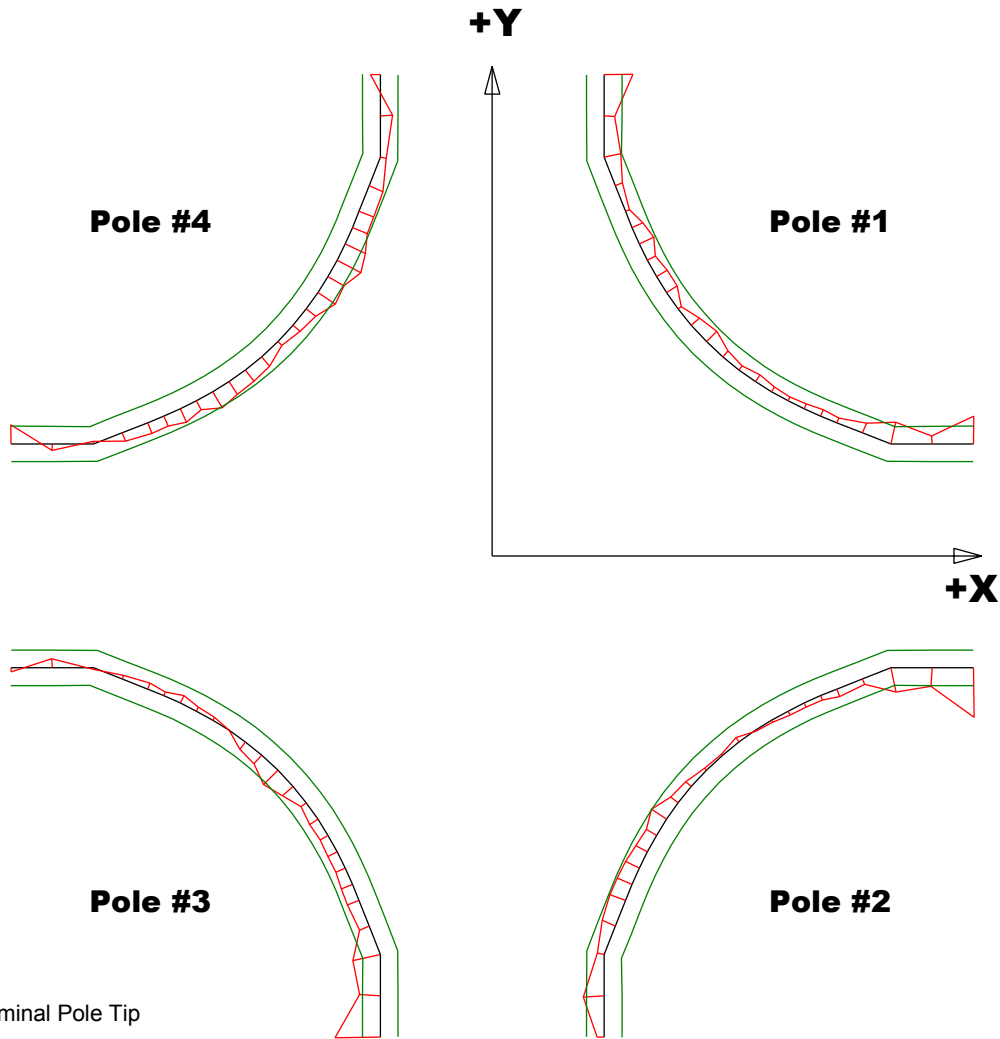
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43487	0.43306
Pole Tip Distance 2-4	0.433 ± .002	0.43246	0.43721
Gap 1-2	0.159 ± .002	0.16082	0.16043
Gap 2-3	0.159 ± .002	0.15983	0.15896
Gap 3-4	0.159 ± .002	0.15888	0.16035
Gap 4-1	0.159 ± .002	0.15938	0.15833

Dimensions in Inch

Barcode # : 4076

Mfg. S/N : 004

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

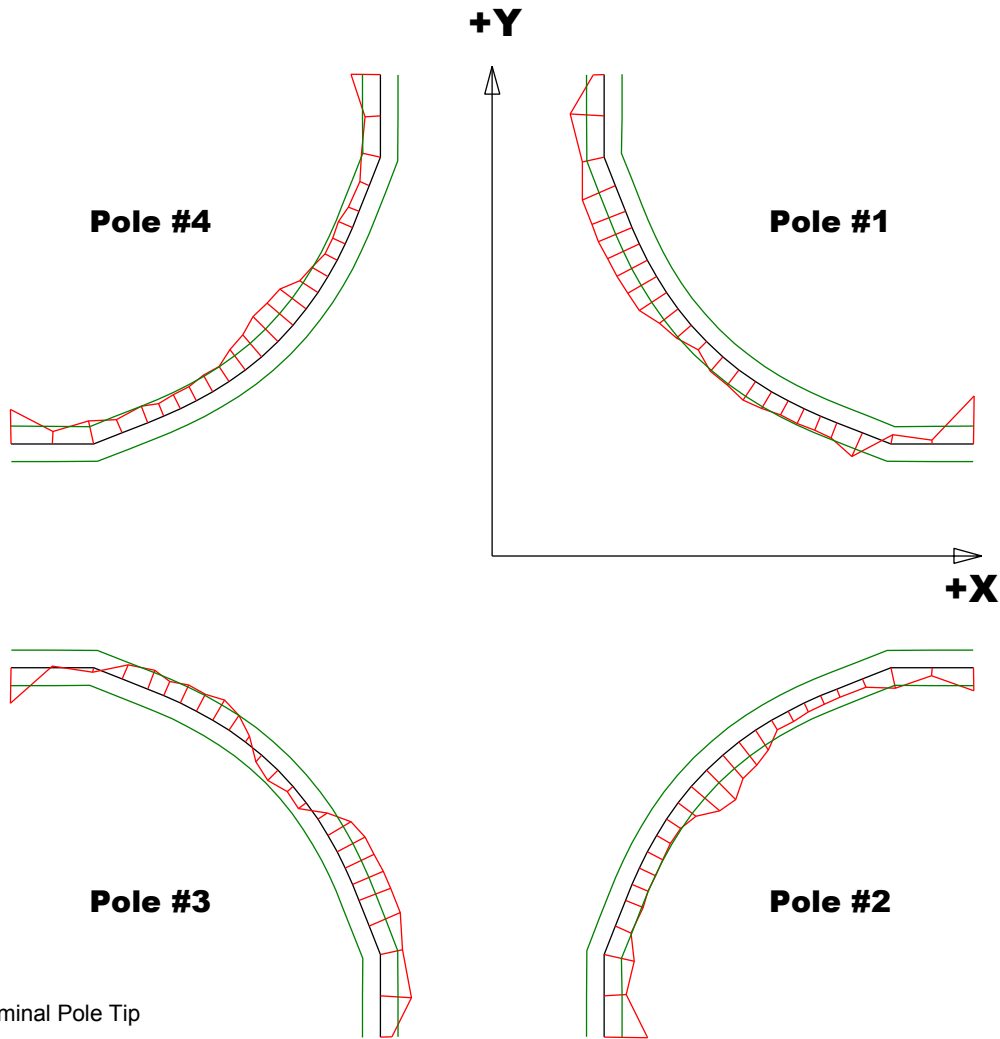
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00163	-0.00279	-0.00255	-0.00107
Max. Dev.	-0.00022	0.00118	0.00051	0.00151

Barcode # : 4076

Mfg. S/N : 004

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

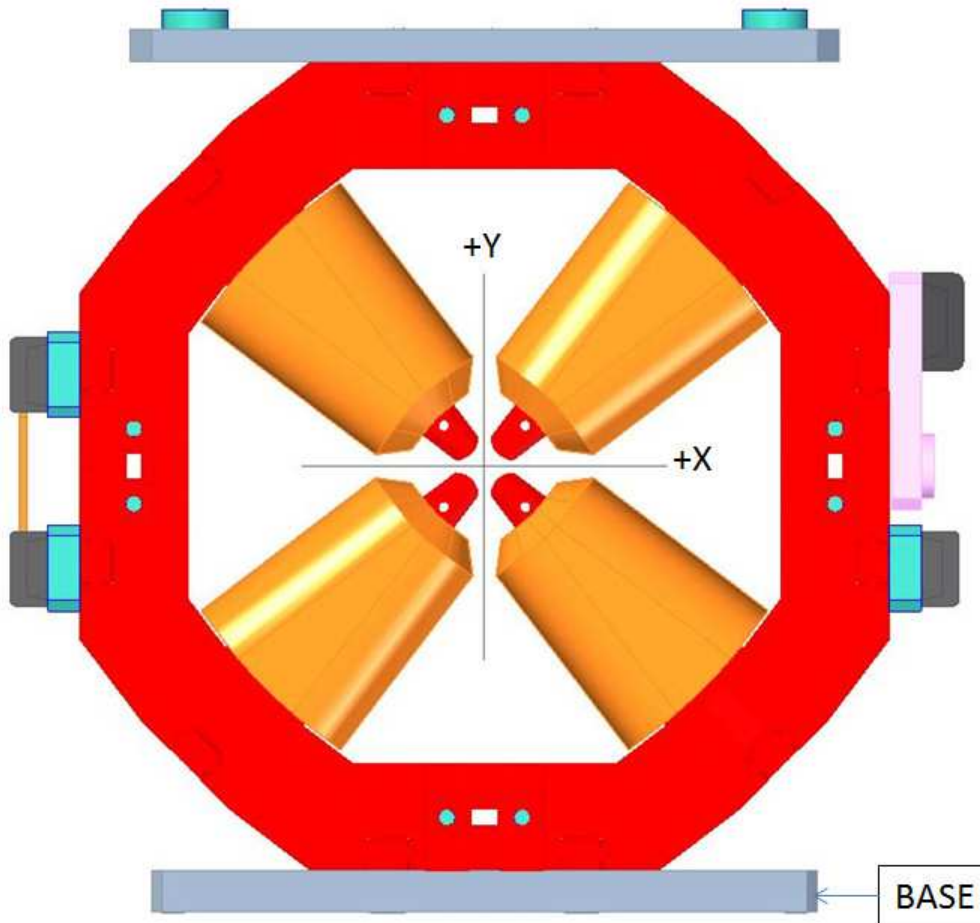
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00269	-0.00245	-0.00199	-0.002
Max. Dev.	0.00205	-0.00044	0.00192	-0.00056

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



Angle in Decimal Degrees ° :0.01805

Angle in Milliradians :0.31504

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