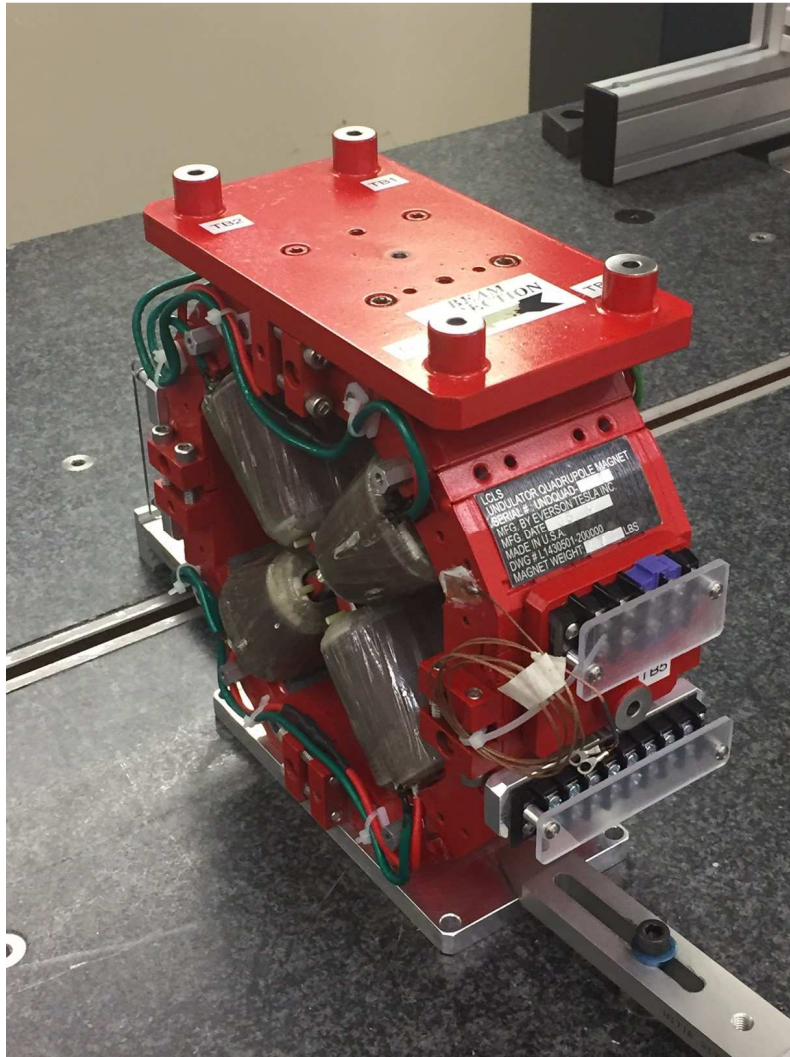


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4090
Mfg. S/N : 020

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.

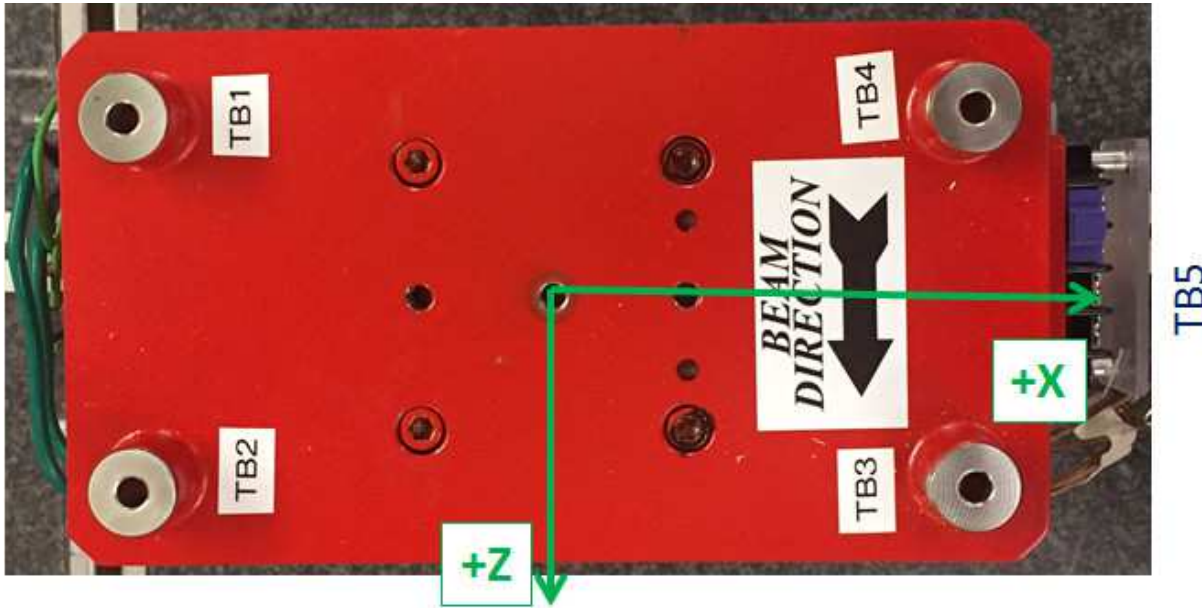
Coordinate Origins

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



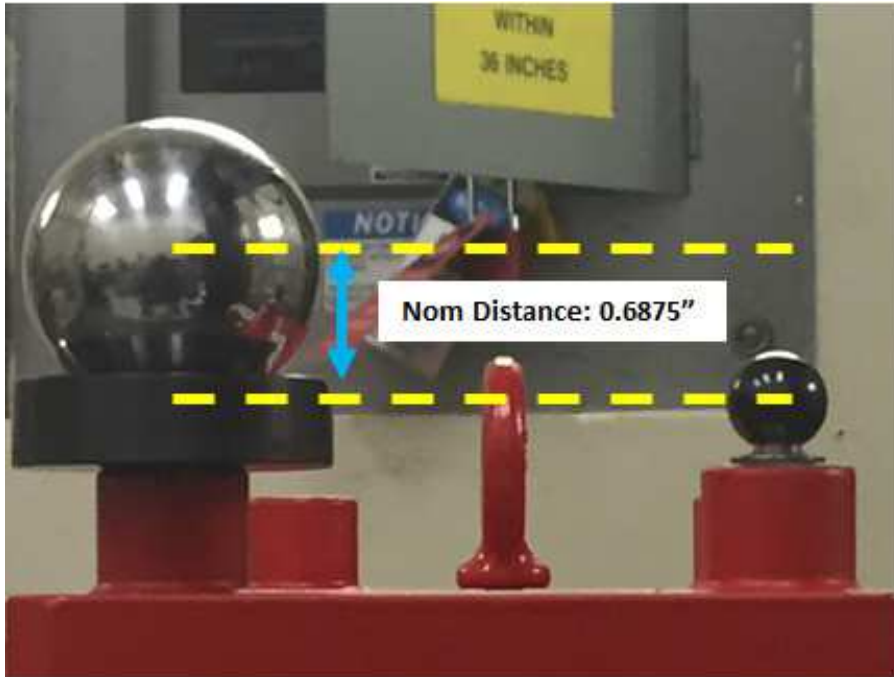
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36965	6.80441	-1.52075
TB 2	-3.37107	6.80184	1.47906
TB 3	3.37794	6.79718	1.47709
TB 4	3.37904	6.80195	-1.52374
TB 5	6.58755	0.12235	-0.02883
TB A	-3.36973	6.11721	-1.52171
TB B	-3.37017	6.11413	1.47778
TB C	3.37820	6.10961	1.47713
TB D	3.37863	6.11412	-1.52331
TB E	5.90031	0.12345	-0.02969

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



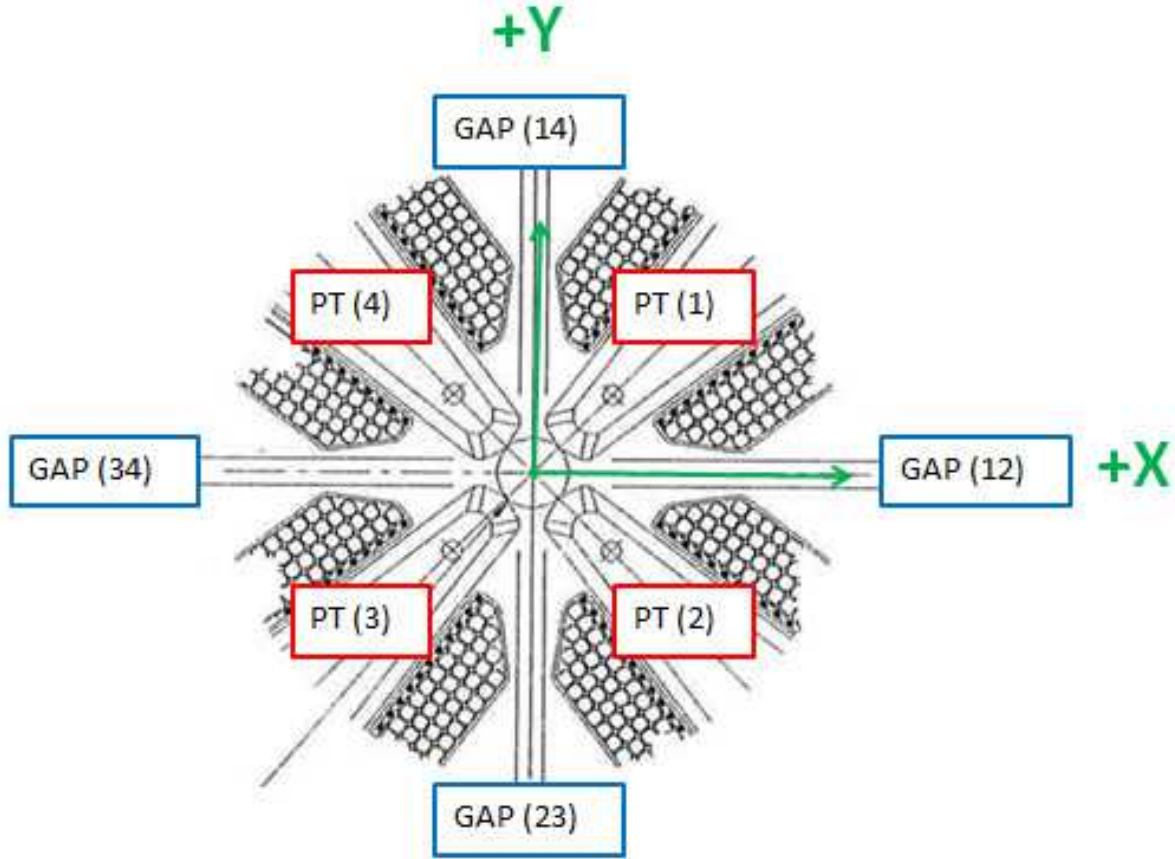
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.6872
TB 2	0.6875 ± 0.001	0.68771
TB 3	0.6875 ± 0.001	0.68756
TB 4	0.6875 ± 0.001	0.68783
TB 5	0.6875 ± 0.001	0.68724

Dimensions in Inch

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Pole Tip Gap Measurements



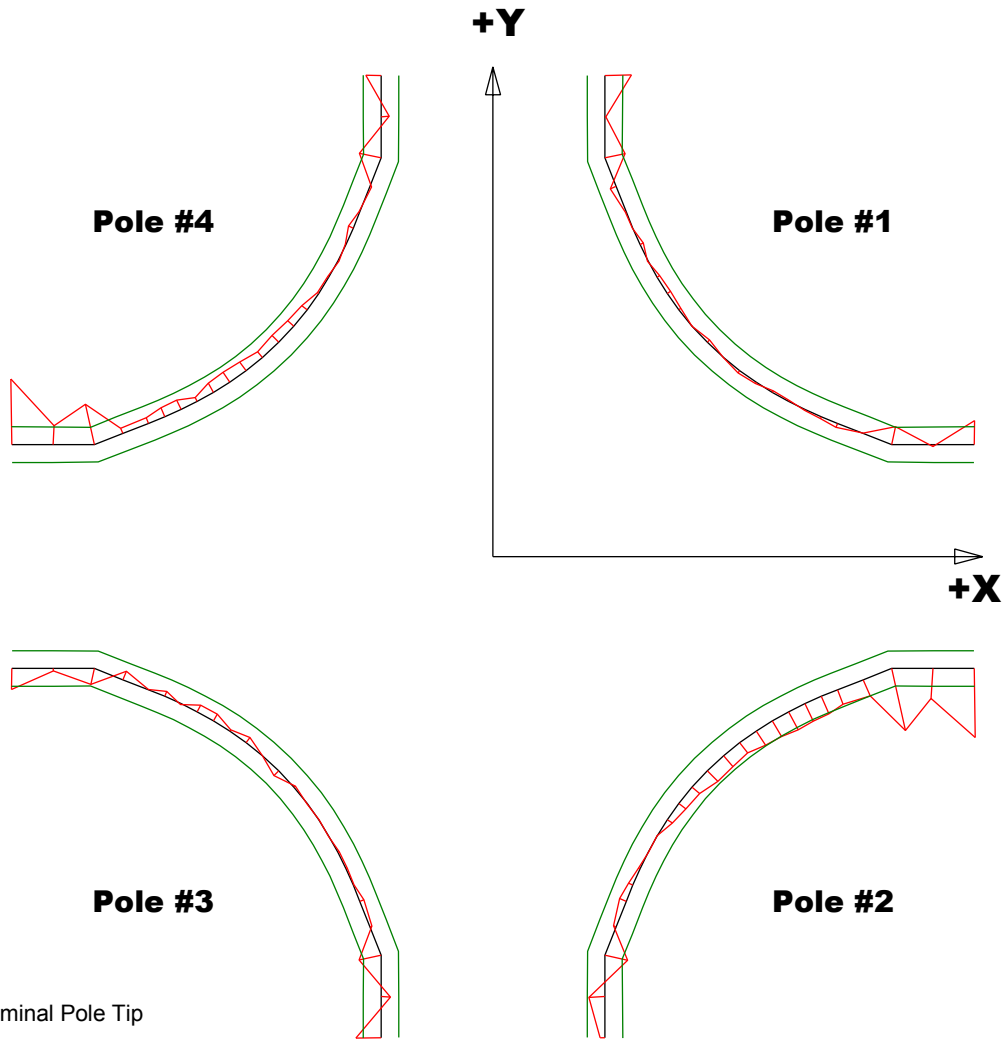
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.4335	0.43427
Pole Tip Distance 2-4	0.433 ± .002	0.43441	0.4337
Gap 1-2	0.159 ± .002	0.16149	0.15851
Gap 2-3	0.159 ± .002	0.15845	0.1611
Gap 3-4	0.159 ± .002	0.16076	0.16062
Gap 4-1	0.159 ± .002	0.15927	0.15882

Dimensions in Inch

Barcode # : 4090

Mfg. S/N : 020

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

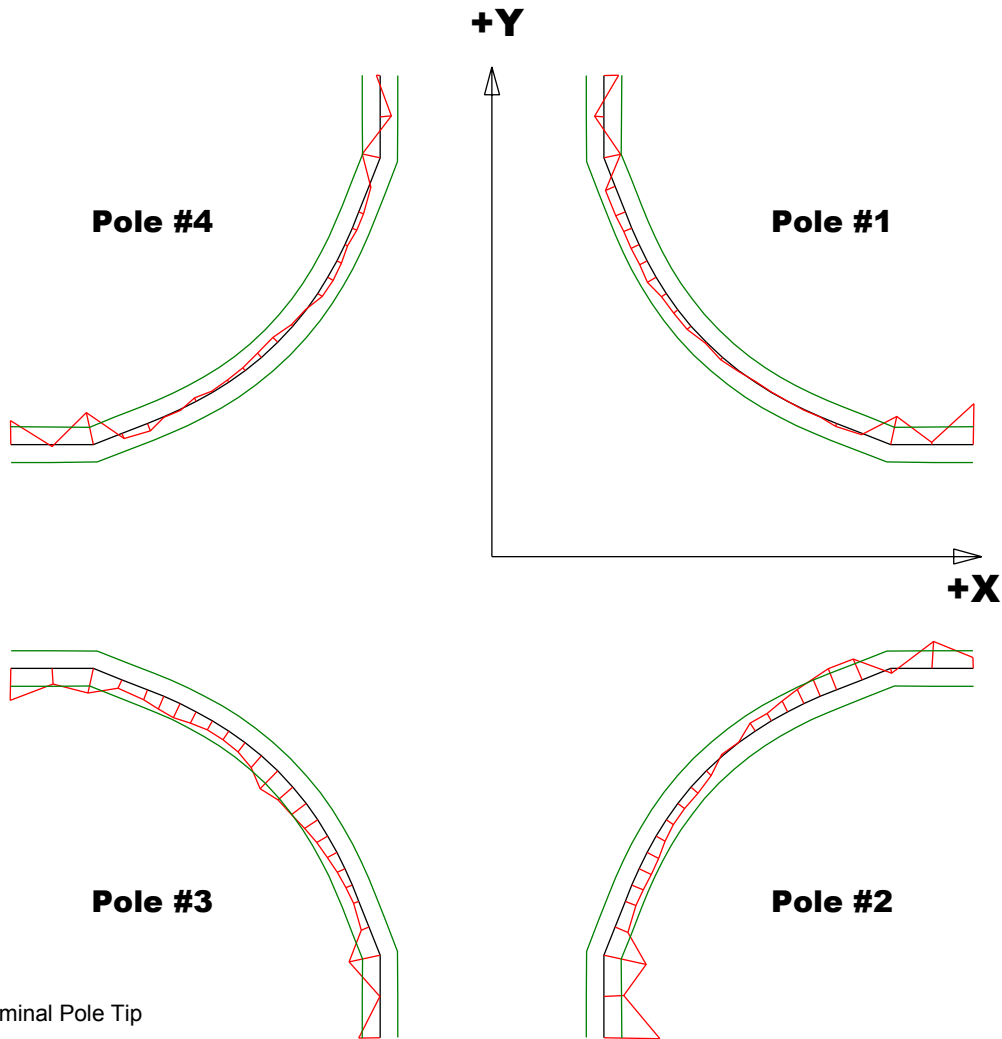
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00149	-0.00388	-0.00142	-0.00369
Max. Dev.	0.00034	0.00091	0.00054	0.00045

Barcode # : 4090

Mfg. S/N : 020

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

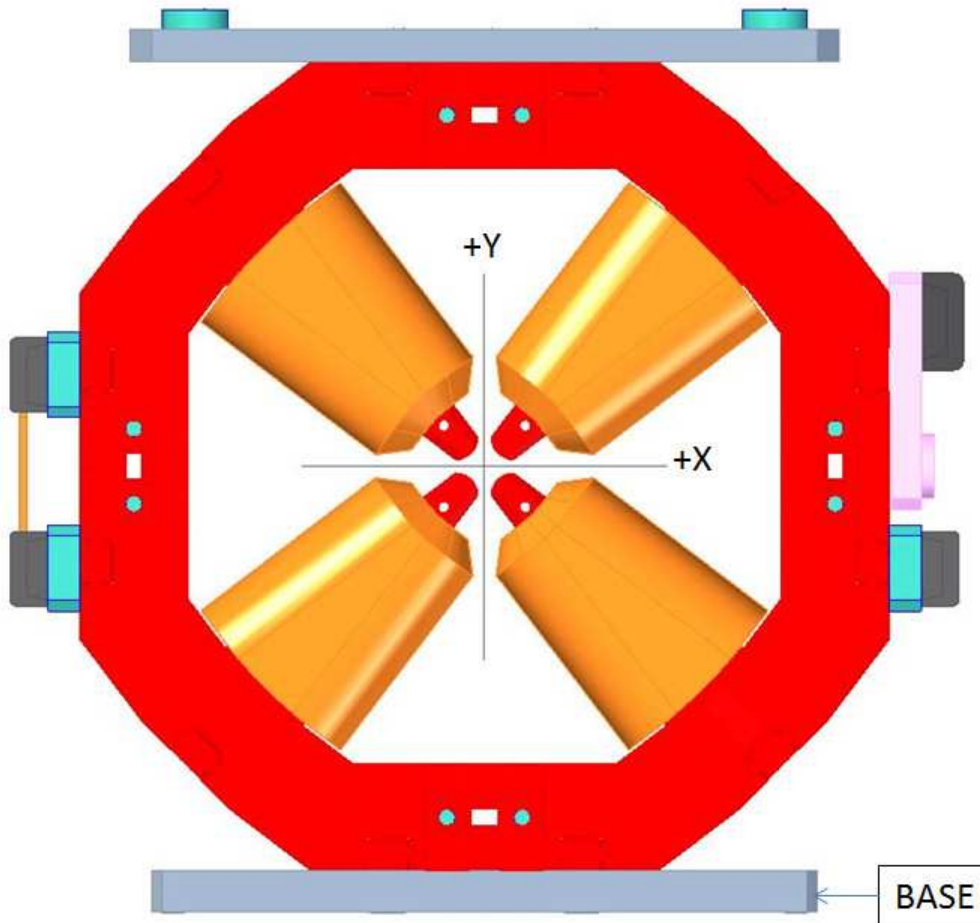
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00231	-0.00314	-0.0018	-0.00185
Max. Dev.	0.00059	0.00152	-0.00001	0.00063

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



Angle in Decimal Degrees ° :0.02640

Angle in Milliradians :0.46071

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