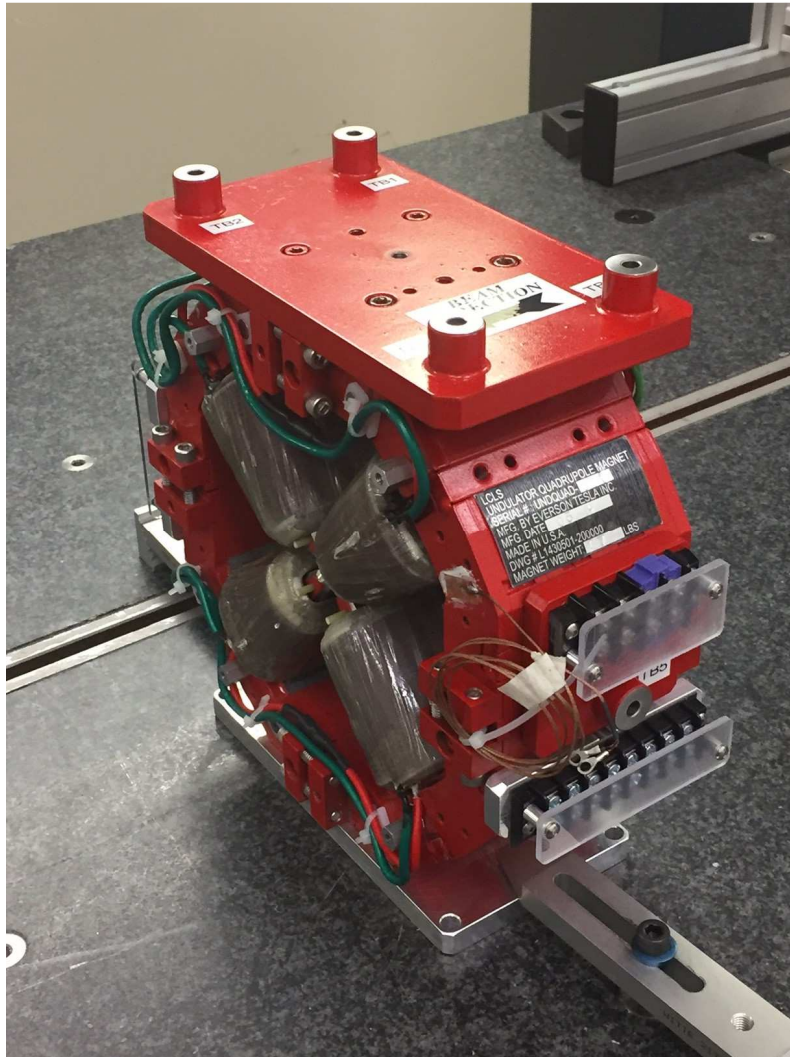


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4099
Mfg. S/N : 022

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.

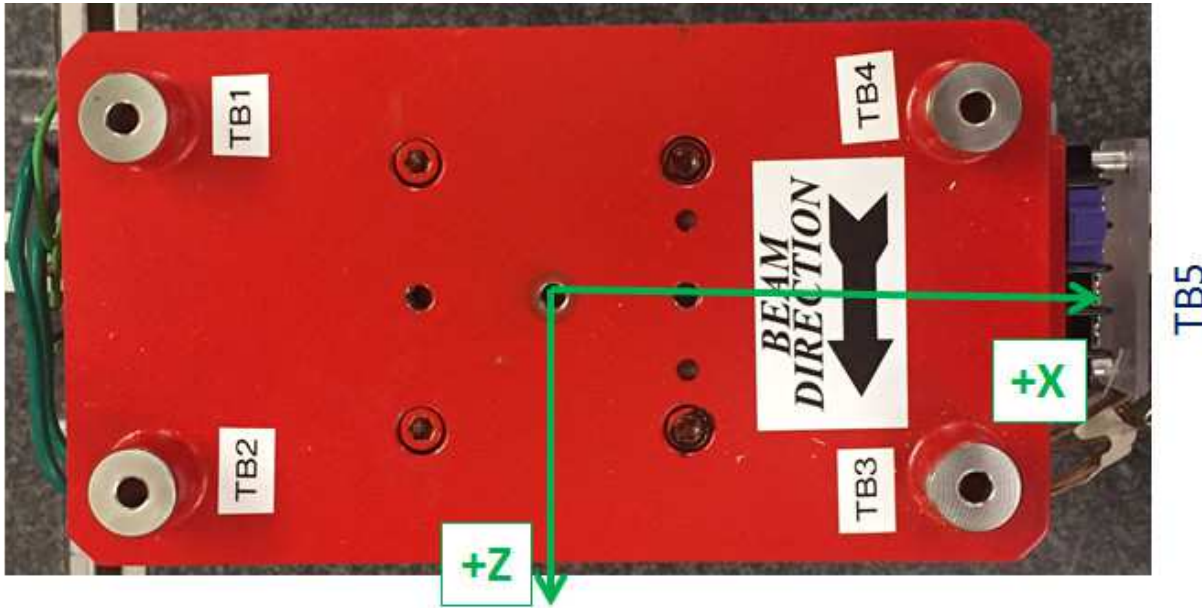
Coordinate Origins

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



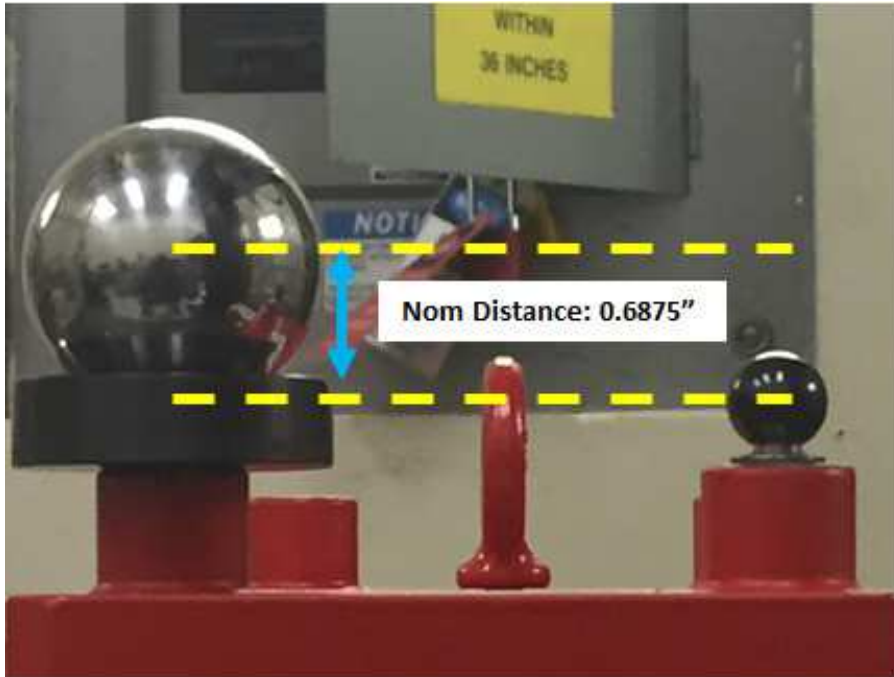
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36584	6.81643	-1.46715
TB 2	-3.36084	6.81668	1.53373
TB 3	3.38572	6.79689	1.52590
TB 4	3.38084	6.80221	-1.47508
TB 5	6.58802	0.11613	0.01705
TB A	-3.36848	6.12906	-1.46648
TB B	-3.36271	6.12944	1.53381
TB C	3.38491	6.10904	1.52513
TB D	3.38007	6.11498	-1.47623
TB E	5.90074	0.11859	0.01703

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



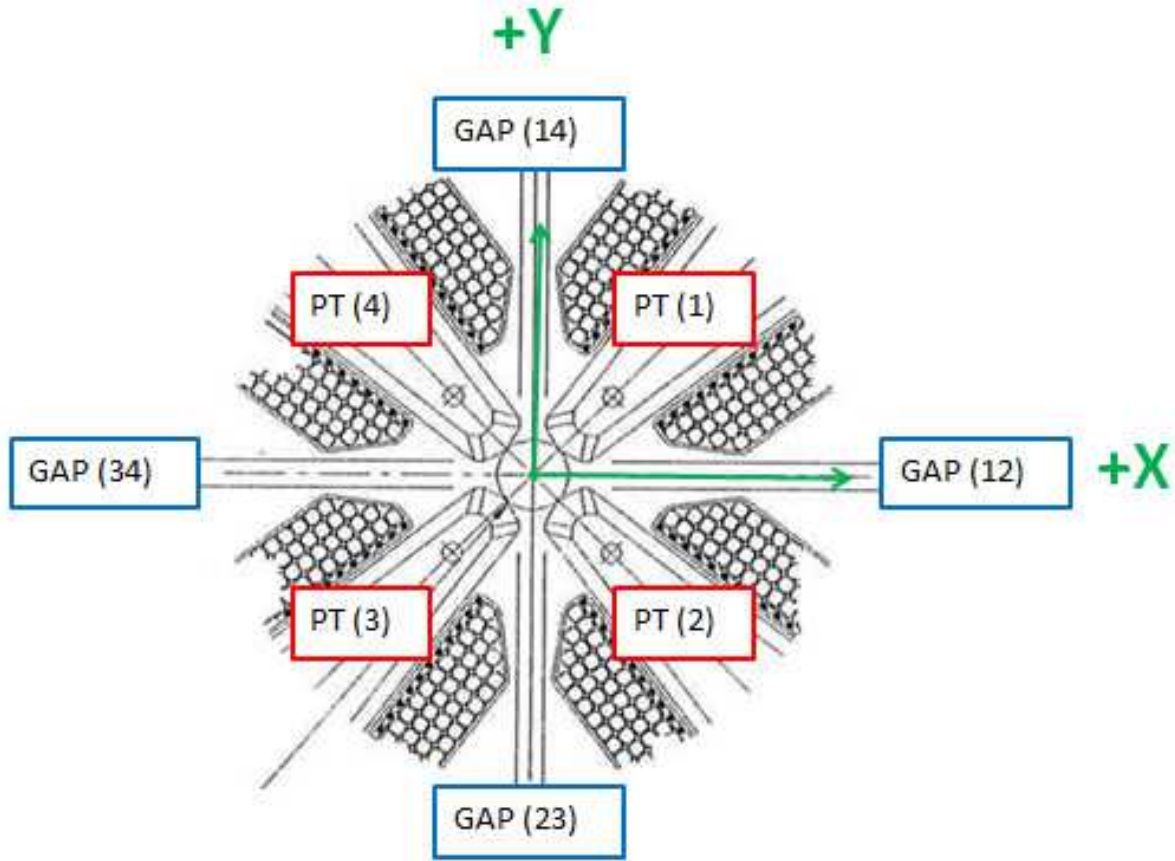
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68737
TB 2	0.6875 ± 0.001	0.68724
TB 3	0.6875 ± 0.001	0.68786
TB 4	0.6875 ± 0.001	0.68723
TB 5	0.6875 ± 0.001	0.68728

Dimensions in Inch

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Pole Tip Gap Measurements



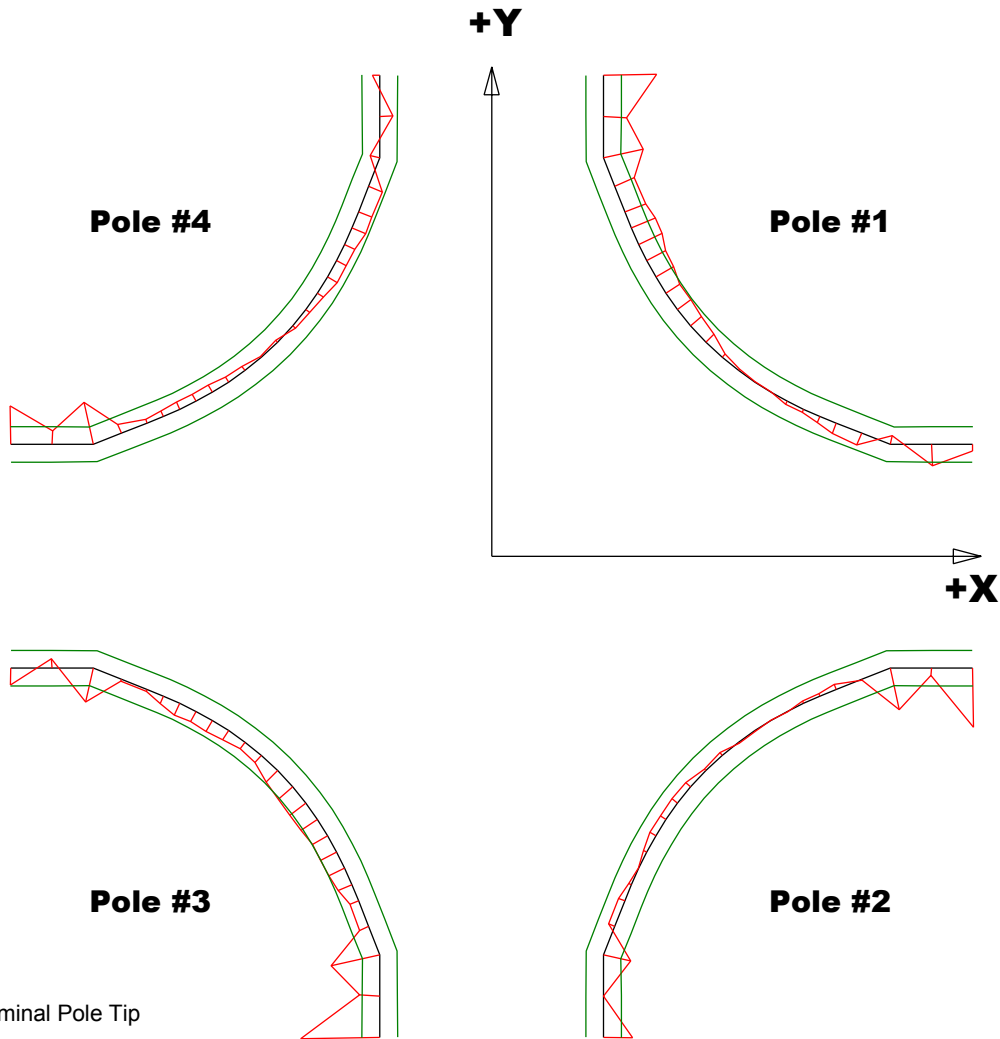
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	$0.433 \pm .002$	0.43451	0.43317
Pole Tip Distance 2-4	$0.433 \pm .002$	0.43303	0.43403
Gap 1-2	$0.159 \pm .002$	0.15911	0.15972
Gap 2-3	$0.159 \pm .002$	0.16103	0.15917
Gap 3-4	$0.159 \pm .002$	0.16024	0.16101
Gap 4-1	$0.159 \pm .002$	0.16027	0.15983

Dimensions in Inch

Barcode # : 4099

Mfg. S/N : 022

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

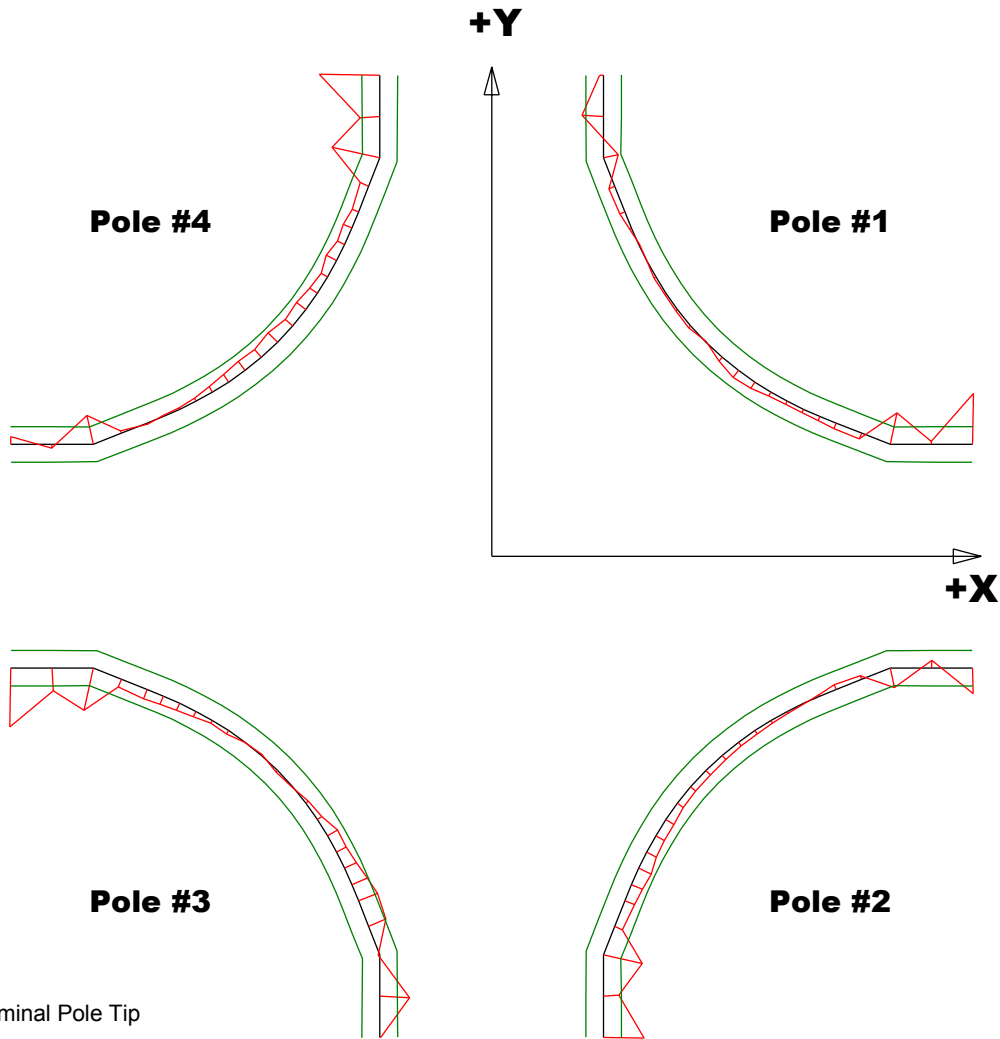
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00298	-0.00332	-0.00446	-0.00243
Max. Dev.	0.0012	0.0004	0.00053	0.00085

Barcode # : 4099

Mfg. S/N : 022

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

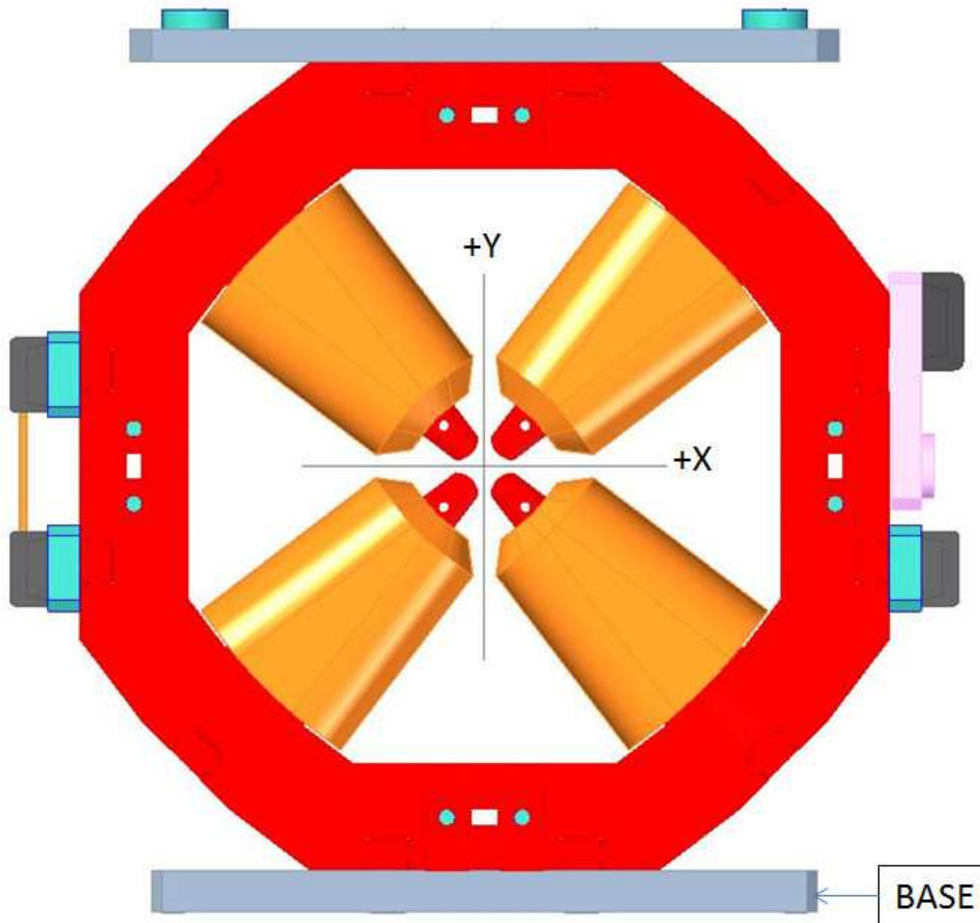
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00288	-0.00228	-0.0033	-0.0034
Max. Dev.	0.0012	0.00045	0.00167	0.0002

Barcode # : 4099

Mfg. S/N : 022

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



Angle in Decimal Degrees ° :0.10313

Angle in Milliradians :1.79997

Barcode # : 4099

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