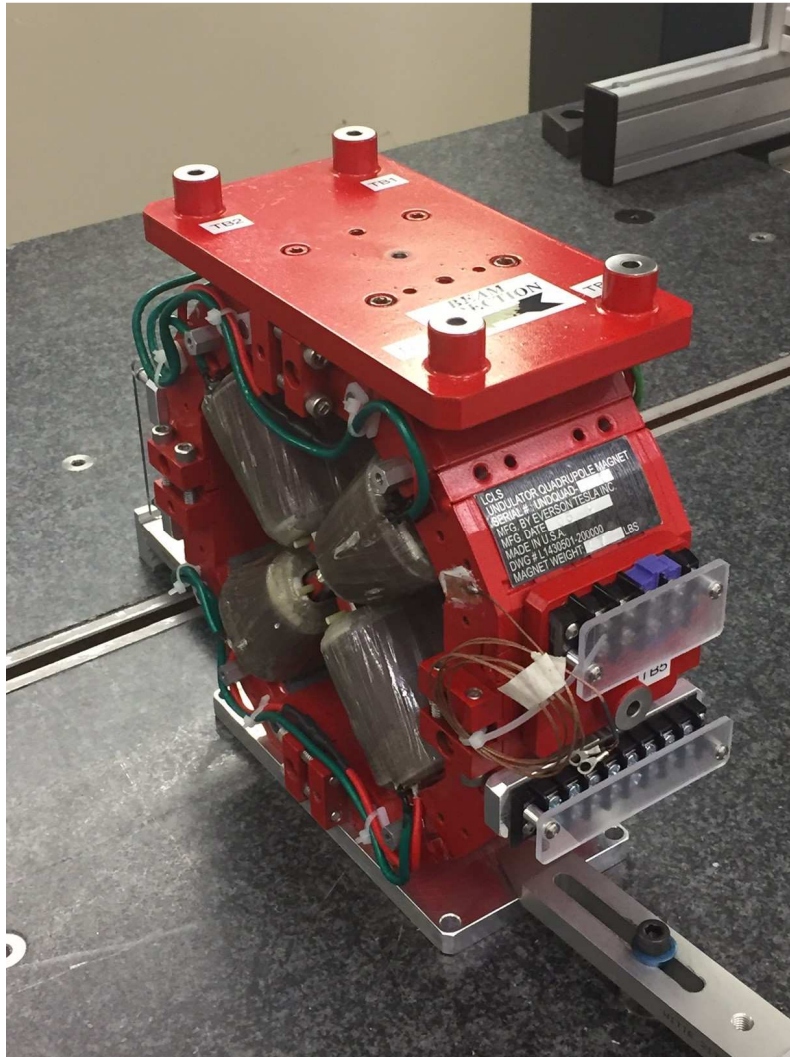


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4093
Mfg. S/N : 024

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.

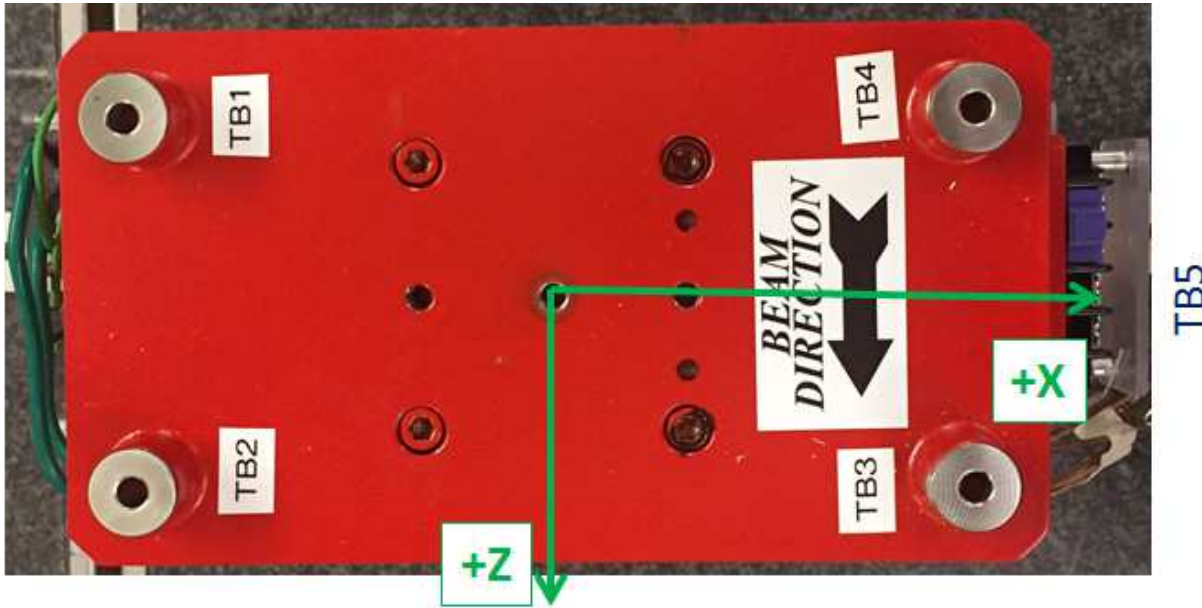
Coordinate Origins

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.

Barcode # : 4093

Mfg. S/N : 024

Tooling Ball Locations



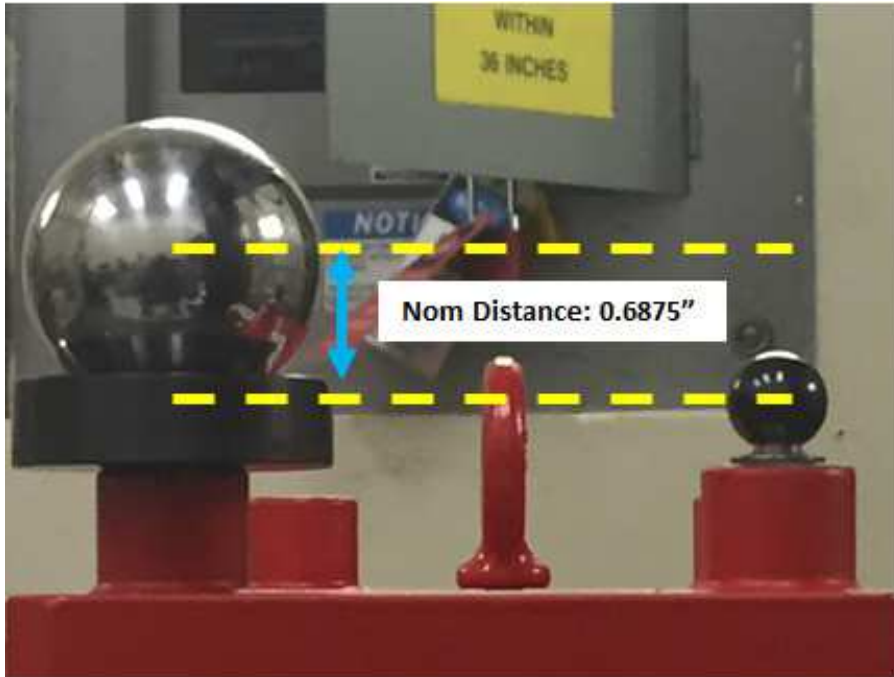
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.35995	6.81820	-1.53079
TB 2	-3.36281	6.82038	1.46944
TB 3	3.38493	6.80942	1.47167
TB 4	3.38586	6.80624	-1.53054
TB 5	6.58627	0.11651	-0.03624
TB A	-3.36174	6.13111	-1.53052
TB B	-3.36430	6.13326	1.47011
TB C	3.38387	6.12270	1.47121
TB D	3.38469	6.11913	-1.52947
TB E	5.89875	0.11943	-0.03655

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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Mfg. S/N : 024

1" Tooling Ball to 5/16" Tooling Ball Difference



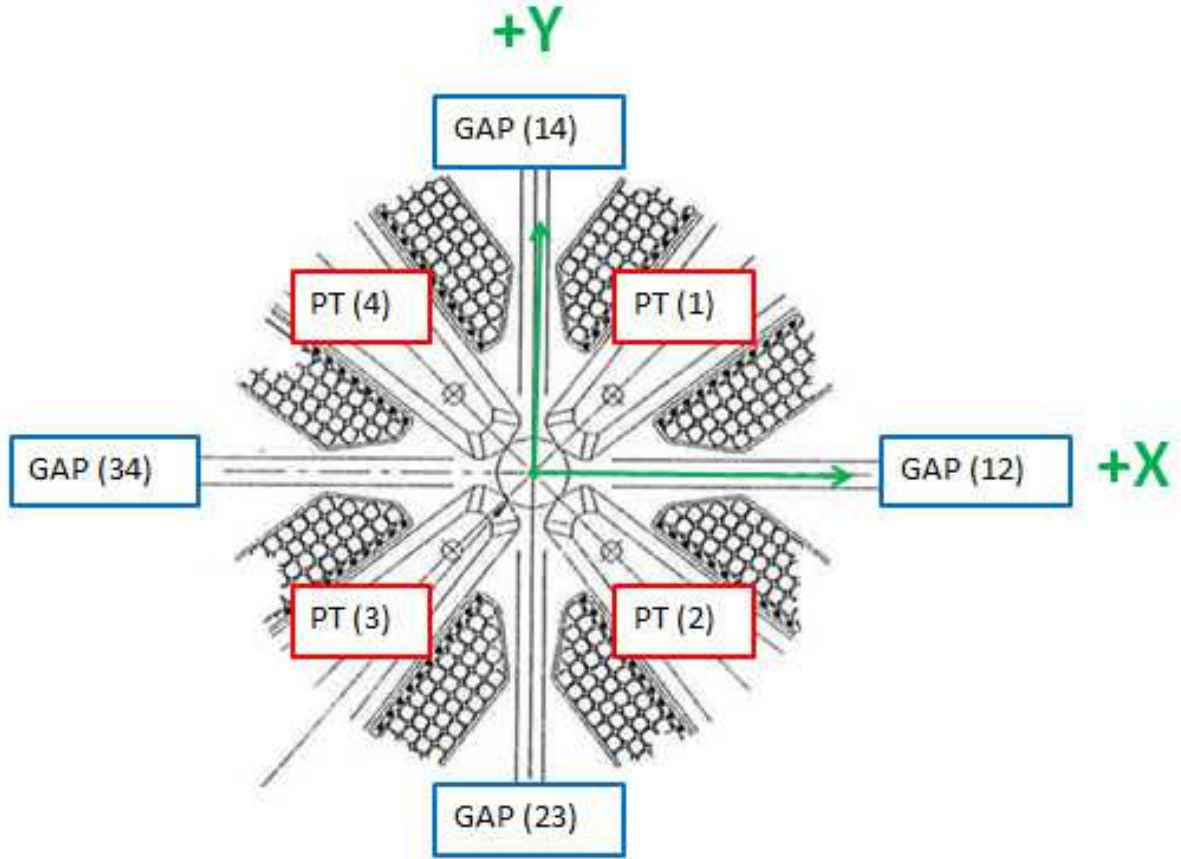
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68709
TB 2	0.6875 ± 0.001	0.68712
TB 3	0.6875 ± 0.001	0.68672
TB 4	0.6875 ± 0.001	0.68711
TB 5	0.6875 ± 0.001	0.68753

Dimensions in Inch

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Pole Tip Gap Measurements



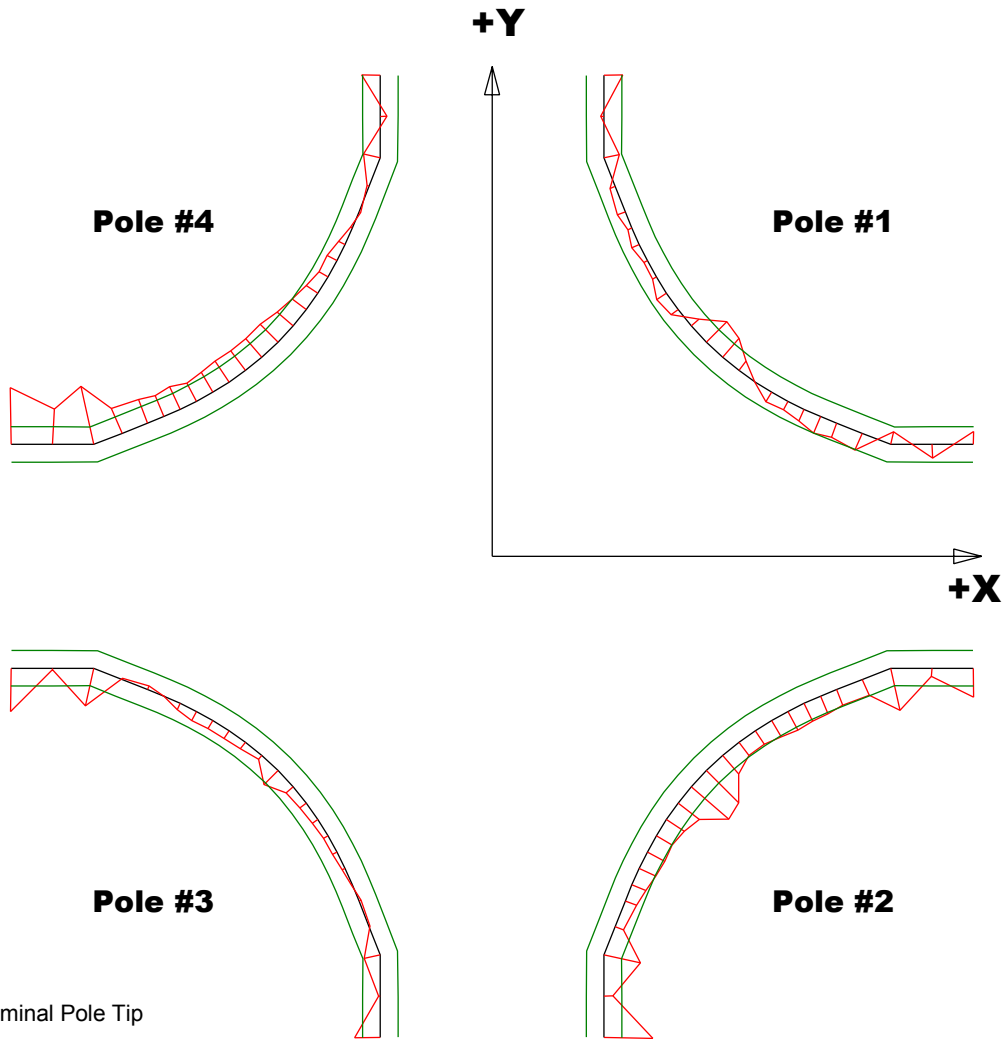
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43543	0.43455
Pole Tip Distance 2-4	0.433 ± .002	0.43673	0.43556
Gap 1-2	0.159 ± .002	0.15961	0.15946
Gap 2-3	0.159 ± .002	0.16045	0.16027
Gap 3-4	0.159 ± .002	0.16192	0.16232
Gap 4-1	0.159 ± .002	0.15929	0.15928

Dimensions in Inch

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Mfg. S/N : 024

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

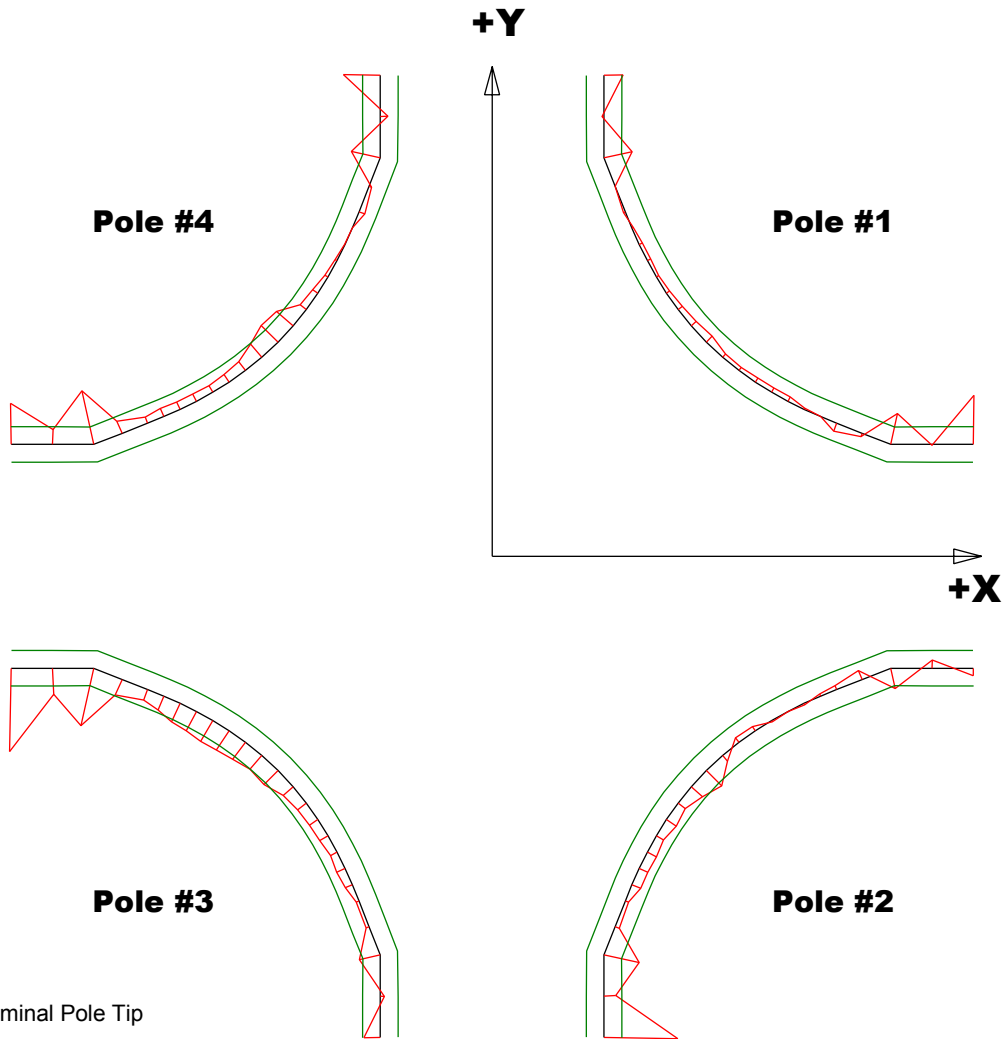
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00164	-0.00279	-0.00244	-0.00335
Max. Dev.	0.00104	-0.00045	0.00021	0.00037

Barcode # : 4093

Mfg. S/N : 024

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

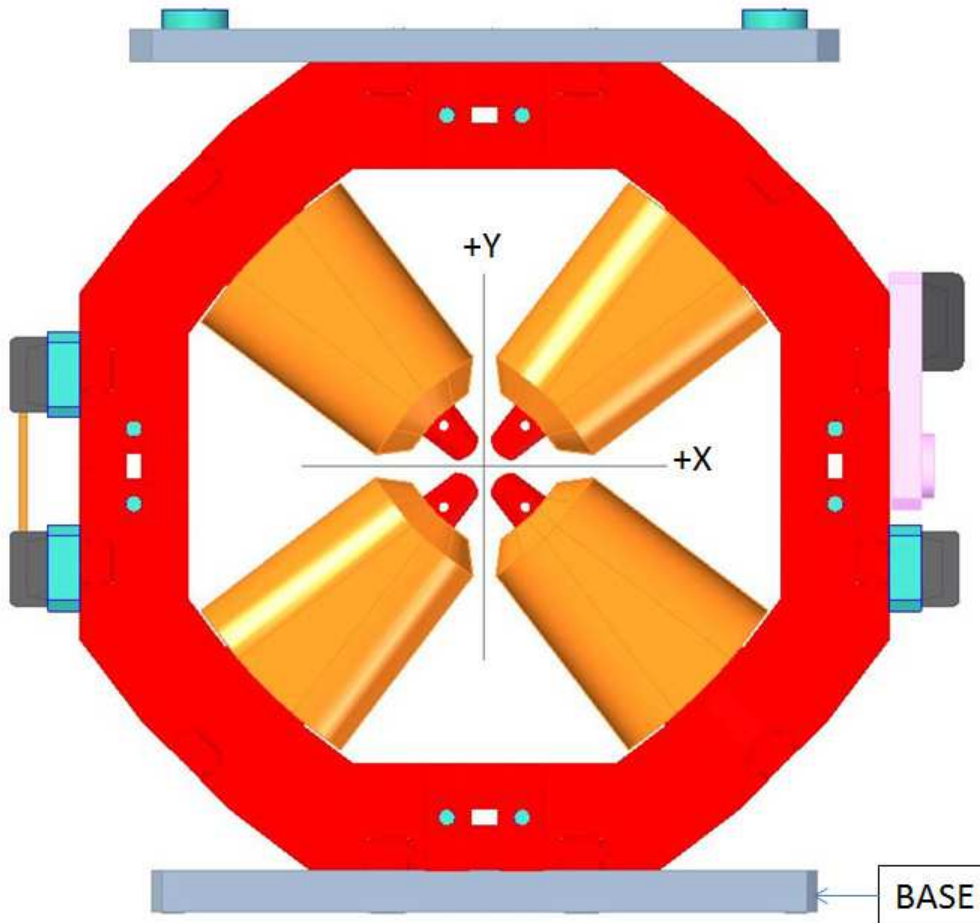
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00276	-0.00416	-0.00469	-0.00309
Max. Dev.	0.00047	0.00055	0.00023	0.00044

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



Angle in Decimal Degrees ° :0.07166

Angle in Milliradians :1.25075

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