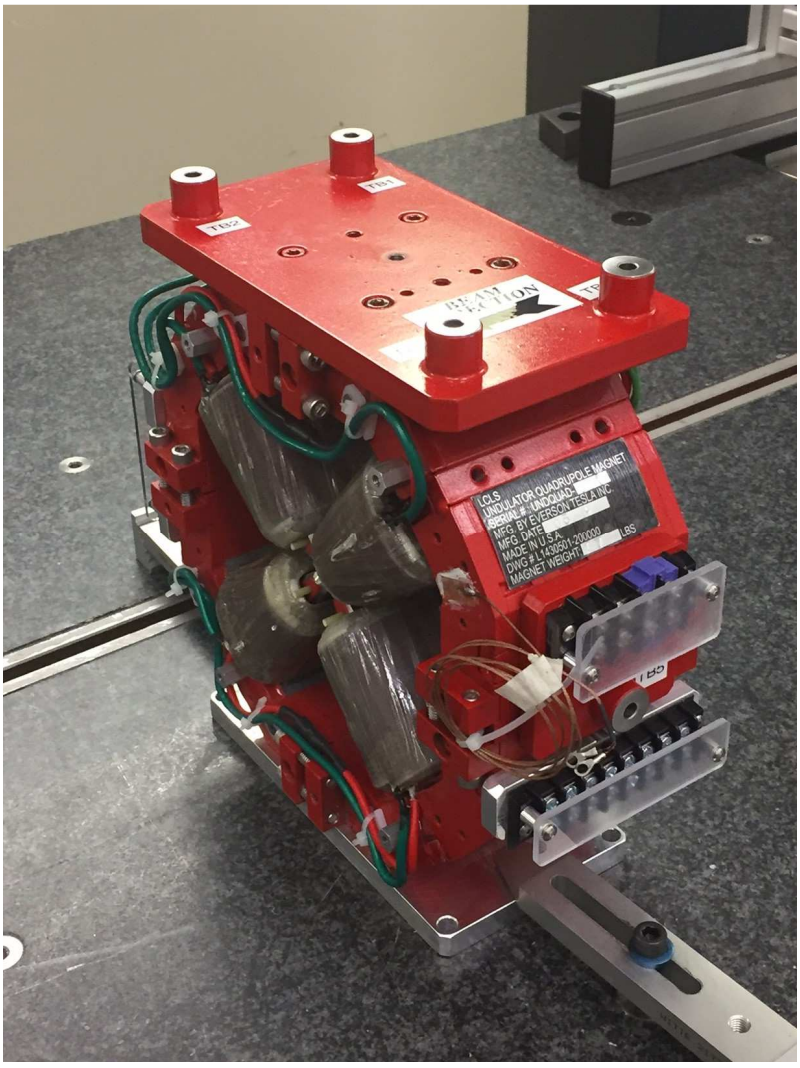
LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban

Engineer : J. Amann

Drawing No. : SA-381-012-22

Barcode # : 4079

Mfg. S/N : 010

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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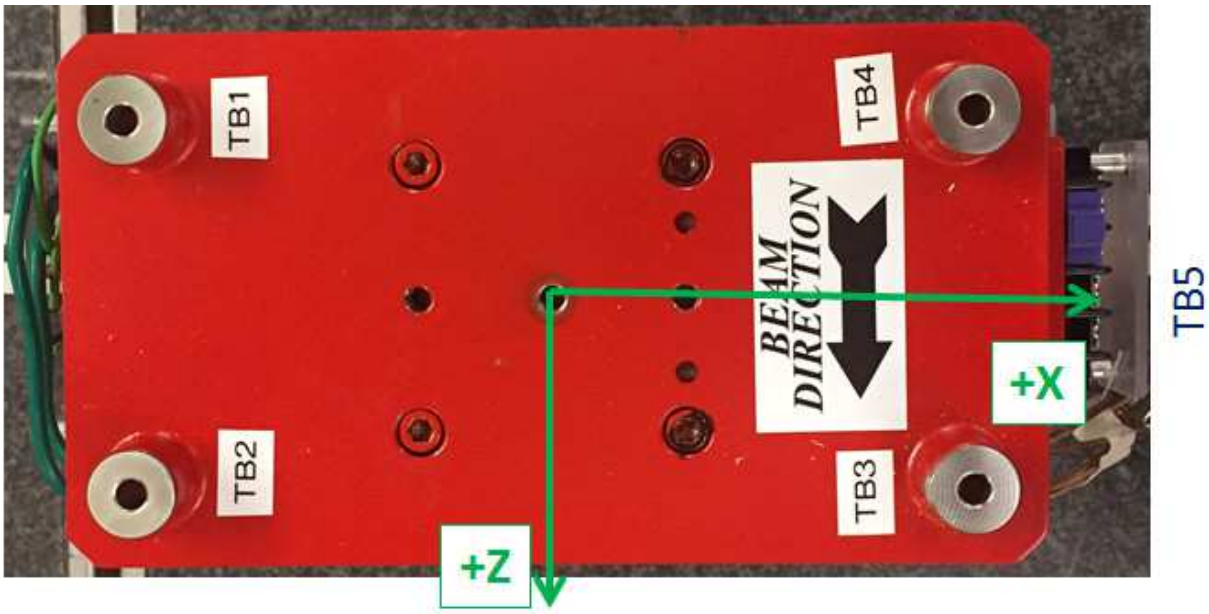
Tooling Ball Locations



Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36510	6.80725	-1.49591
TB 2	-3.37650	6.81101	1.50577
TB 3	3.36985	6.81562	1.52981
TB 4	3.38247	6.81248	-1.47176
TB 5	6.58765	0.12298	0.03275
TB A	-3.36435	6.11858	-1.49312
TB B	-3.37644	6.12108	1.50811
TB C	3.37073	6.12553	1.53098
TB D	3.38178	6.12406	-1.46945
TB E	5.89993	0.12404	0.03329

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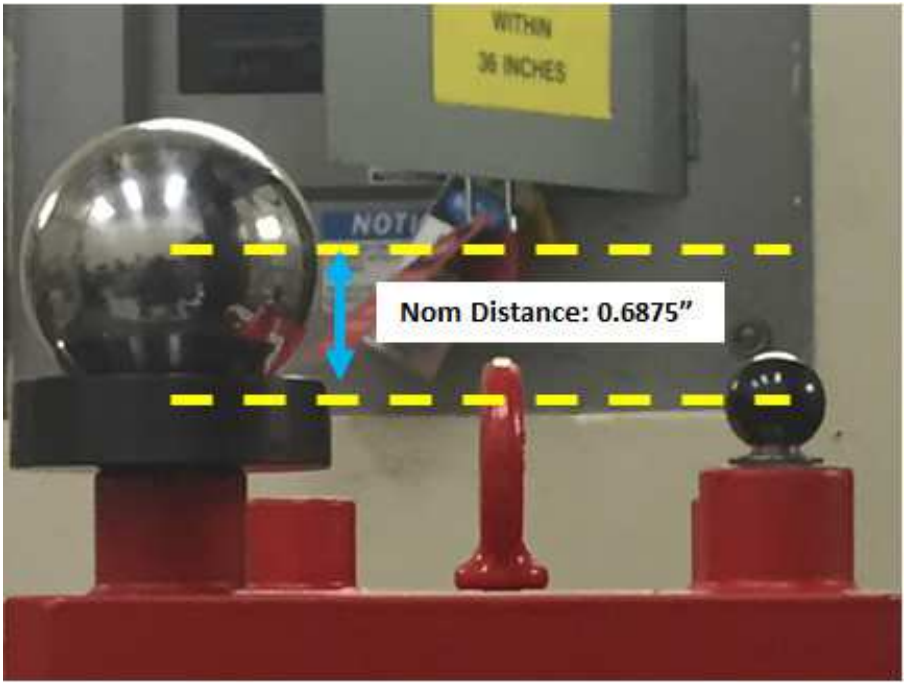
1" Tooling Ball to 5/16" Tooling Ball Difference



Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68868
TB 2	0.6875 ± 0.001	0.68993
TB 3	0.6875 ± 0.001	0.69009
TB 4	0.6875 ± 0.001	0.68843
TB 5	0.6875 ± 0.001	0.68772

Dimensions in Inch

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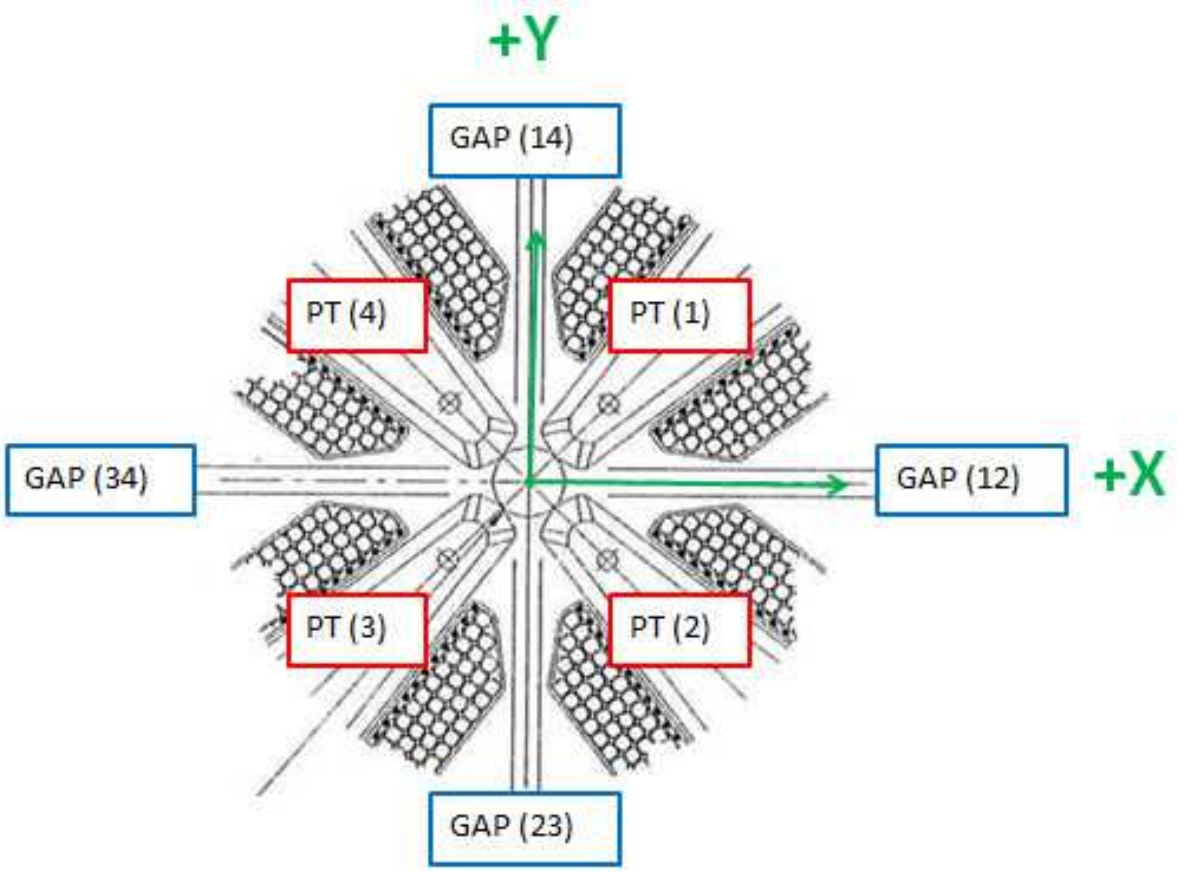
Pole Tip Gap Measurements



	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43258	0.43412
Pole Tip Distance 2-4	0.433 ± .002	0.43448	0.43301
Gap 1-2	0.159 ± .002	0.15961	0.15631
Gap 2-3	0.159 ± .002	0.15959	0.16121
Gap 3-4	0.159 ± .002	0.1572	0.16103
Gap 4-1	0.159 ± .002	0.15746	0.15886

Dimensions in Inch

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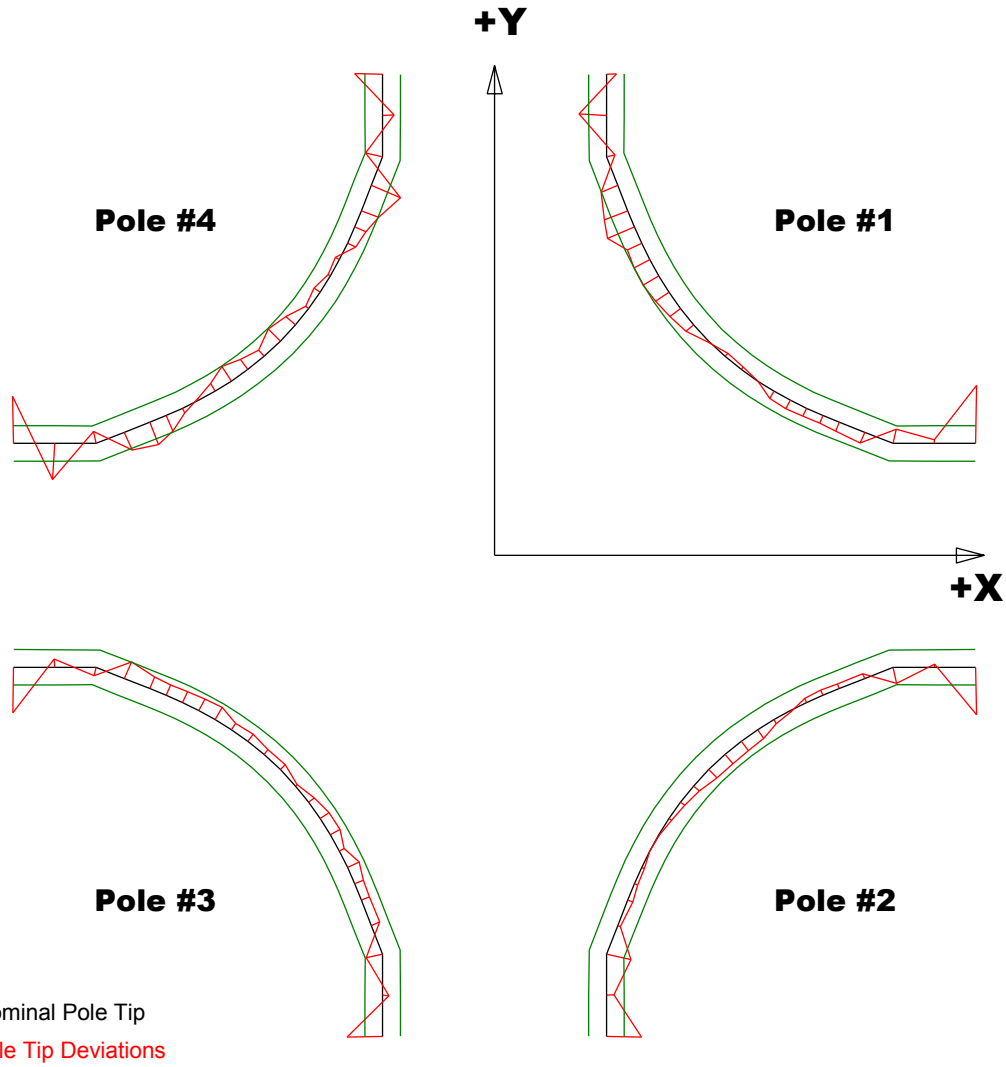
Composite Best-fit of Pole Tips, Downstream



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.	-0.00328	-0.00266	-0.00256	-0.00267
Max. Dev.	0.00164	0.00031	0.00101	0.00204

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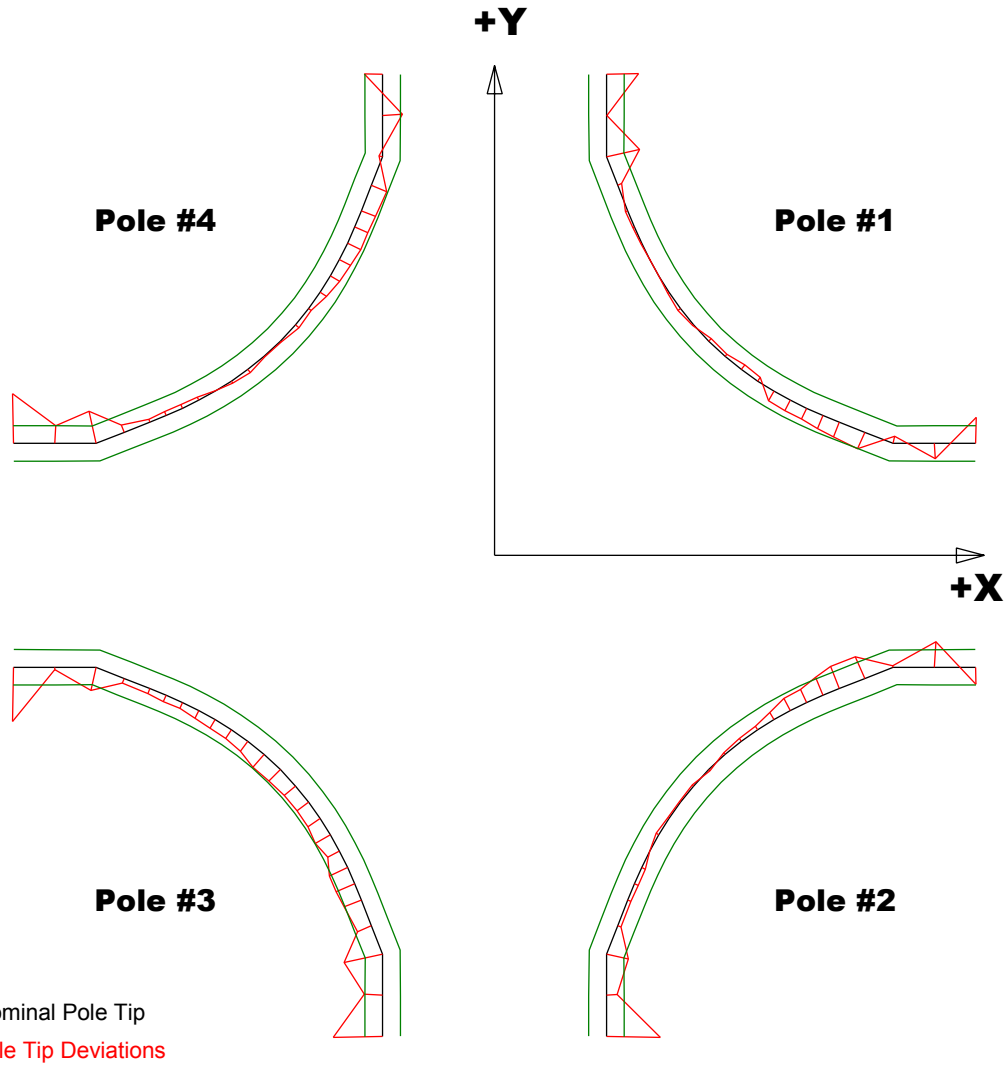
Composite Best-fit of Pole Tips, Upstream



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.	-0.0019	-0.00303	-0.00305	-0.00279
Max. Dev.	0.00101	0.00143	-0.00013	0.00111

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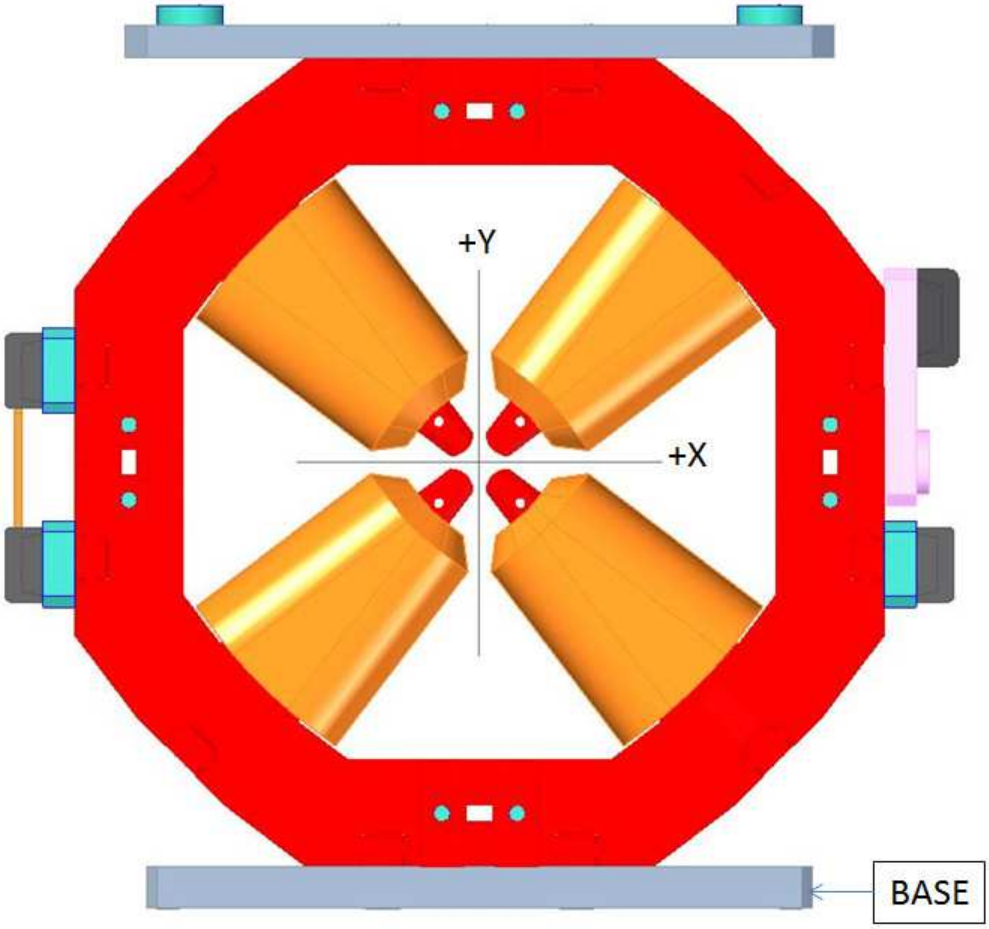
Angle of the Composite Pole Tip Best-Fit In Relation to Base



Angle in Decimal Degrees ° :-0.02830

Angle in Milliradians :-0.49396

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