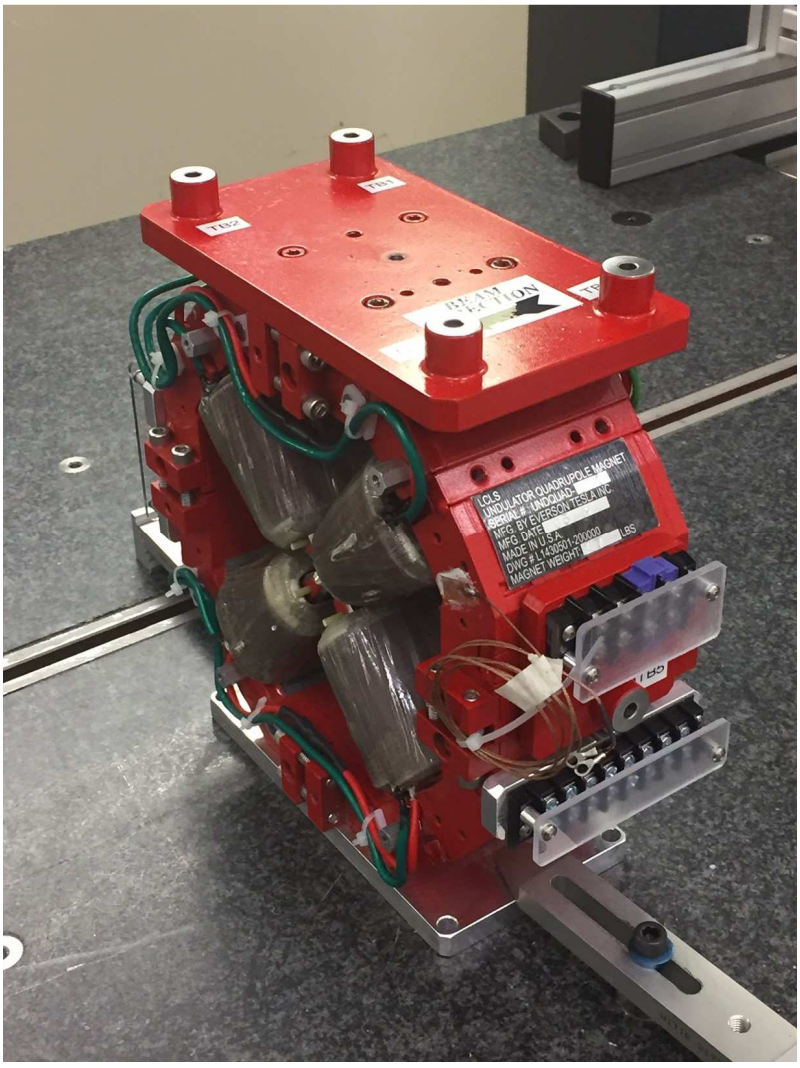
LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4083
Mfg. S/N : 016

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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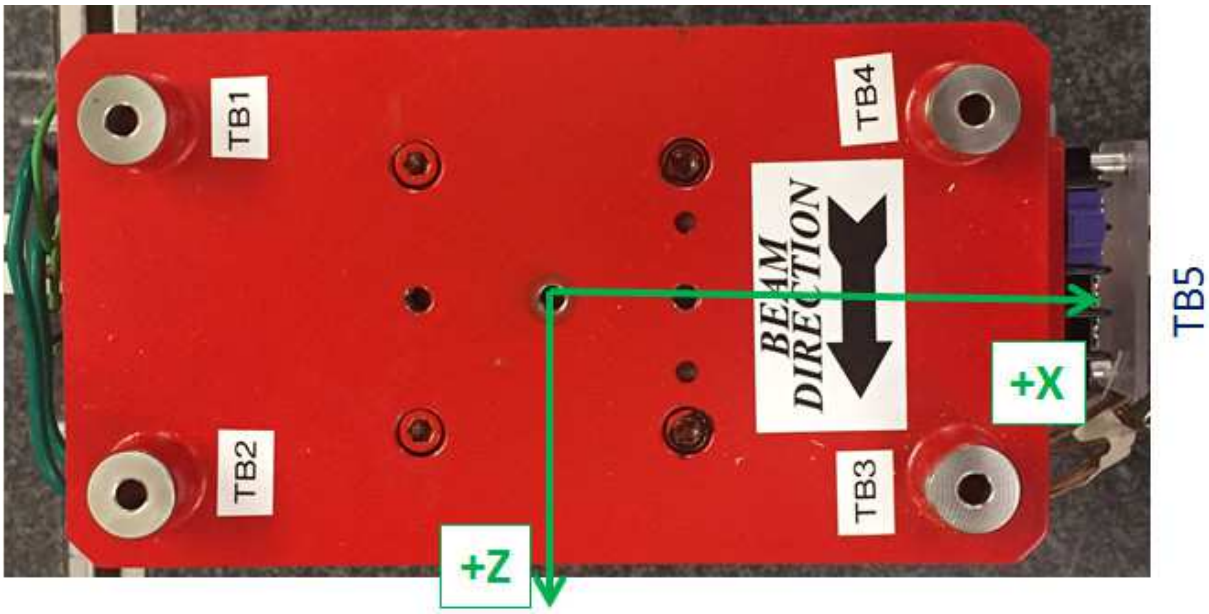
Tooling Ball Locations



Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37648	6.81168	-1.45555
TB 2	-3.37101	6.81398	1.54493
TB 3	3.37121	6.81411	1.53152
TB 4	3.36453	6.81469	-1.46872
TB 5	6.58724	0.12625	0.02416
TB A	-3.37763	6.12461	-1.45443
TB B	-3.37223	6.12702	1.54484
TB C	3.37237	6.12713	1.53032
TB D	3.36630	6.12760	-1.46887
TB E	5.89957	0.12743	0.02426

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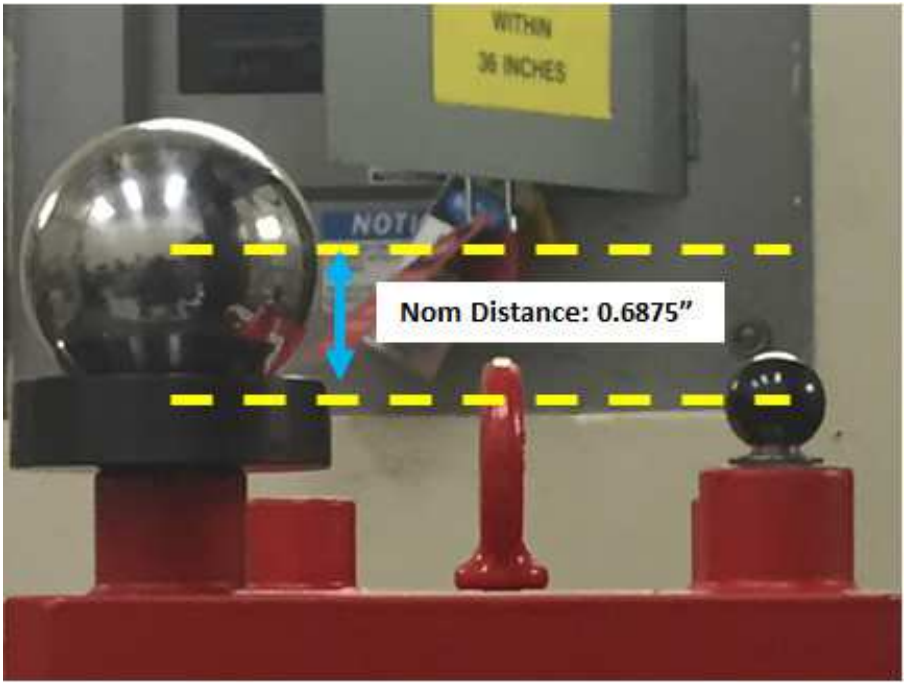
1" Tooling Ball to 5/16" Tooling Ball Difference



Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68707
TB 2	0.6875 ± 0.001	0.68696
TB 3	0.6875 ± 0.001	0.68698
TB 4	0.6875 ± 0.001	0.68709
TB 5	0.6875 ± 0.001	0.68767

Dimensions in Inch

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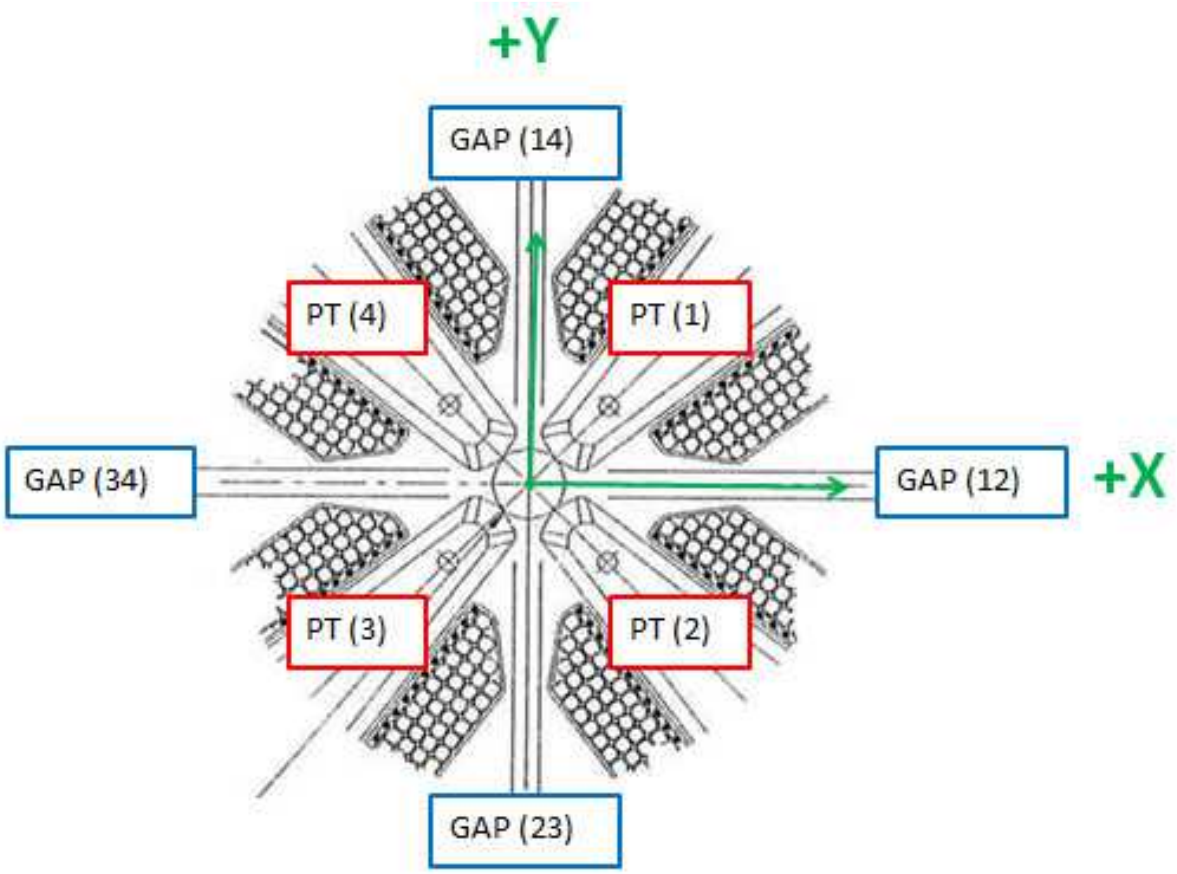
Pole Tip Gap Measurements



	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43313	0.43212
Pole Tip Distance 2-4	0.433 ± .002	0.43443	0.4357
Gap 1-2	0.159 ± .002	0.16047	0.16155
Gap 2-3	0.159 ± .002	0.16126	0.15746
Gap 3-4	0.159 ± .002	0.15778	0.16198
Gap 4-1	0.159 ± .002	0.1594	0.15872

Dimensions in Inch

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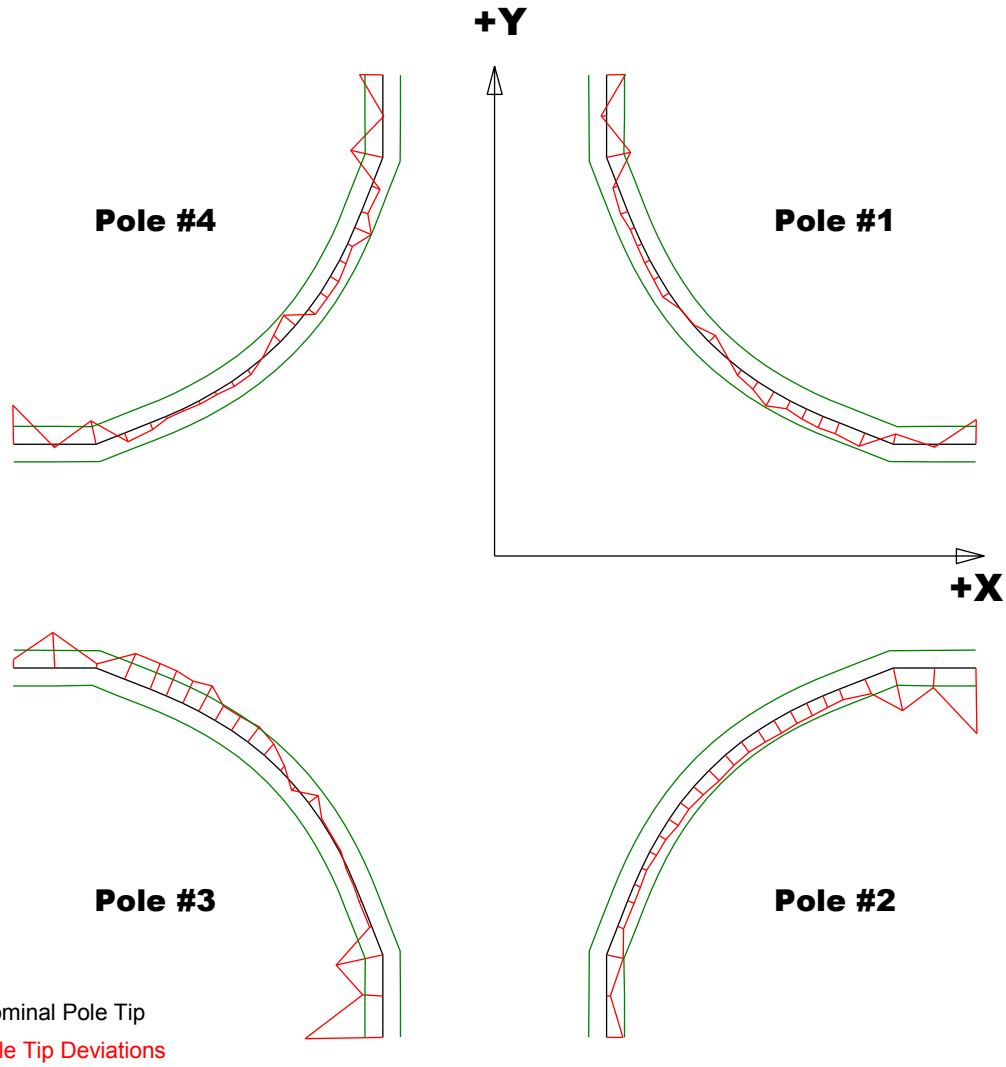
Composite Best-fit of Pole Tips, Downstream



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.	-0.00138	-0.00369	-0.00437	-0.00218
Max. Dev.	0.00092	-0.00021	0.00201	0.00101

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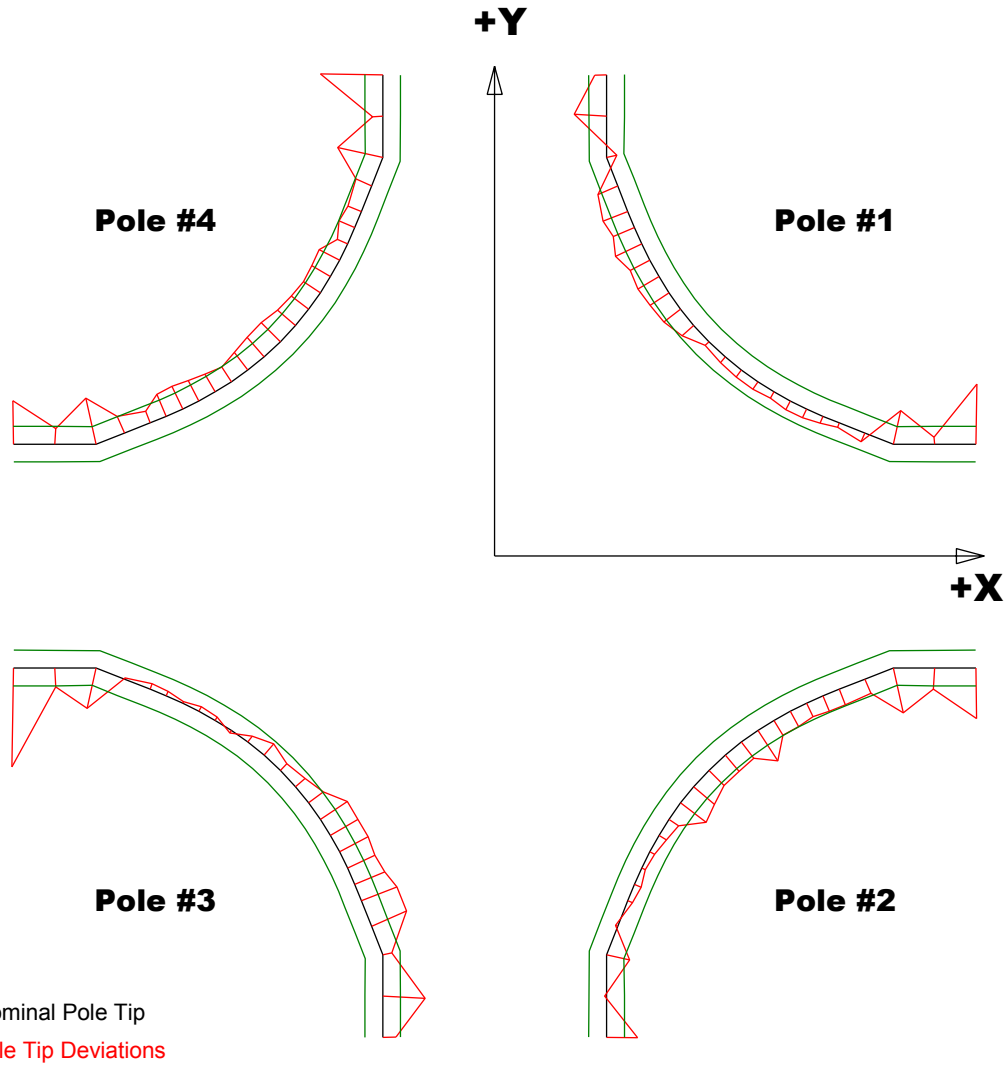
Composite Best-fit of Pole Tips, Upstream



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.	-0.00339	-0.00284	-0.00557	-0.00351
Max. Dev.	0.00182	0.00013	0.00239	-0.00056

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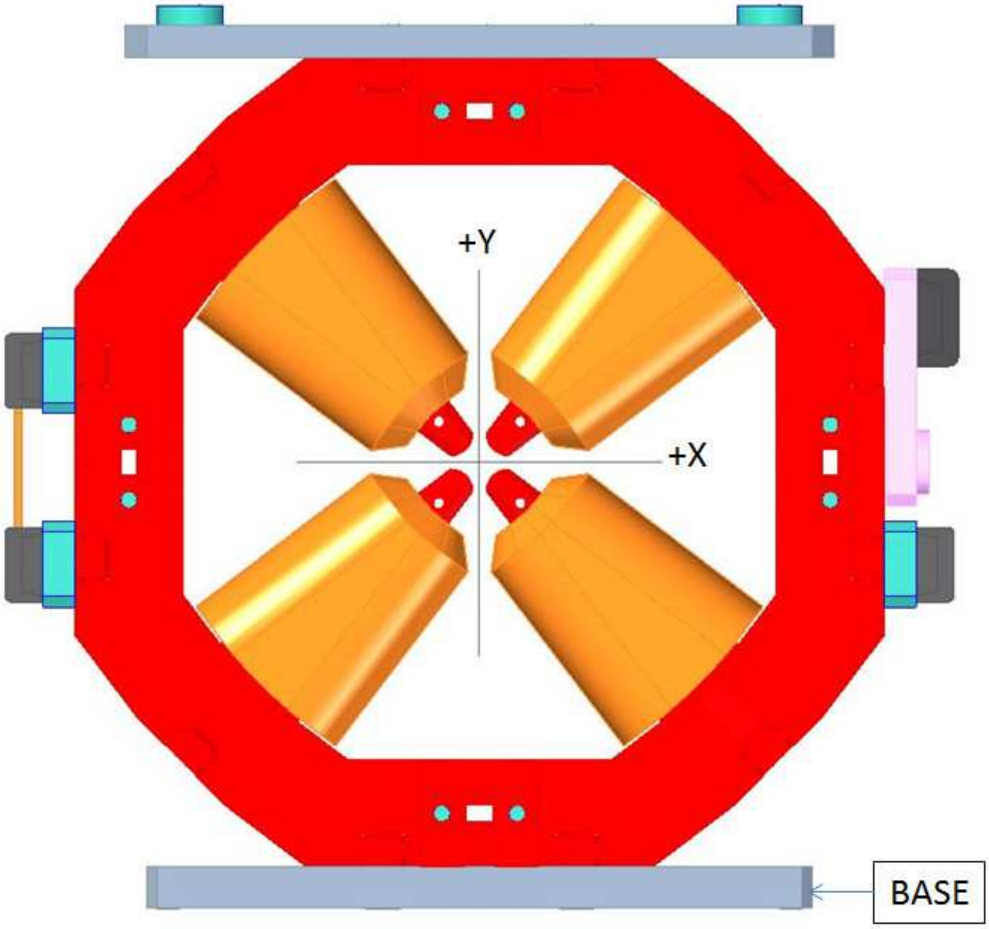
Angle of the Composite Pole Tip Best-Fit In Relation to Base



Angle in Decimal Degrees ° :0.01852

Angle in Milliradians :0.32321

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