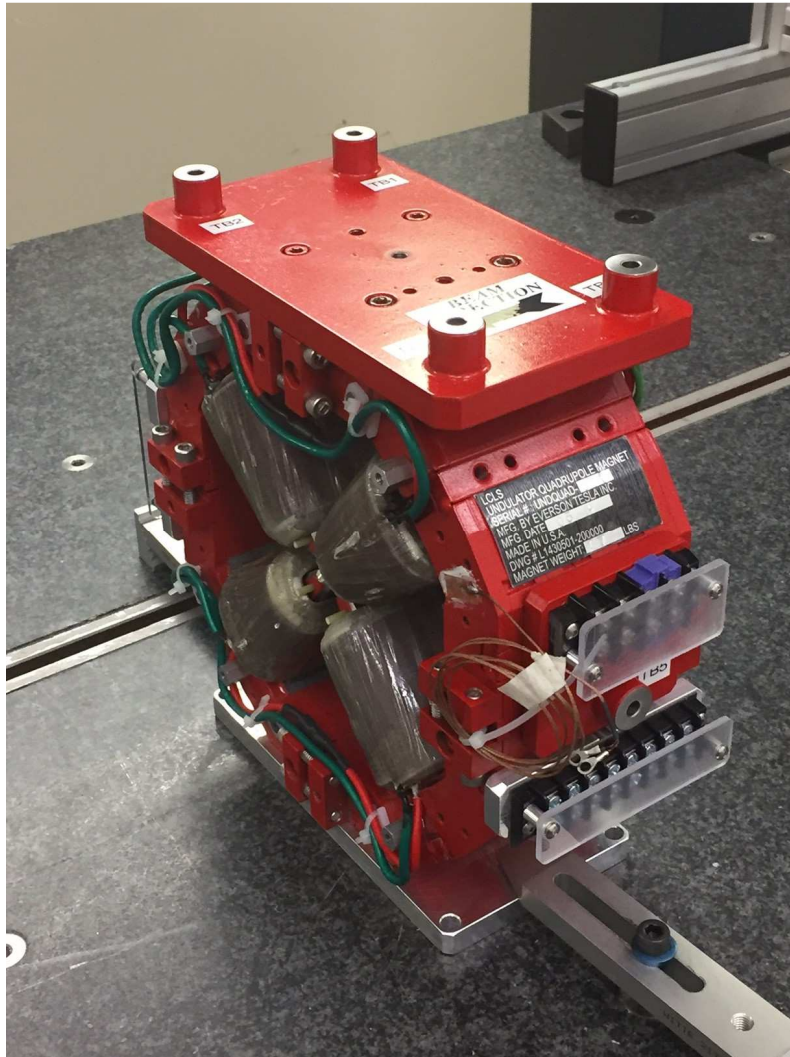


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4089
Mfg. S/N : 021

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.

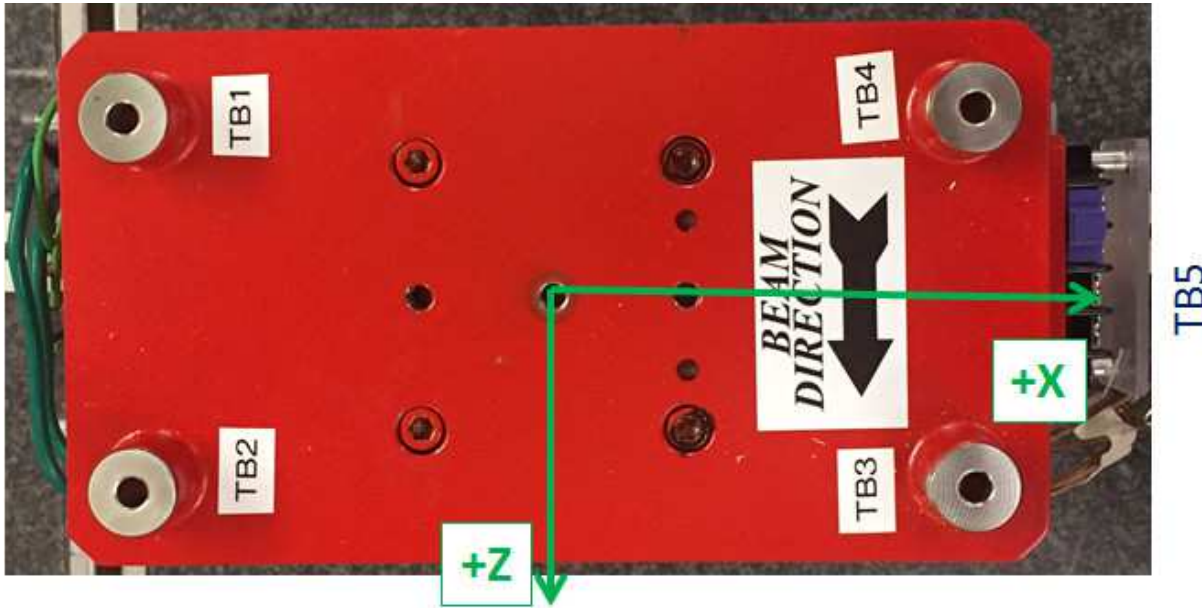
Coordinate Origins

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.

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Tooling Ball Locations



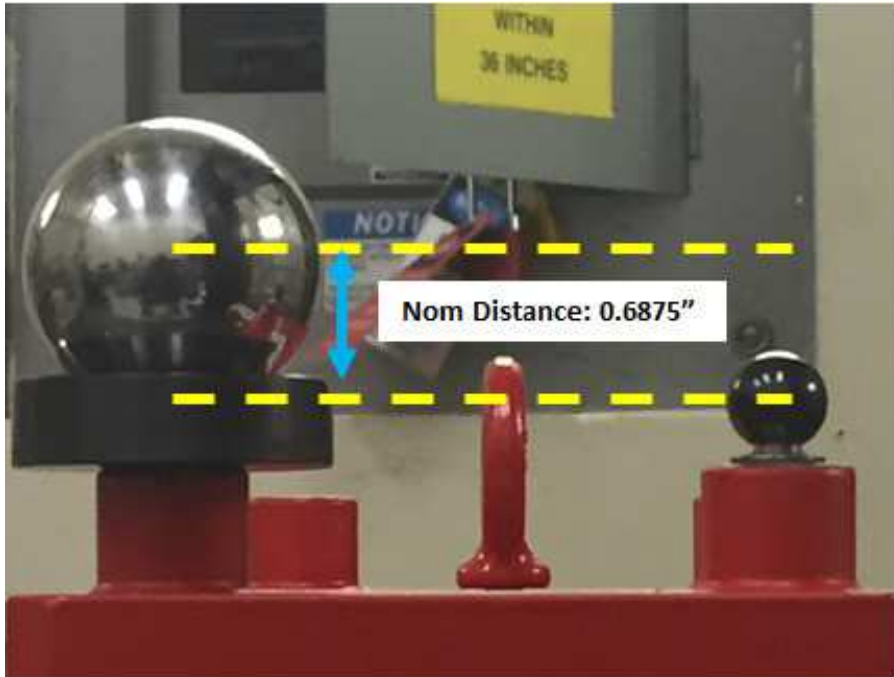
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37084	6.81285	-1.53063
TB 2	-3.37243	6.81570	1.47041
TB 3	3.37680	6.81371	1.46773
TB 4	3.37705	6.81317	-1.52522
TB 5	6.58799	0.12516	-0.03087
TB A	-3.37125	6.12648	-1.52965
TB B	-3.37336	6.12872	1.47147
TB C	3.37750	6.12609	1.47212
TB D	3.37673	6.12288	-1.52697
TB E	5.90033	0.12701	-0.03214

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



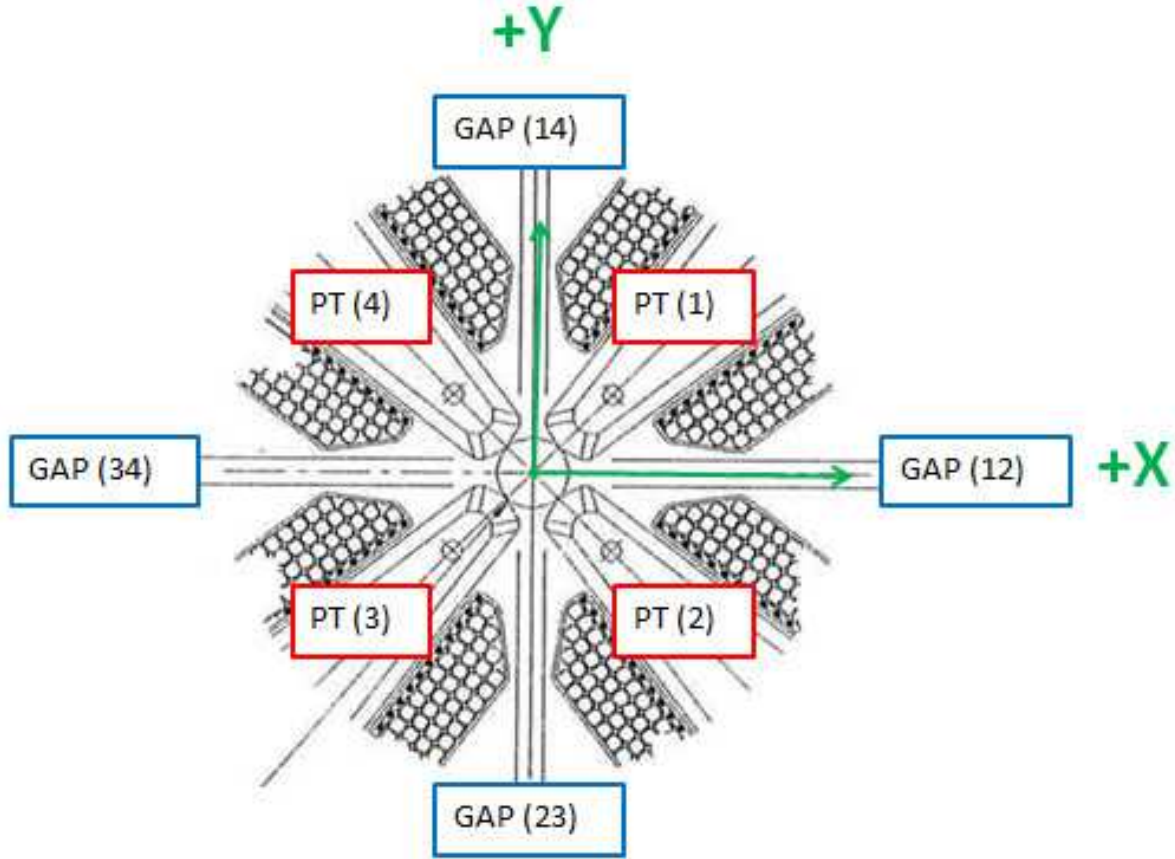
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68638
TB 2	0.6875 ± 0.001	0.68698
TB 3	0.6875 ± 0.001	0.68764
TB 4	0.6875 ± 0.001	0.69029
TB 5	0.6875 ± 0.001	0.68766

Dimensions in Inch

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Pole Tip Gap Measurements



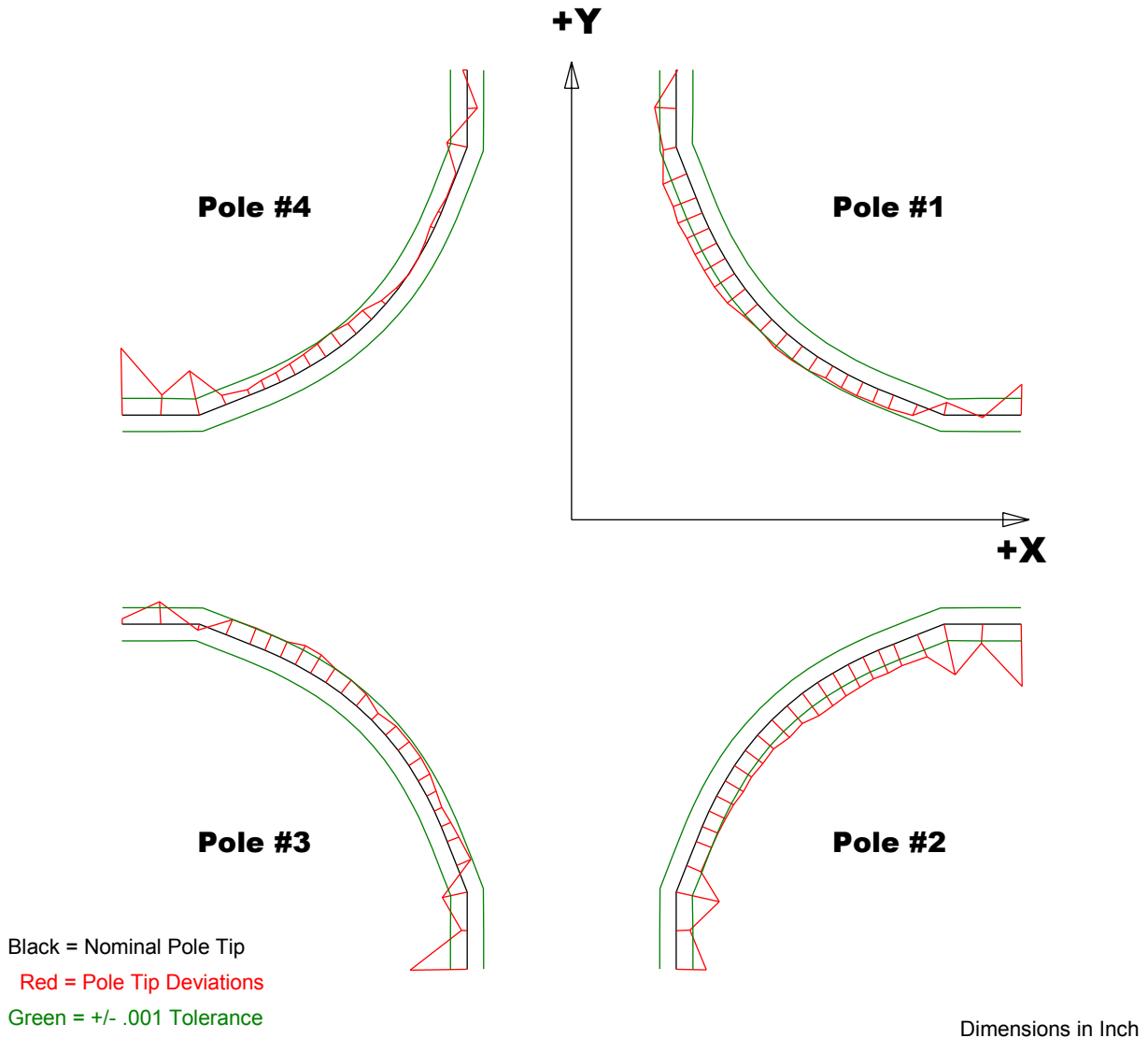
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43141	0.43366
Pole Tip Distance 2-4	0.433 ± .002	0.43521	0.43287
Gap 1-2	0.159 ± .002	0.16102	0.15975
Gap 2-3	0.159 ± .002	0.1611	0.16011
Gap 3-4	0.159 ± .002	0.1598	0.15928
Gap 4-1	0.159 ± .002	0.15795	0.16077

Dimensions in Inch

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Composite Best-fit of Pole Tips, Downstream



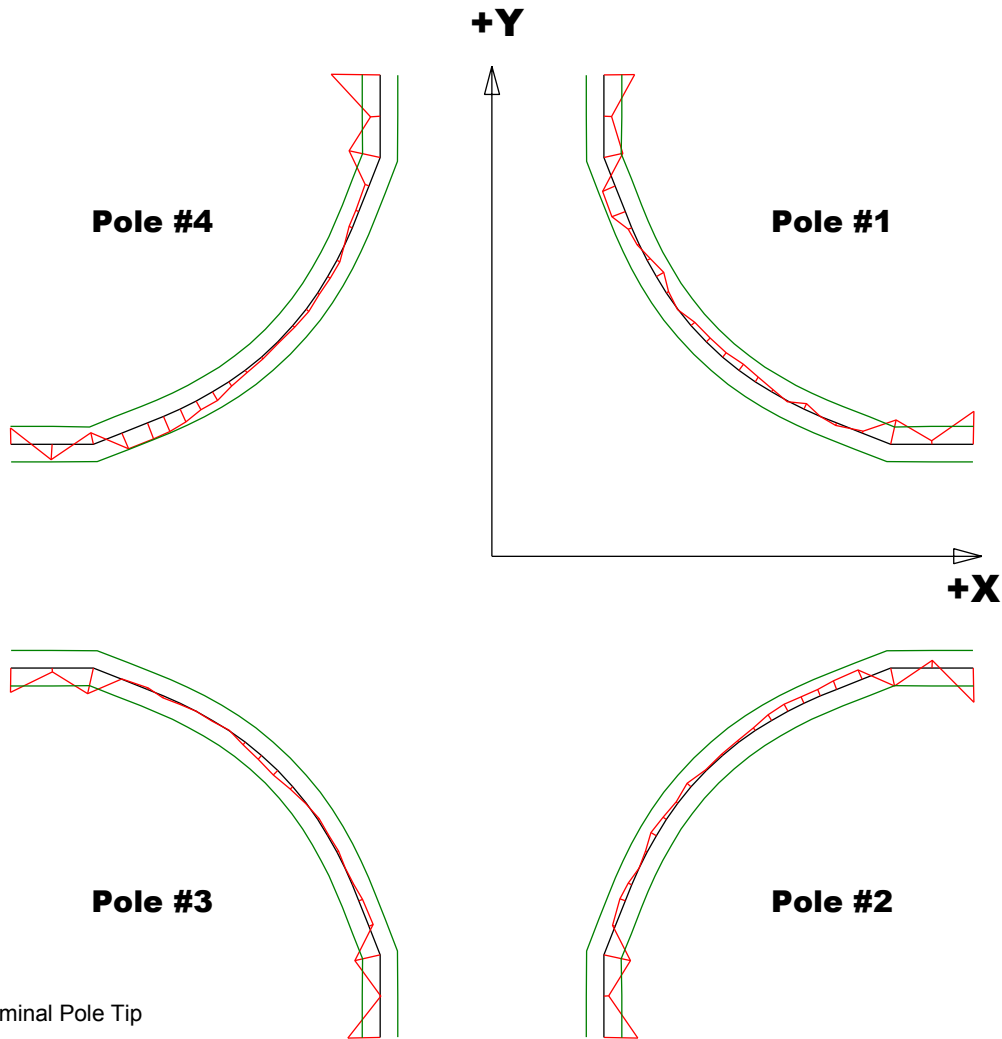
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00186	-0.00374	-0.00343	-0.00403
Max. Dev.	0.00159	-0.00082	0.00135	0.00061

Barcode # : 4089

Mfg. S/N : 021

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

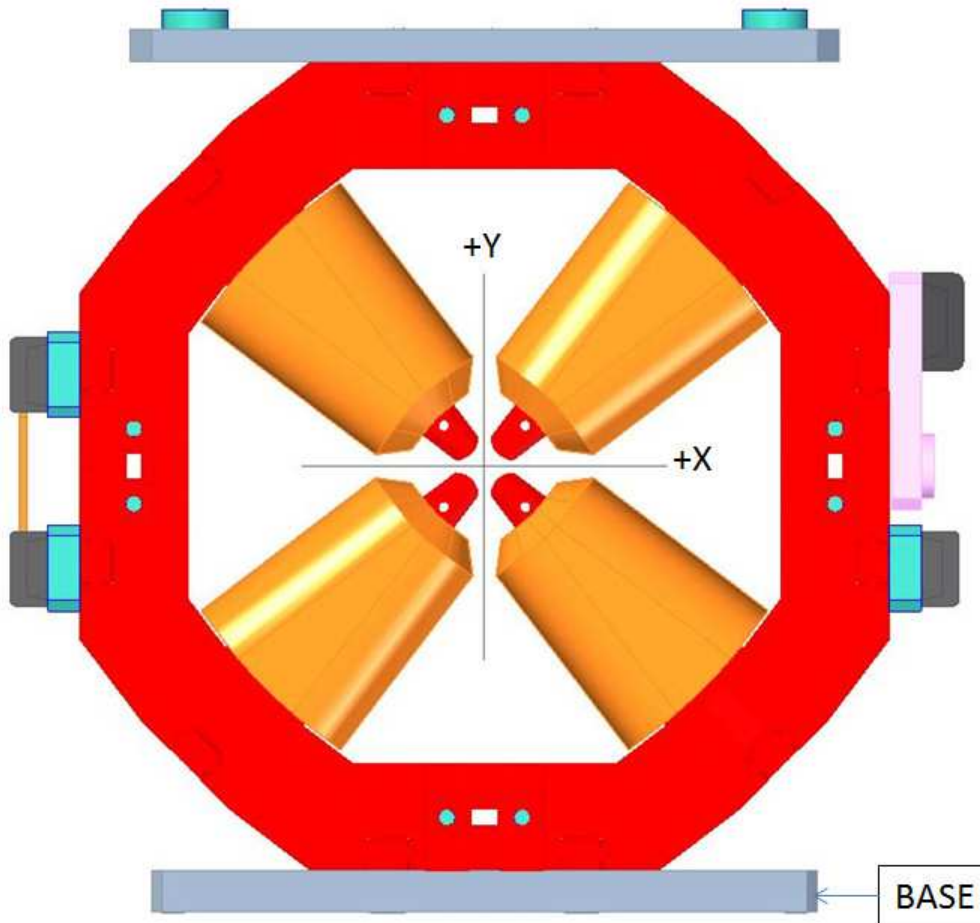
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00186	-0.00191	-0.00181	-0.00275
Max. Dev.	0.00081	0.00058	0.00026	0.00097

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



Angle in Decimal Degrees ° :0.00055

Angle in Milliradians :0.00954

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