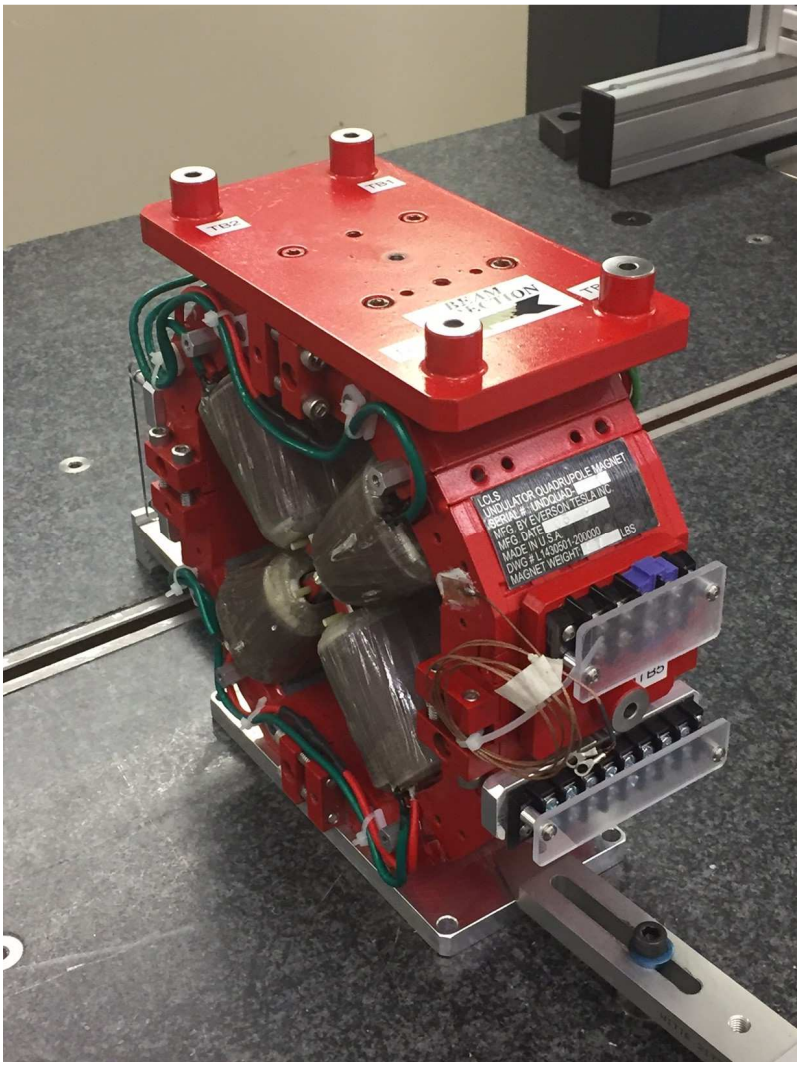
LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban

Engineer : J. Amann

Drawing No. : SA-381-012-22

Barcode # : 4086

Mfg. S/N : 015

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.

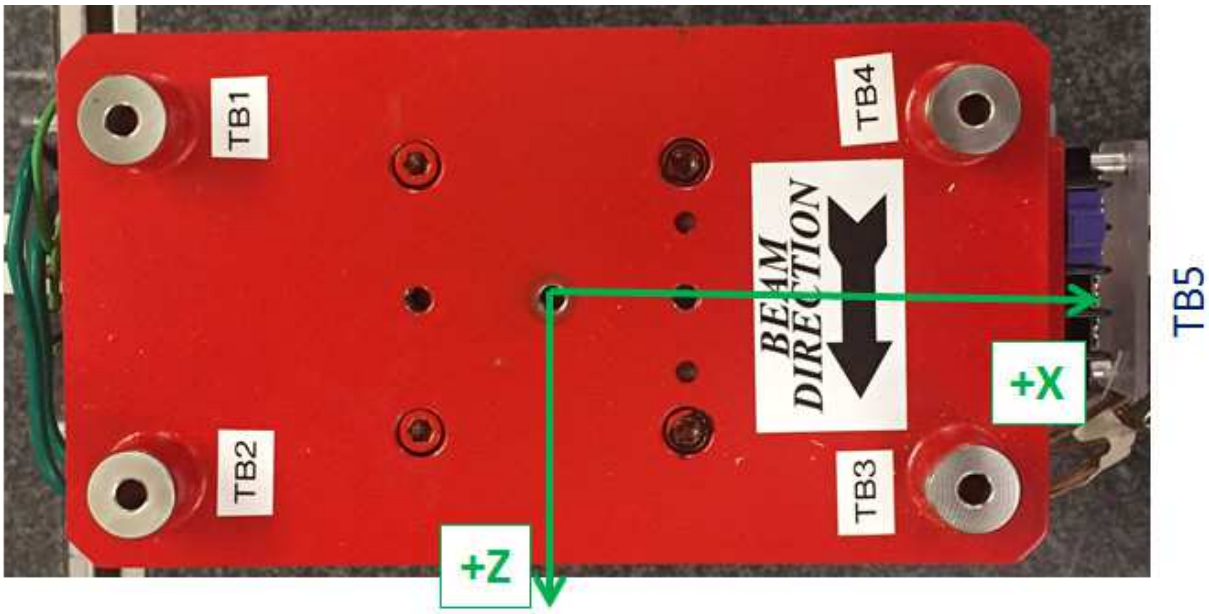
Coordinate Origins

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.

Barcode # : 4086

Mfg. S/N : 015

Tooling Ball Locations



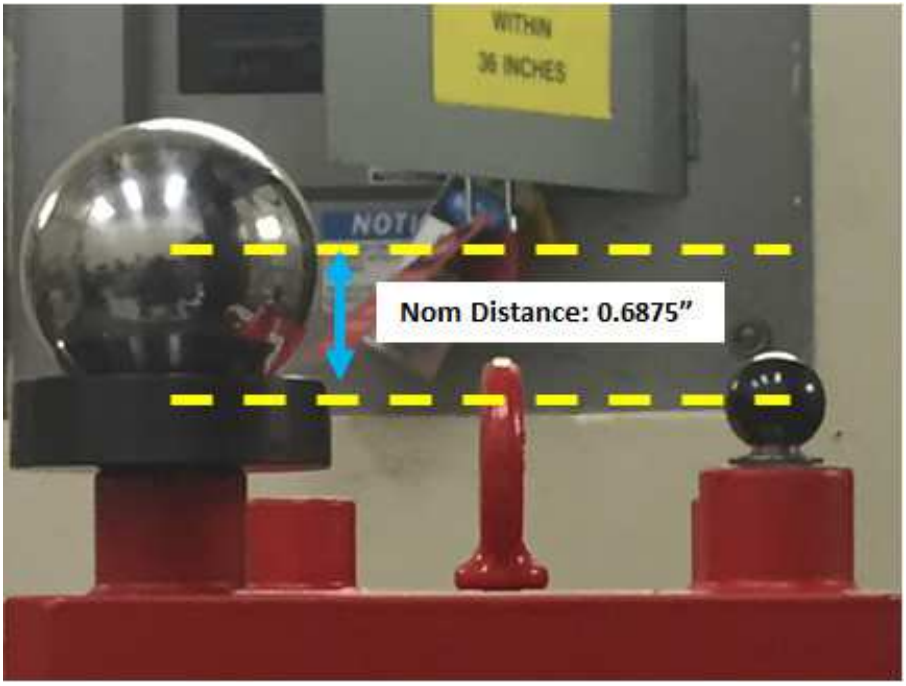
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37772	6.81254	-1.44907
TB 2	-3.36713	6.80651	1.54963
TB 3	3.37762	6.80575	1.52893
TB 4	3.36673	6.80733	-1.47363
TB 5	6.58854	0.12940	0.03641
TB A	-3.37698	6.12534	-1.45078
TB B	-3.36721	6.11882	1.54908
TB C	3.37946	6.11840	1.52642
TB D	3.36875	6.11954	-1.47444
TB E	5.90122	0.13163	0.03471

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

Barcode # : 4086

Mfg. S/N : 015

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



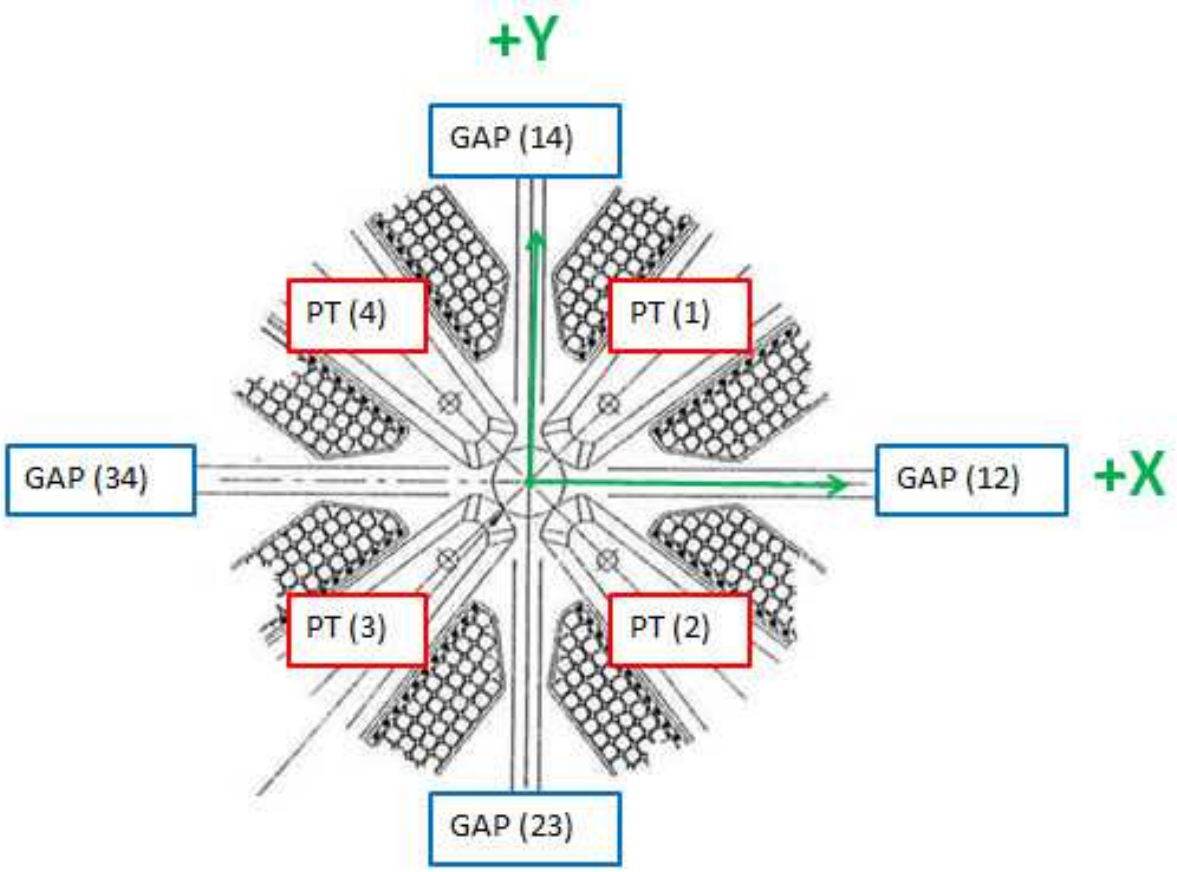
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68721
TB 2	0.6875 ± 0.001	0.68769
TB 3	0.6875 ± 0.001	0.68736
TB 4	0.6875 ± 0.001	0.6878
TB 5	0.6875 ± 0.001	0.68733

Dimensions in Inch

Barcode # : 4086

Mfg. S/N : 015

Pole Tip Gap Measurements



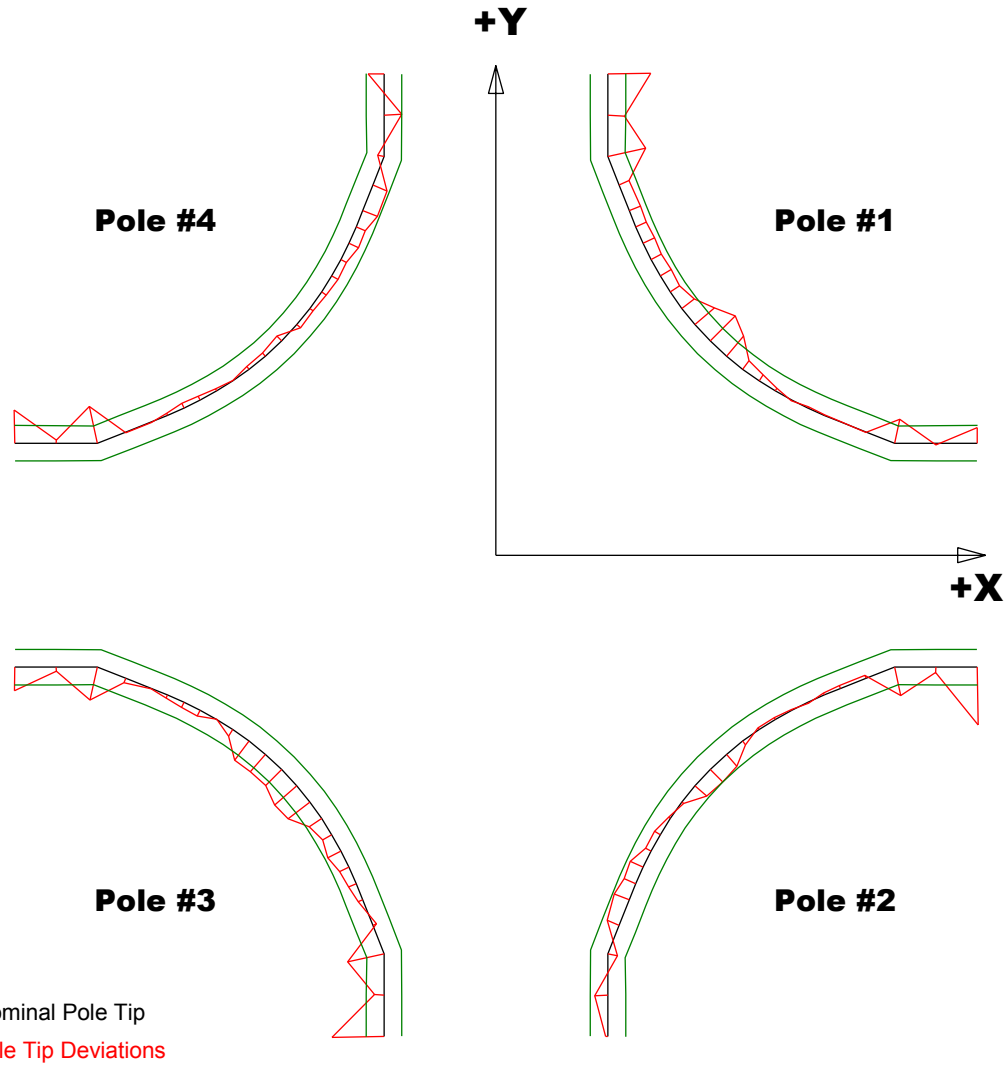
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43615	0.43447
Pole Tip Distance 2-4	0.433 ± .002	0.43431	0.43433
Gap 1-2	0.159 ± .002	0.16	0.16208
Gap 2-3	0.159 ± .002	0.15944	0.15819
Gap 3-4	0.159 ± .002	0.16031	0.15975
Gap 4-1	0.159 ± .002	0.15959	0.15992

Dimensions in Inch

Barcode # : 4086

Mfg. S/N : 015

Composite Best-fit of Pole Tips, Downstream



Black = Nominal Pole Tip

Red = Pole Tip Deviations

Green = +/- .001 Tolerance

Dimensions in Inch

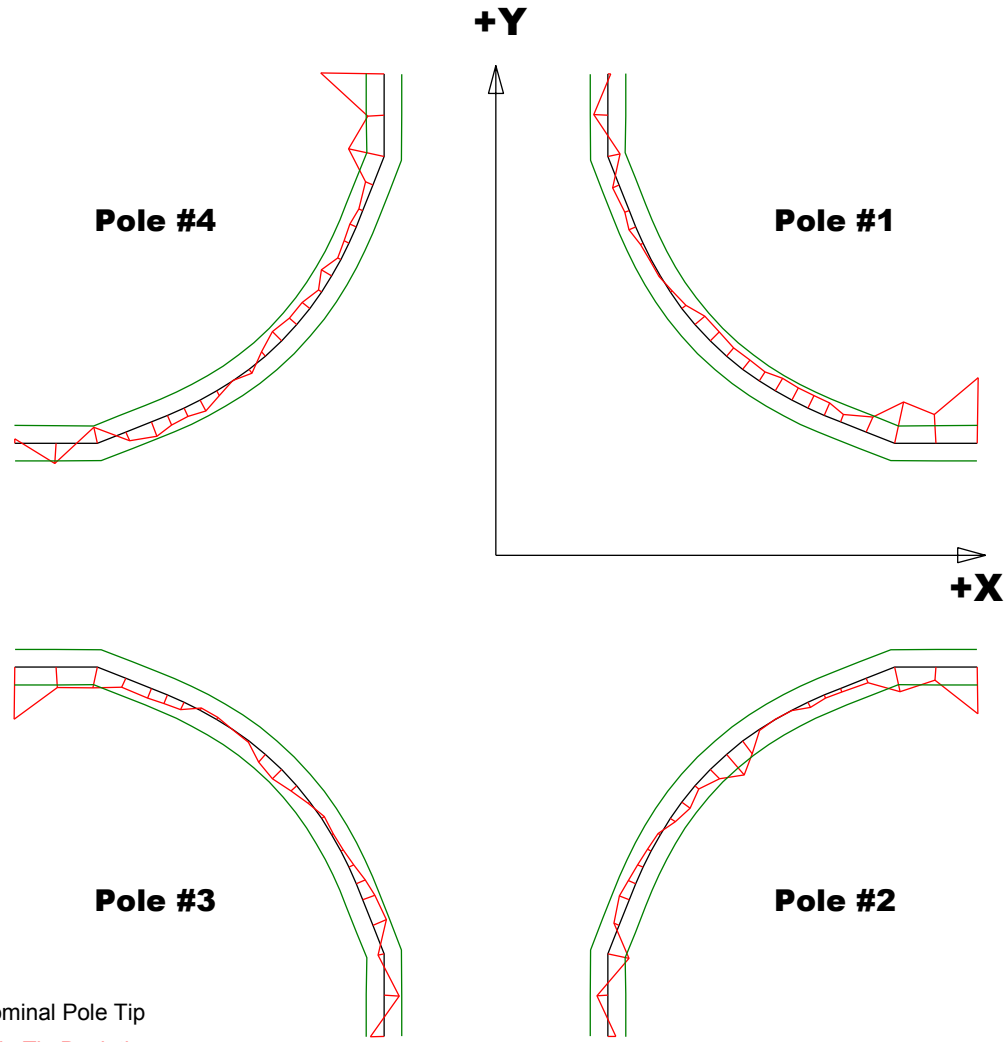
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.0024	-0.00325	-0.00293	-0.00212
Max. Dev.	0.00009	0.0009	0.00022	0.00099

Barcode # : 4086

Mfg. S/N : 015

Composite Best-fit of Pole Tips, Upstream



Black = Nominal Pole Tip

Red = Pole Tip Deviations

Green = +/- .001 Tolerance

Dimensions in Inch

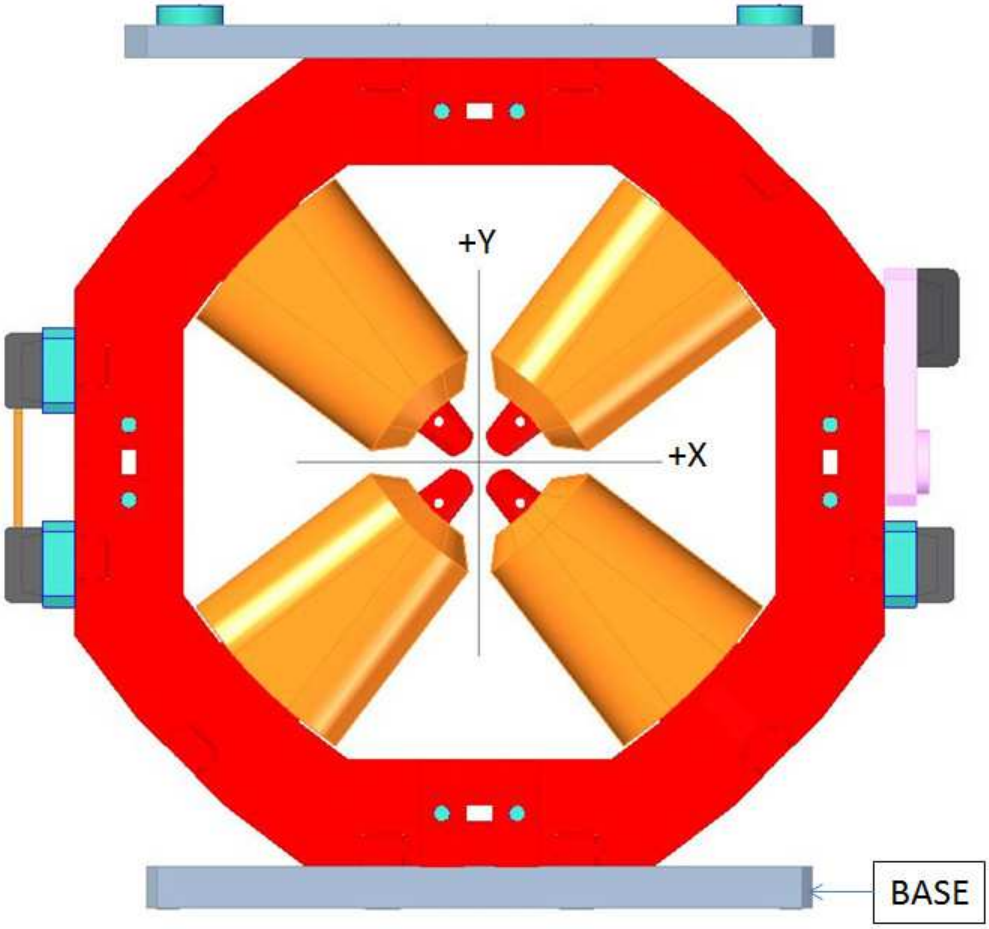
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00369	-0.00262	-0.00293	-0.00357
Max. Dev.	0.00079	0.00062	0.00086	0.00115

Barcode # : 4086

Mfg. S/N : 015

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



Angle in Decimal Degrees ° :-0.02255

Angle in Milliradians :-0.39349

Barcode # : 4086

Mfg. S/N : 015