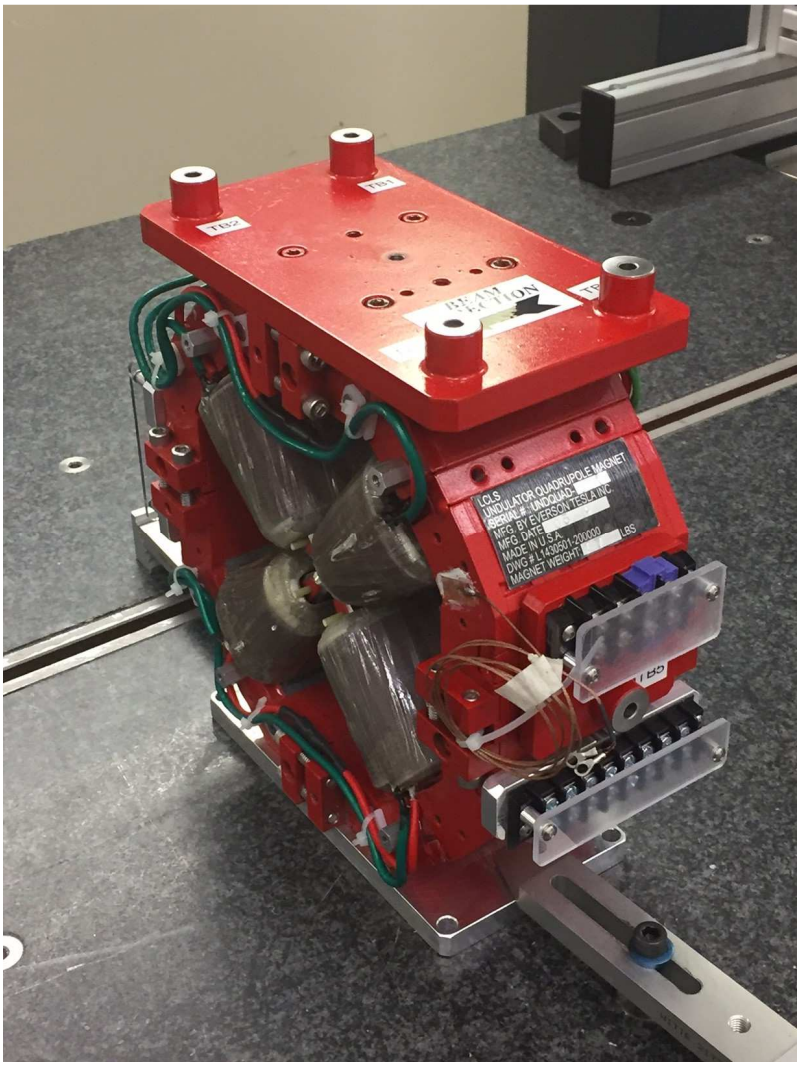
LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban

Engineer : J. Amann

Drawing No. : SA-381-012-22

Barcode # : 4085

Mfg. S/N : 014

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.

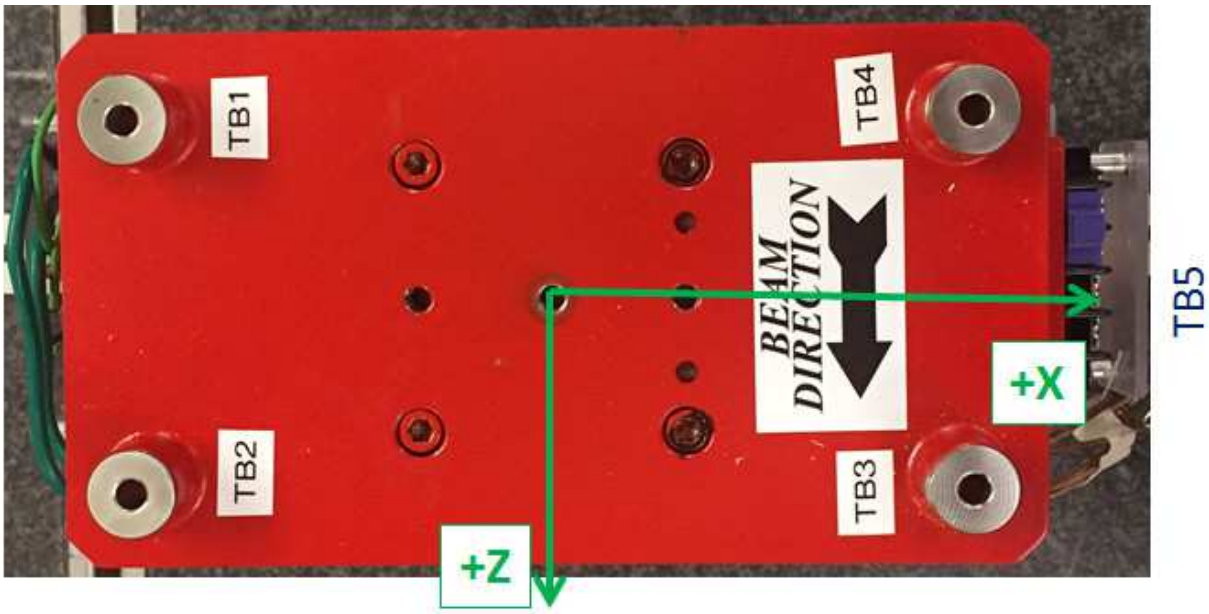
Coordinate Origins

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 # : 4085

Mfg. S/N : 014

Tooling Ball Locations



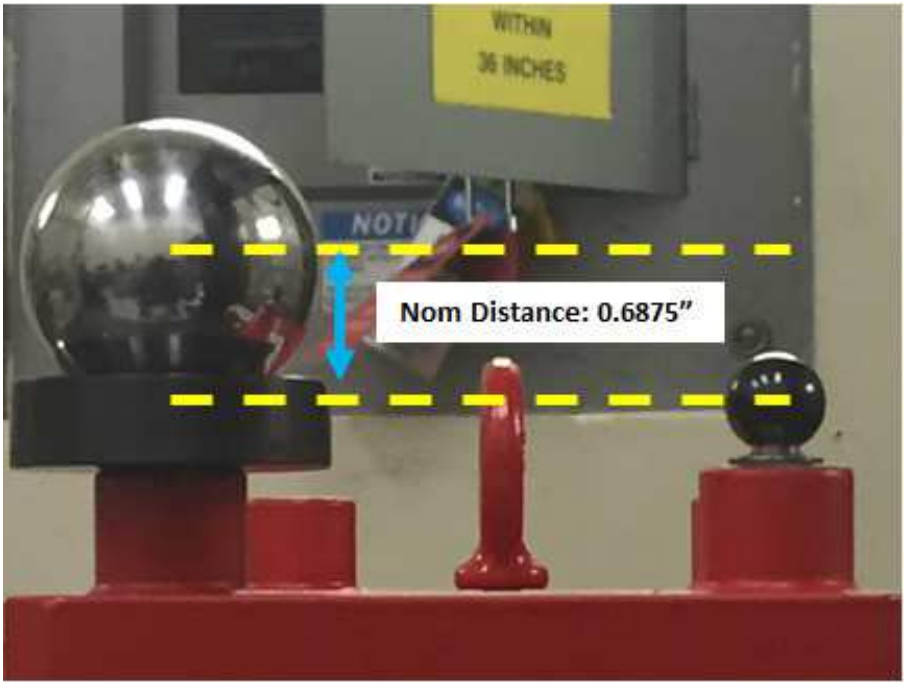
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36682	6.81394	-1.47680
TB 2	-3.36693	6.80947	1.52179
TB 3	3.37823	6.80999	1.52645
TB 4	3.38012	6.80906	-1.47455
TB 5	6.58760	0.12548	0.01746
TB A	-3.36712	6.12697	-1.47836
TB B	-3.36986	6.12089	1.52282
TB C	3.37719	6.12237	1.52619
TB D	3.38006	6.12019	-1.47380
TB E	5.90030	0.12737	0.01641

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 # : 4085

Mfg. S/N : 014

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



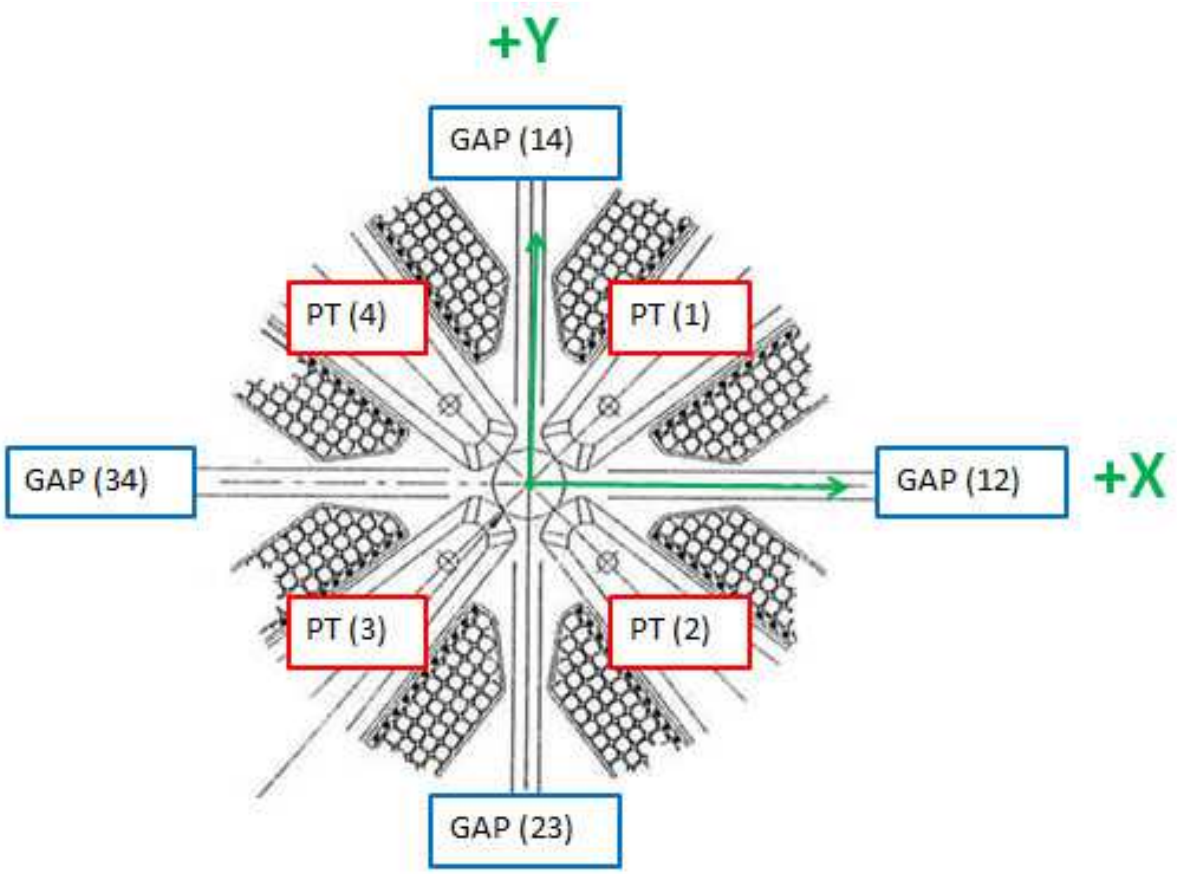
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68697
TB 2	0.6875 ± 0.001	0.68859
TB 3	0.6875 ± 0.001	0.68762
TB 4	0.6875 ± 0.001	0.68887
TB 5	0.6875 ± 0.001	0.6873

Dimensions in Inch

Barcode # : 4085

Mfg. S/N : 014

Pole Tip Gap Measurements



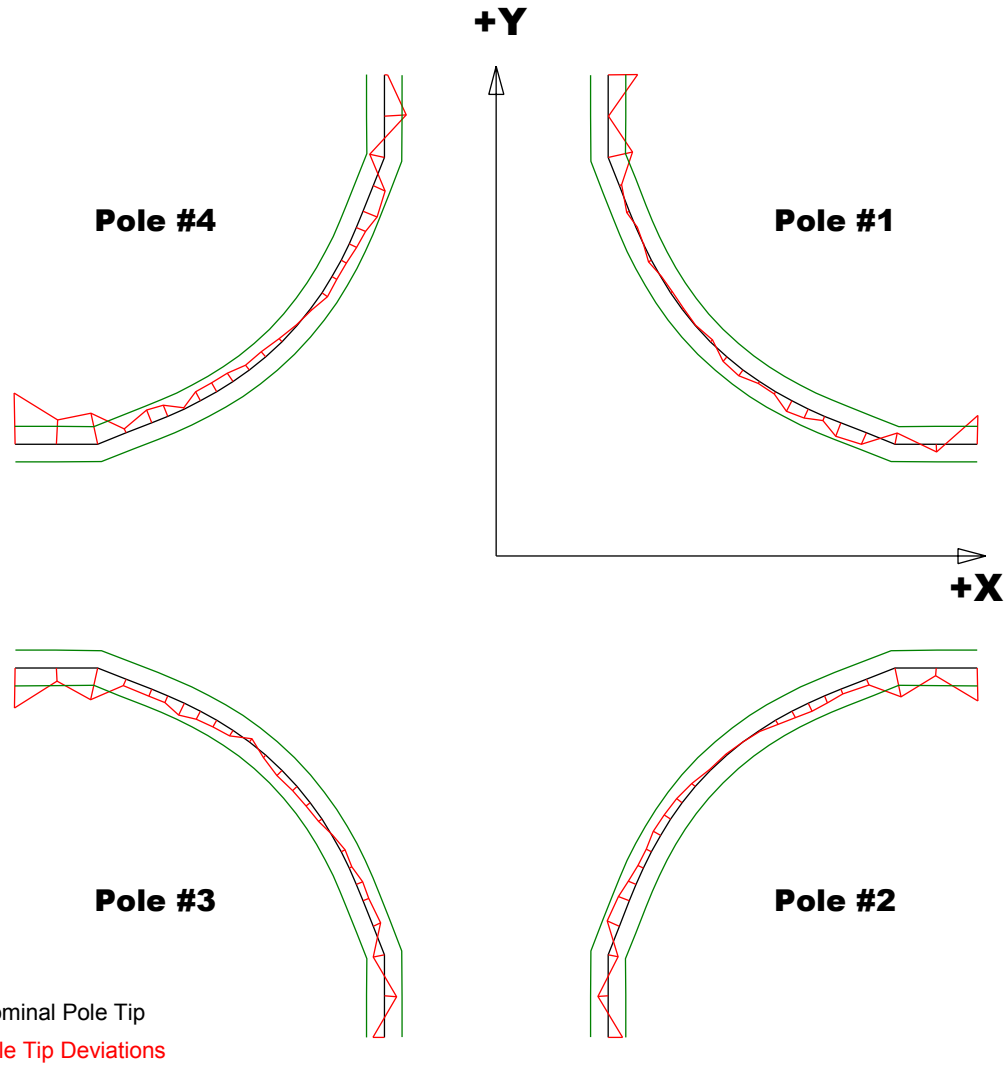
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43343	0.43198
Pole Tip Distance 2-4	0.433 ± .002	0.43312	0.43332
Gap 1-2	0.159 ± .002	0.1598	0.15926
Gap 2-3	0.159 ± .002	0.15869	0.16082
Gap 3-4	0.159 ± .002	0.16132	0.15928
Gap 4-1	0.159 ± .002	0.15806	0.15987

Dimensions in Inch

Barcode # : 4085

Mfg. S/N : 014

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

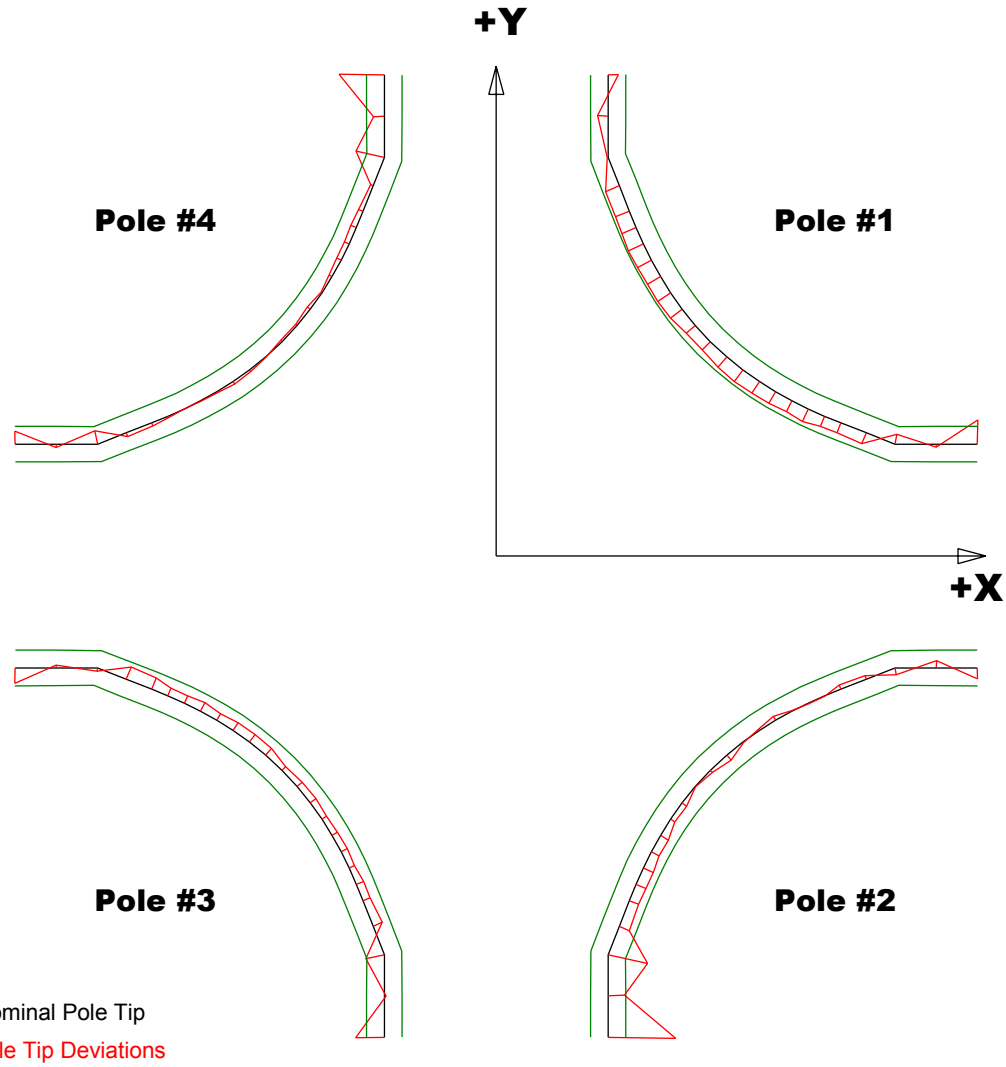
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00166	-0.00186	-0.00225	-0.00287
Max. Dev.	0.0008	0.00074	0.0007	0.00123

Barcode # : 4085

Mfg. S/N : 014

Composite Best-fit of Pole Tips, Upstream



Black = Nominal Pole Tip

Red = Pole Tip Deviations

Green = +/- .001 Tolerance

Dimensions in Inch

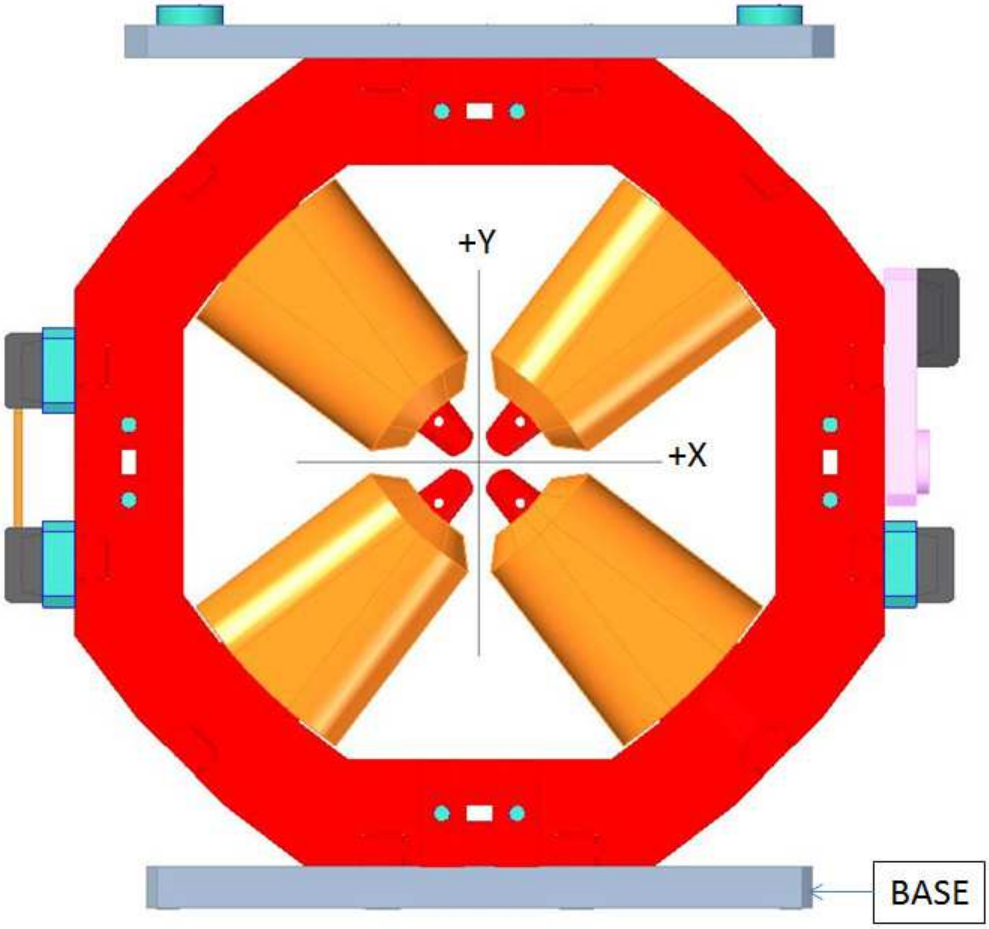
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00136	-0.0038	-0.00162	-0.00255
Max. Dev.	0.00093	0.00041	0.00074	0.00022

Barcode # : 4085

Mfg. S/N : 014

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



Angle in Decimal Degrees ° :0.02162

Angle in Milliradians :0.37734

Barcode # : 4085

Mfg. S/N : 014