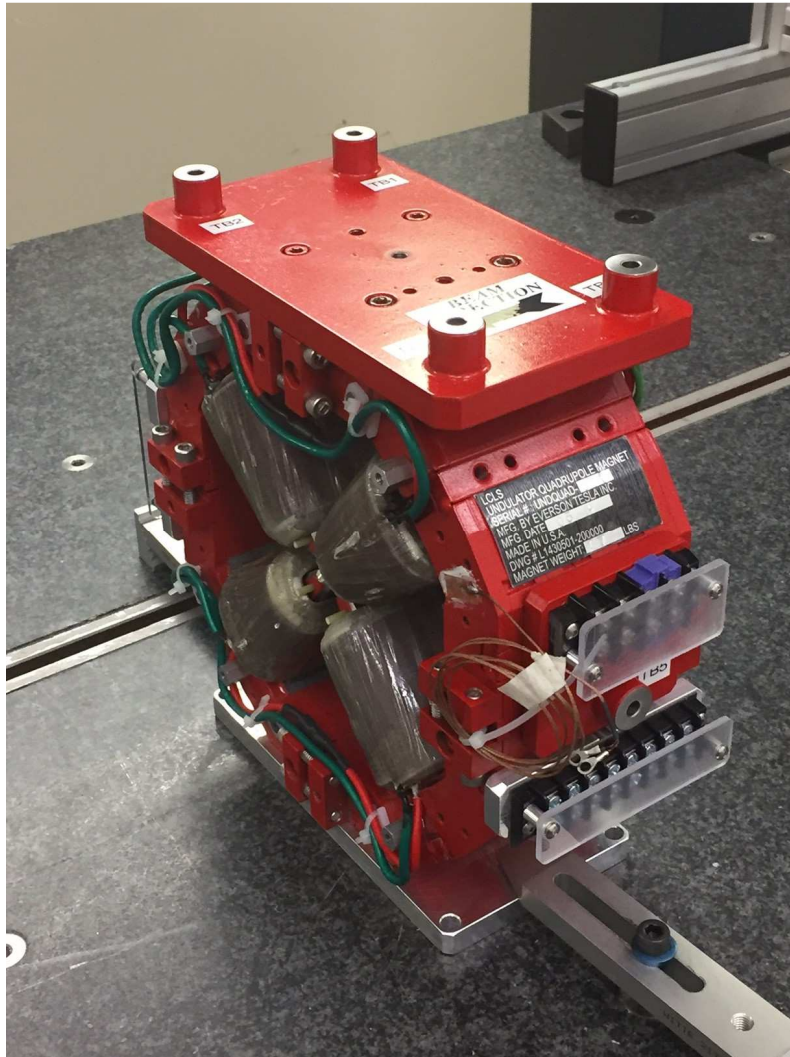


## LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban  
Engineer : J. Amann  
Drawing No. : SA-381-012-22  
Barcode # : 4071  
Mfg. S/N : 008

## **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.

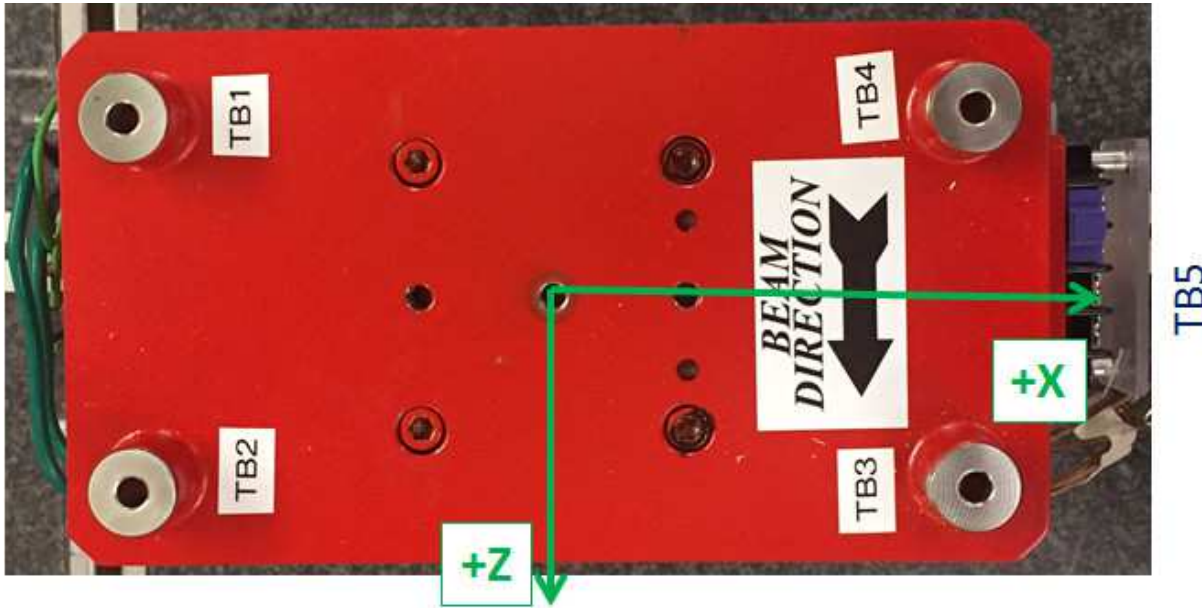
### **Coordinate Origins**

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



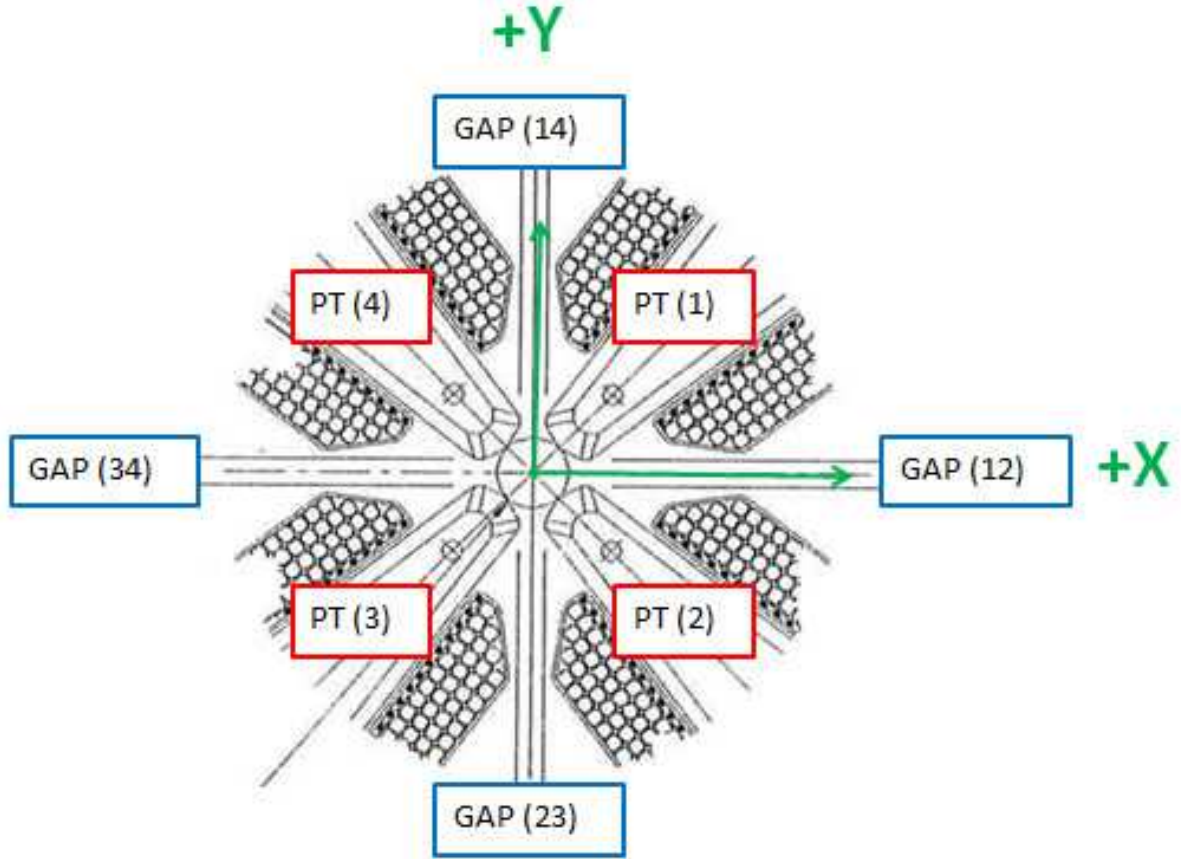
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.37553	6.80130	-1.47245
TB 2	-3.37845	6.80184	1.52379
TB 3	3.37025	6.80690	1.53549
TB 4	3.37310	6.80911	-1.46149
TB 5	6.58948	0.12560	0.01575
TB A	-3.37522	6.11492	-1.47336
TB B	-3.37848	6.11516	1.52548
TB C	3.37069	6.11988	1.53549
TB D	3.37422	6.12283	-1.46357
TB E	5.90162	0.12678	0.01716

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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## Pole Tip Gap Measurements



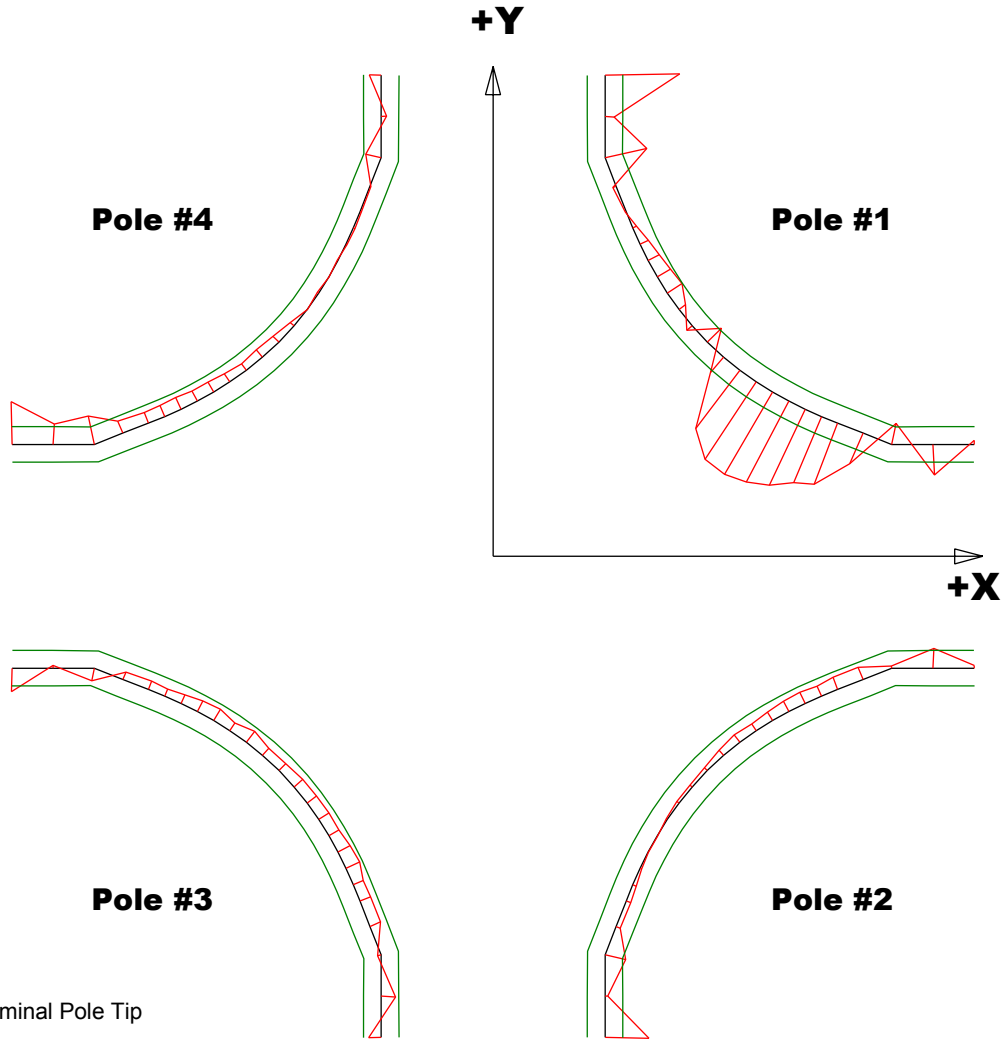
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43192	0.433
Pole Tip Distance 2-4	0.433 ± .002	0.43321	0.43252
Gap 1-2	0.159 ± .002	0.15703	0.1603
Gap 2-3	0.159 ± .002	0.15939	0.16061
Gap 3-4	0.159 ± .002	0.16077	0.159
Gap 4-1	0.159 ± .002	0.16009	0.15748

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

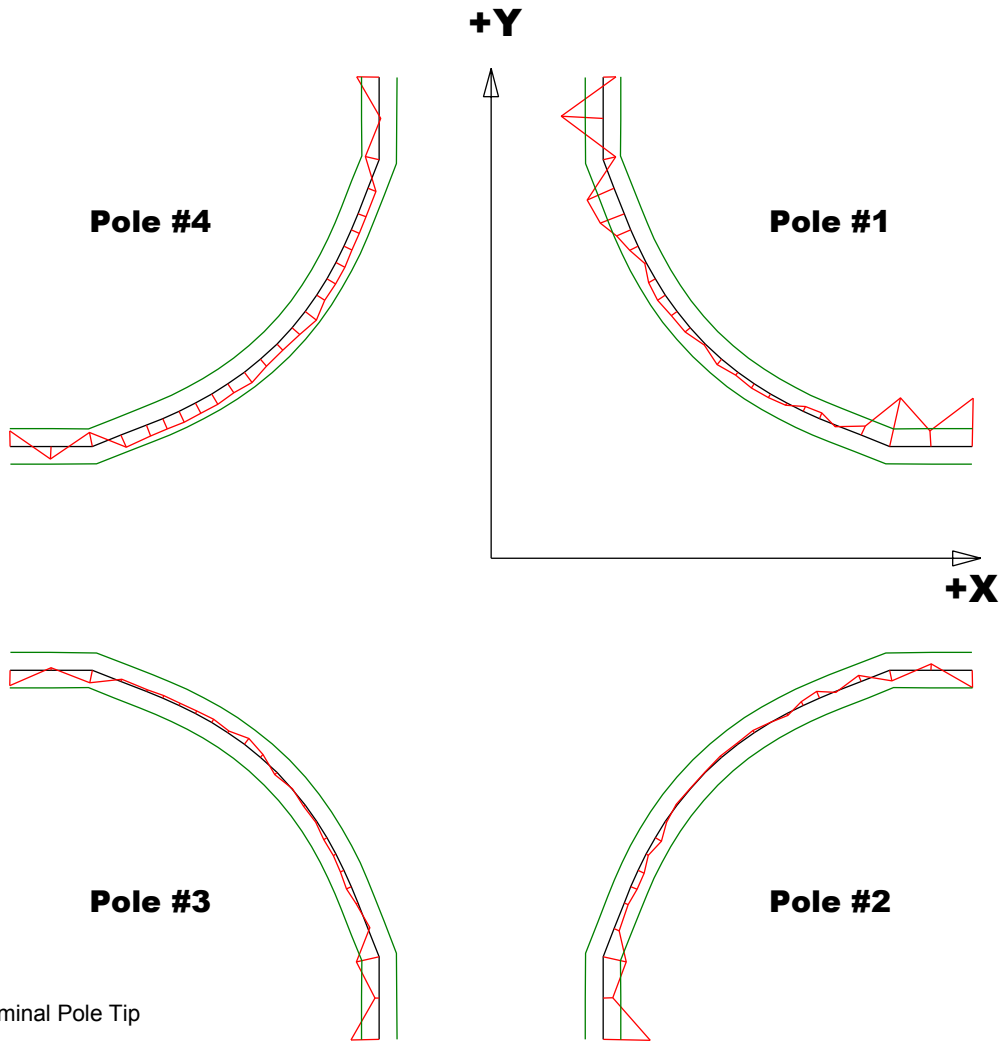
### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00421	-0.00248	-0.00131	-0.0024
Max. Dev.	0.00536	0.00112	0.00084	0.00031

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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

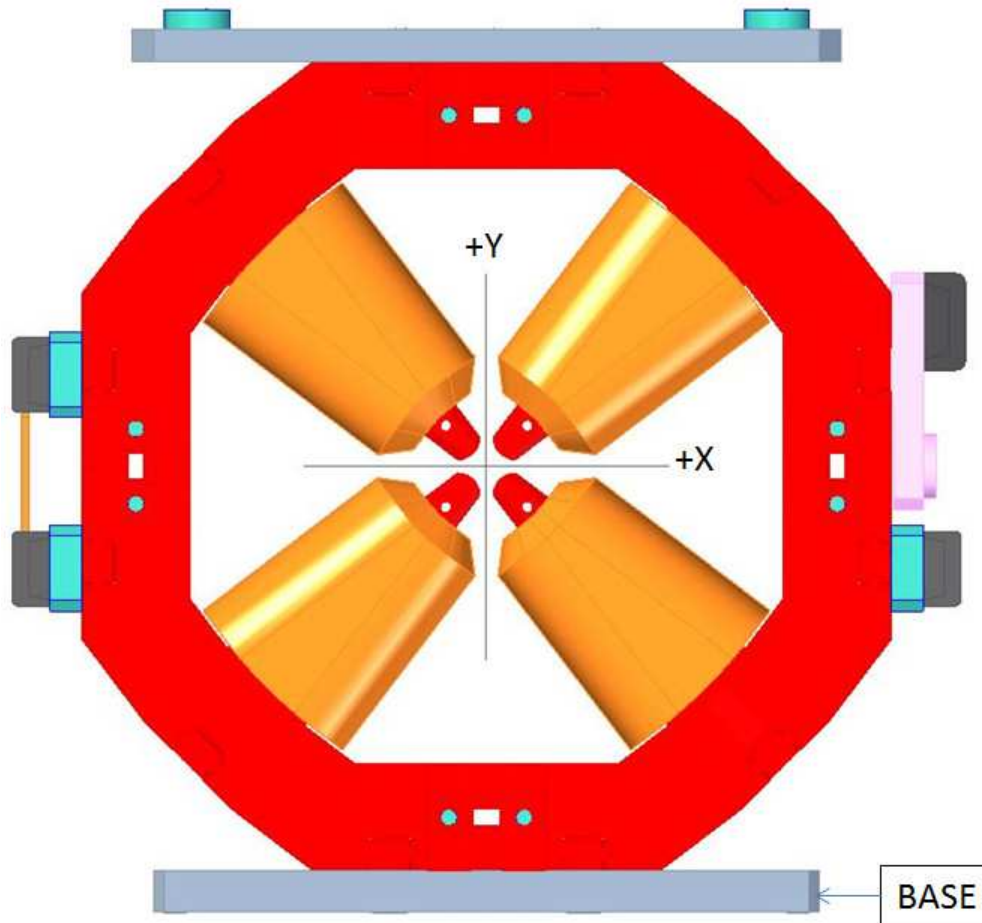
### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.0028	-0.00266	-0.00158	-0.00127
Max. Dev.	0.00236	0.00041	0.00042	0.00079

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



Angle in Decimal Degrees ° :-0.03751

Angle in Milliradians :-0.65460

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