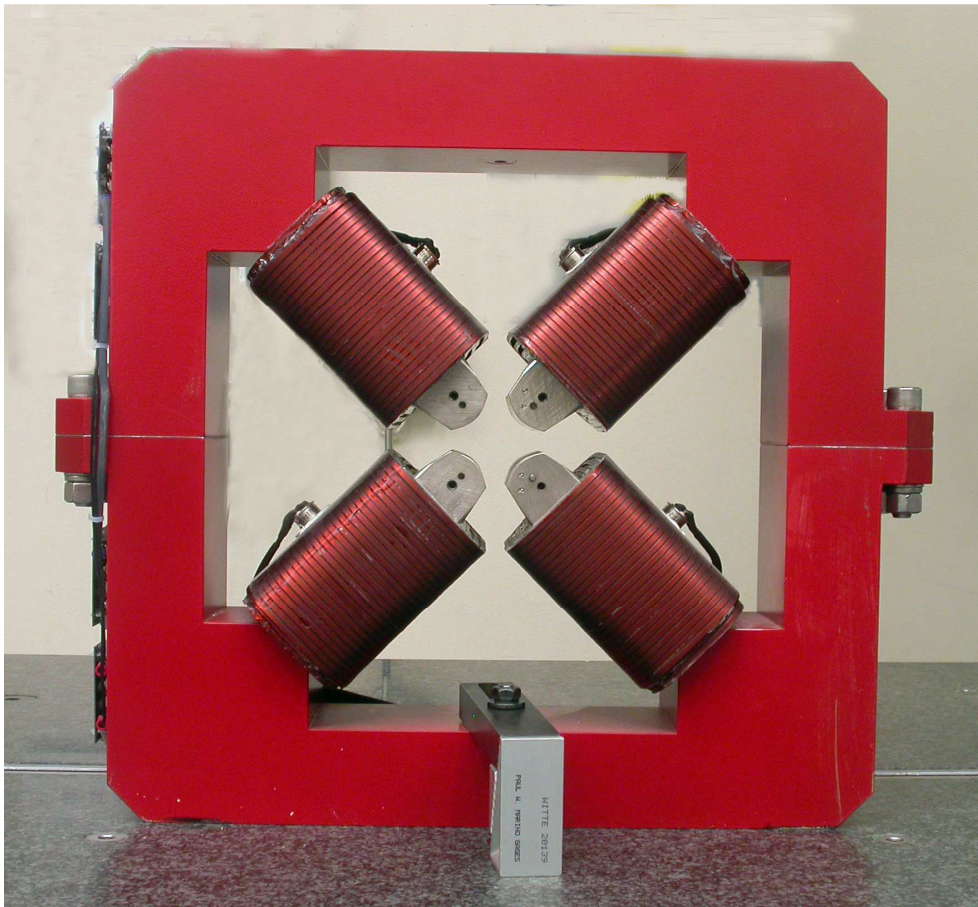


# LCLS II Magnet Fiducialization Report

## Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

Drawing No. : SA-380-309-12 R1

Barcode No.: 4021

Mfg. S/N : 017

## **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	6.51148	8.86518	-1.24261
TB 2	6.51152	8.86500	1.25674
TB 3	-6.48662	8.88527	1.25799
TB 4	-6.48889	8.88455	-1.24308
TB A	6.51031	8.17784	-1.24201
TB B	6.51072	8.17783	1.25710
TB C	-6.48876	8.19639	1.25646
TB D	-6.48893	8.19667	-1.24277

Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads  
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

Dimensions in Inch

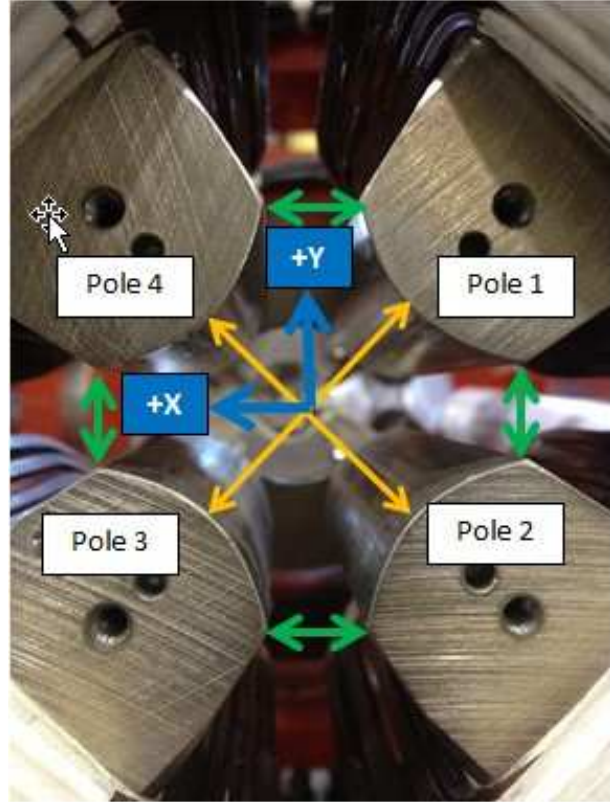
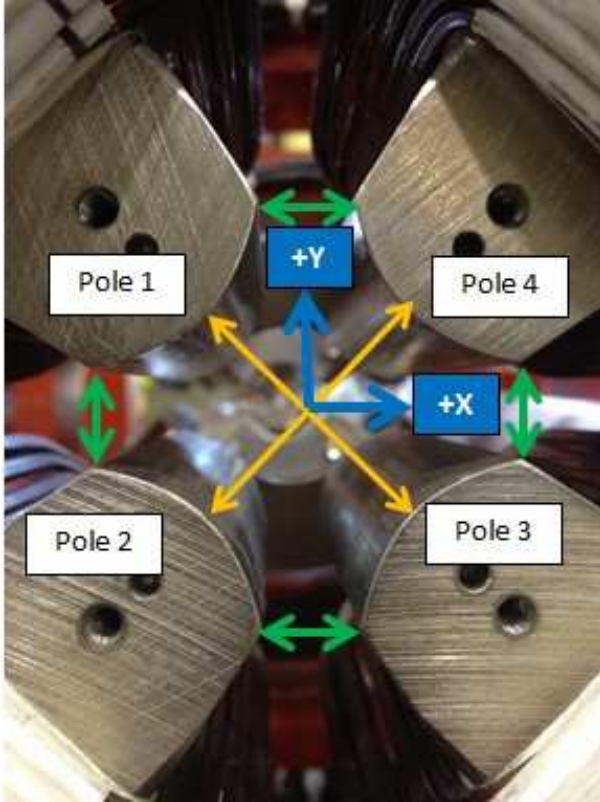
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## Pole Tip Gap Measurements

**Pole Tips View from Downstream**

**Pole Tips View from Upstream**



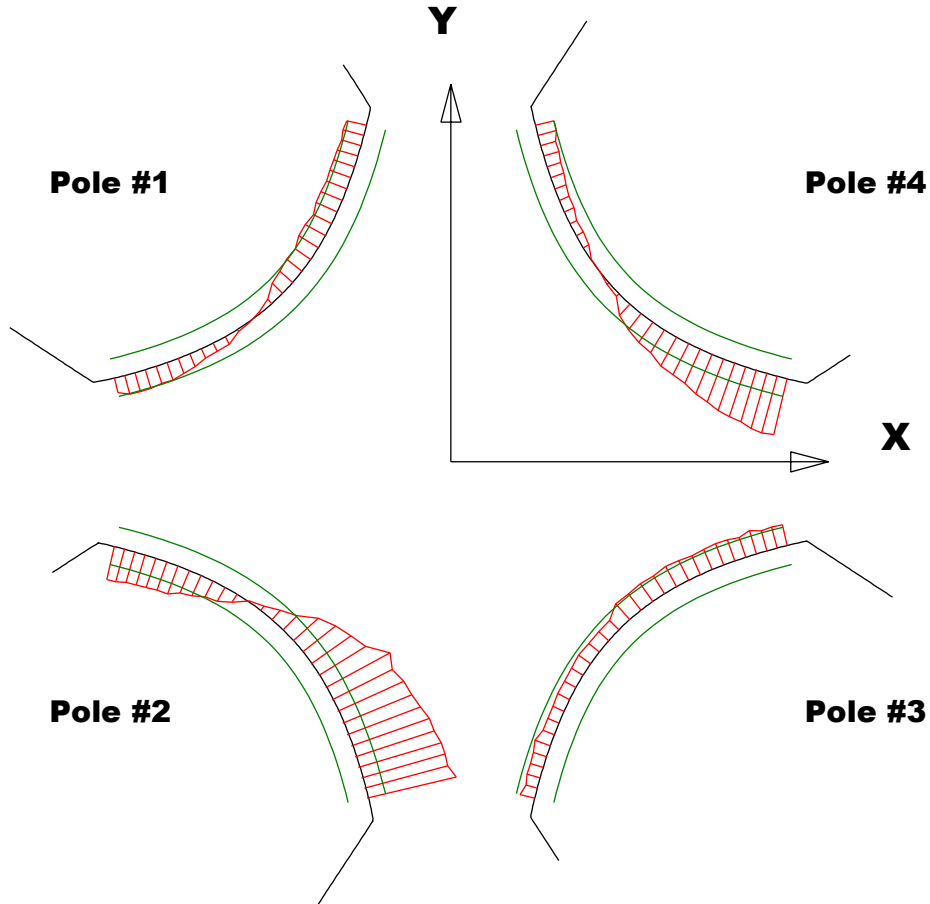
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26005	1.26039
Pole Tip Distance 2-4	1.260	1.25861	1.26066
Gap 1-2	.422	0.42575	0.42597
Gap 2-3	.422	0.41776	0.41646
Gap 3-4	.422	0.41874	0.42051
Gap 4-1	.422	0.42631	0.42741

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

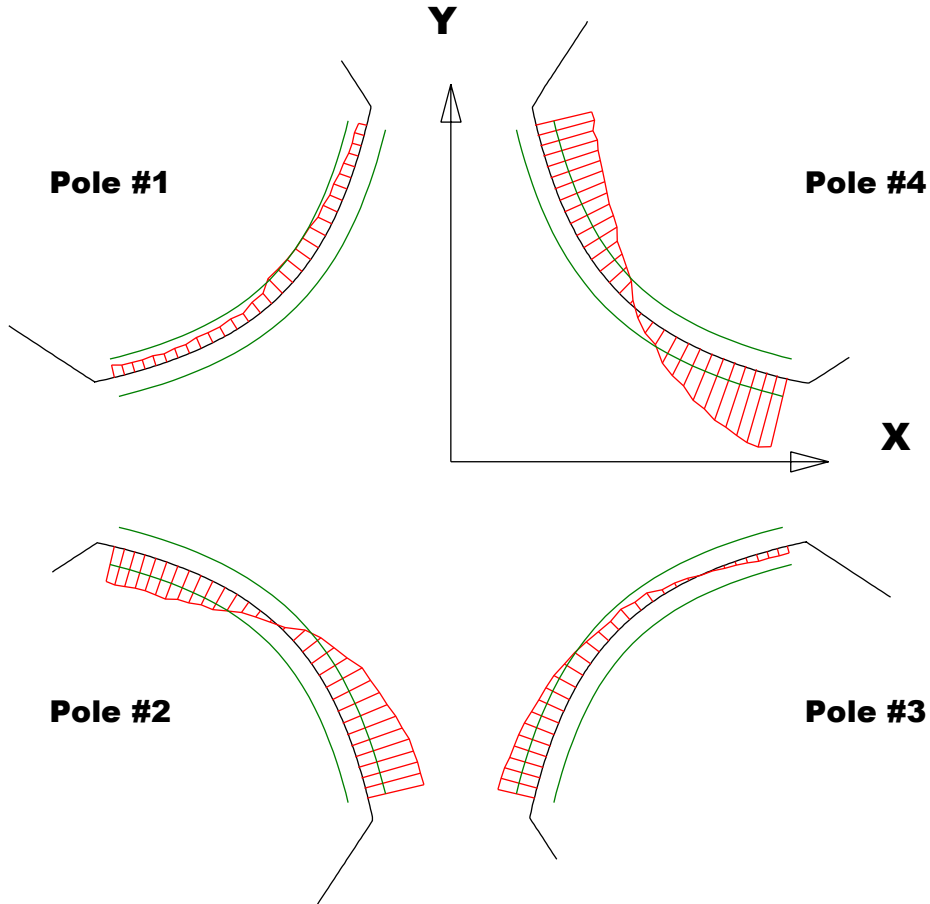
### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00123	-0.0018	0.00063	-0.00101
Max. Dev.	0.00106	0.00479	0.0013	0.00311

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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

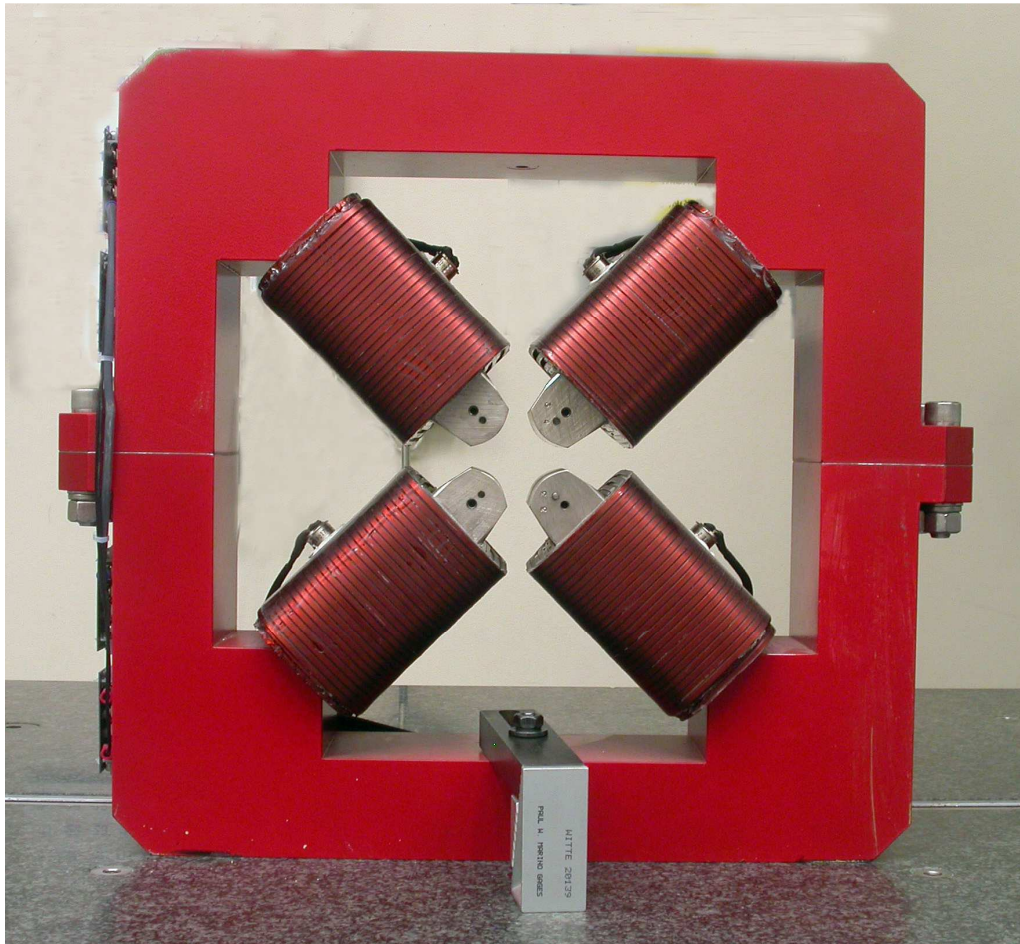
### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00109	-0.00197	-0.0004	-0.00308
Max. Dev.	-0.00044	0.00305	0.00199	0.00387

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## Angle of the Composite Pole Tip Best-Fit In Relation to Tooling Ball Plane



Angle in Decimal Degrees  $^{\circ}$  = 0.08385

Angle in Milliradians = 1.46349

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