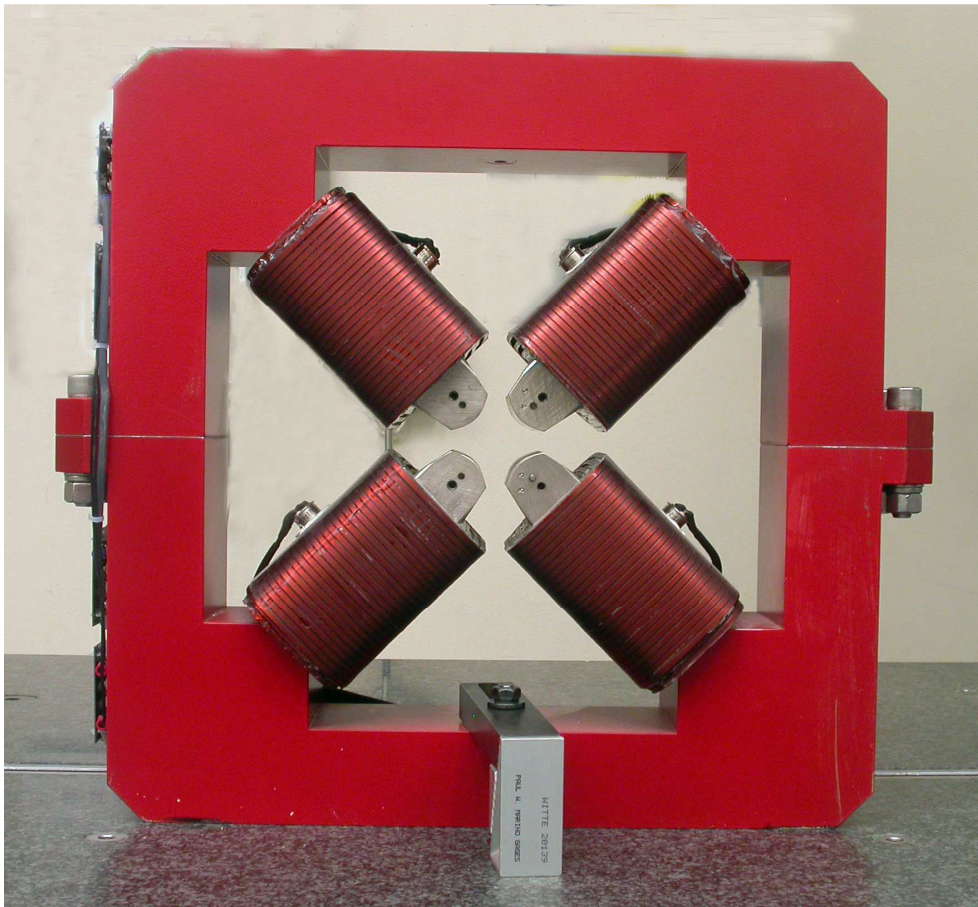


# LCLS II Magnet Fiducialization Report

## Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4011

Mfg. S/N : 012

## 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.

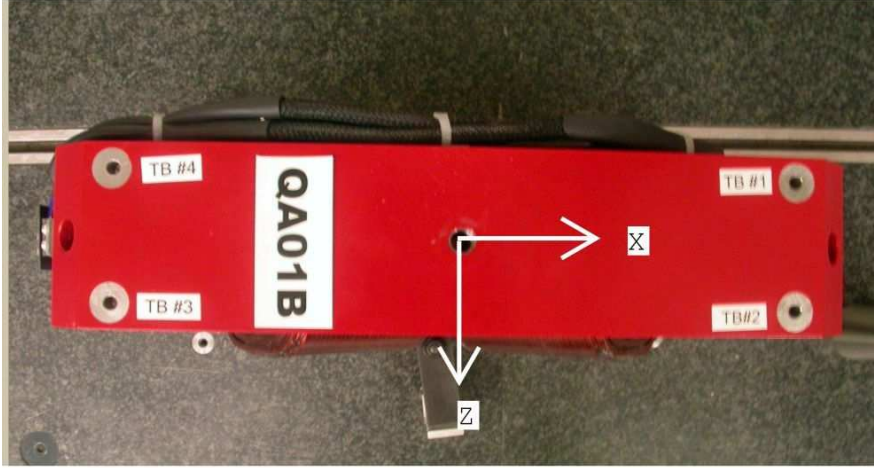
### Coordinate Origins

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	6.49550	8.87513	-1.24614
TB 2	6.49589	8.87472	1.25422
TB 3	-6.50279	8.86989	1.25249
TB 4	-6.50301	8.87017	-1.24745
TB A	6.49543	8.18749	-1.24553
TB B	6.49660	8.18765	1.25410
TB C	-6.50308	8.18395	1.25186
TB D	-6.50278	8.18293	-1.24691

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

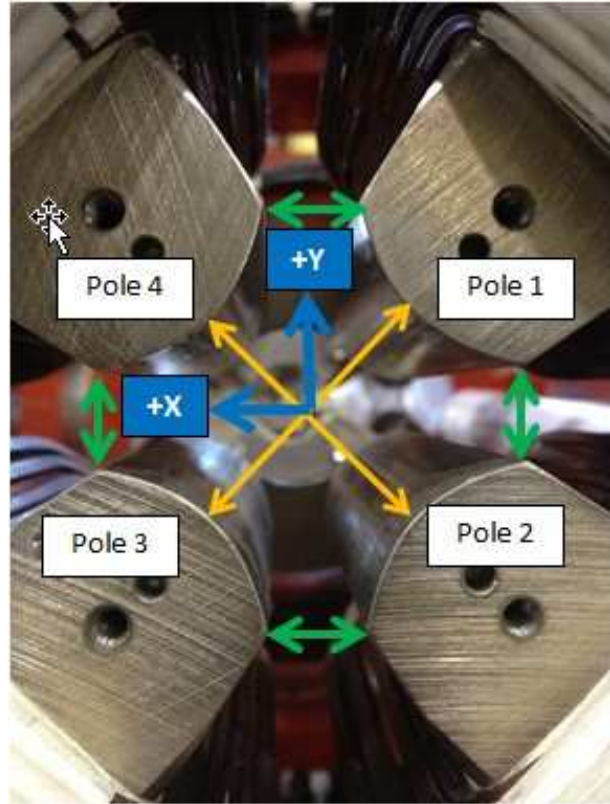
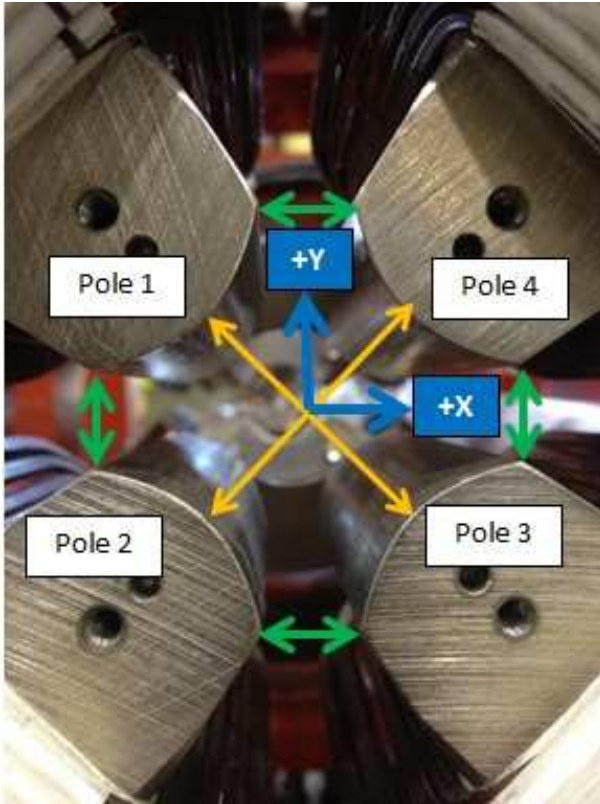
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## Pole Tip Gap Measurements

**Pole Tips View from Downstream**

**Pole Tips View from Upstream**



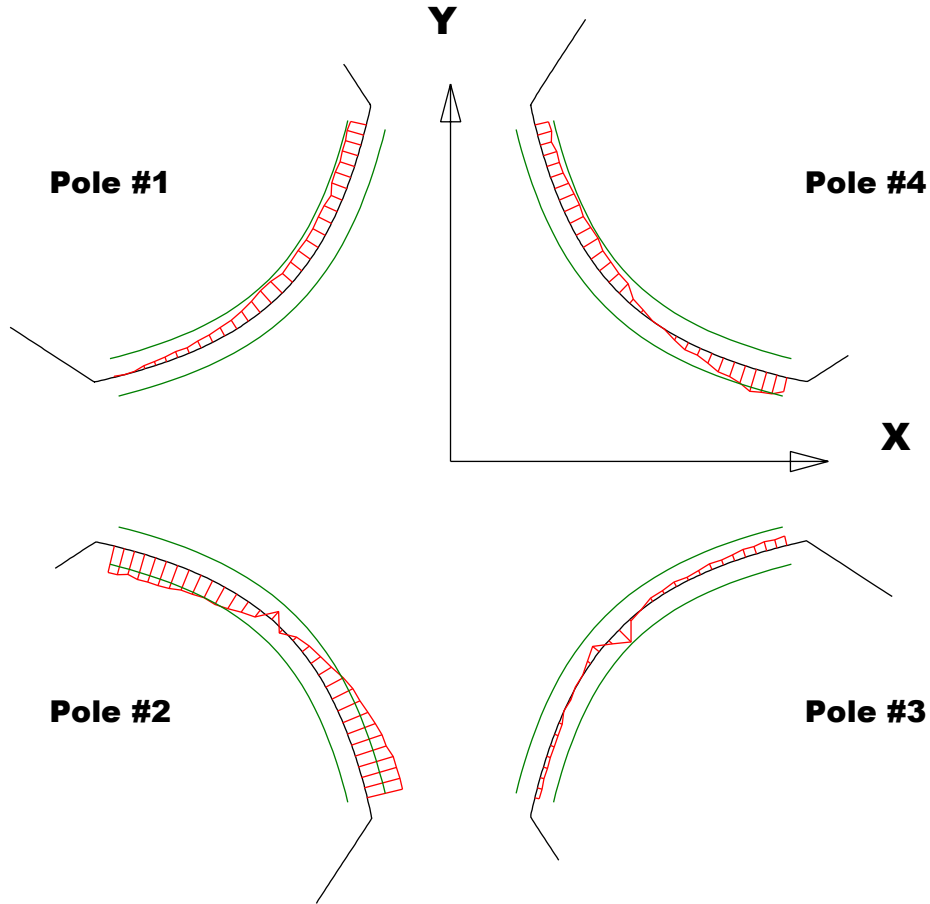
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.2617	1.26159
Pole Tip Distance 2-4	1.260	1.26086	1.26028
Gap 1-2	.422	0.42404	0.42383
Gap 2-3	.422	0.42099	0.42345
Gap 3-4	.422	0.42245	0.42542
Gap 4-1	.422	0.4242	0.4199

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

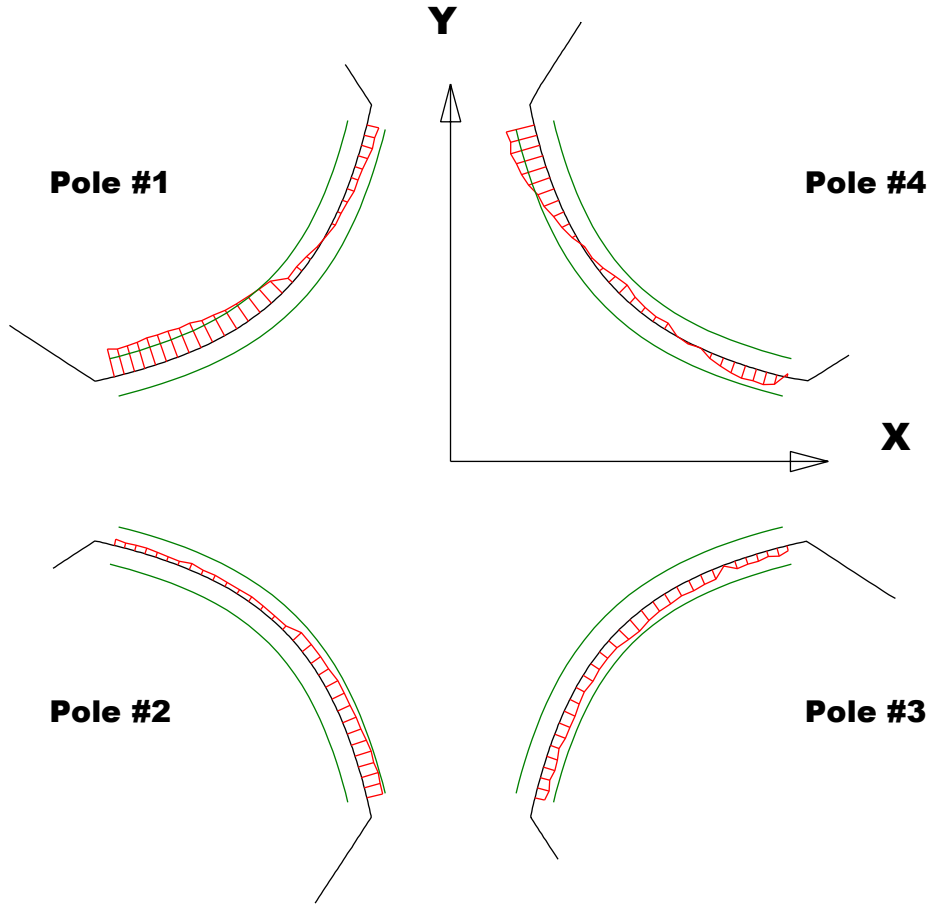
### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00091	-0.00144	-0.00091	-0.00092
Max. Dev.	-0.00001	0.00194	0.00052	0.00122

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## Composite Best-fit of Pole Tips, Upstream



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

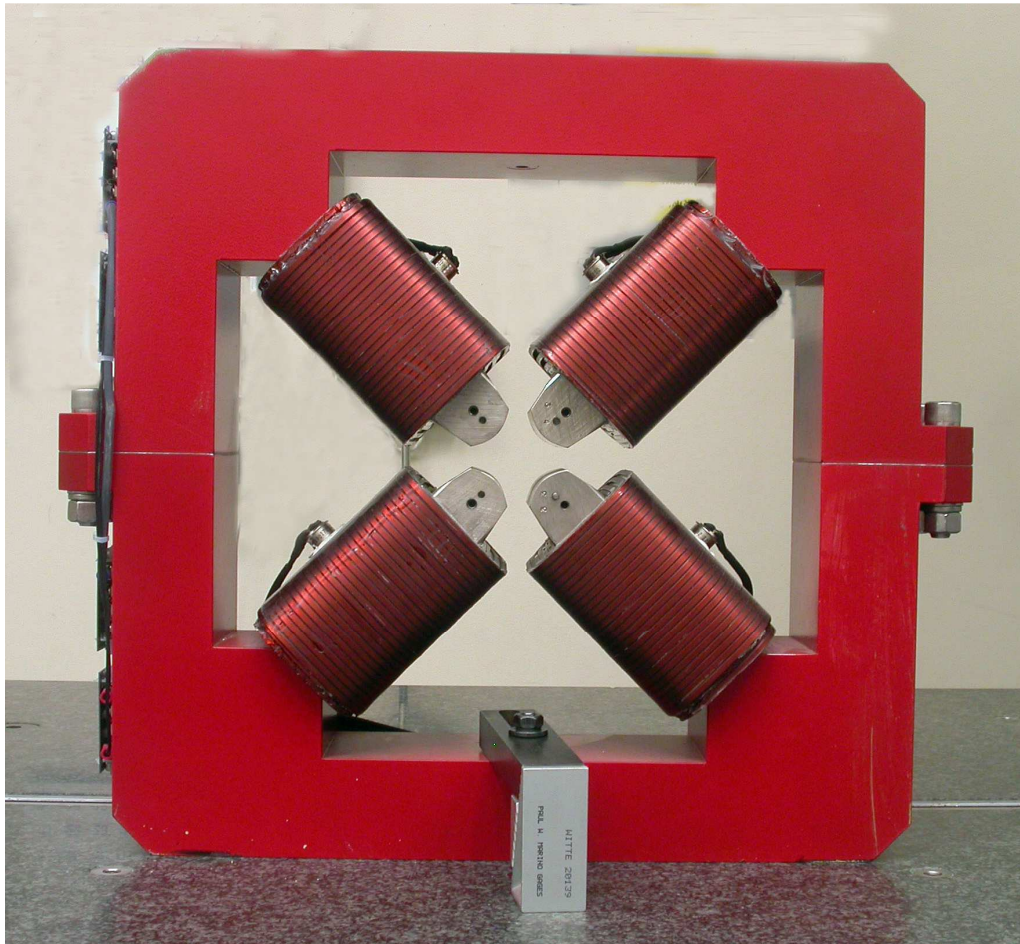
Dimensions in Inch

### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00152	0.00022	-0.0008	-0.0006
Max. Dev.	0.00065	0.00093	-0.00006	0.00161

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



Angle in Decimal Degrees  $^{\circ}$  = -0.02140

Angle in Milliradians = -0.37342

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