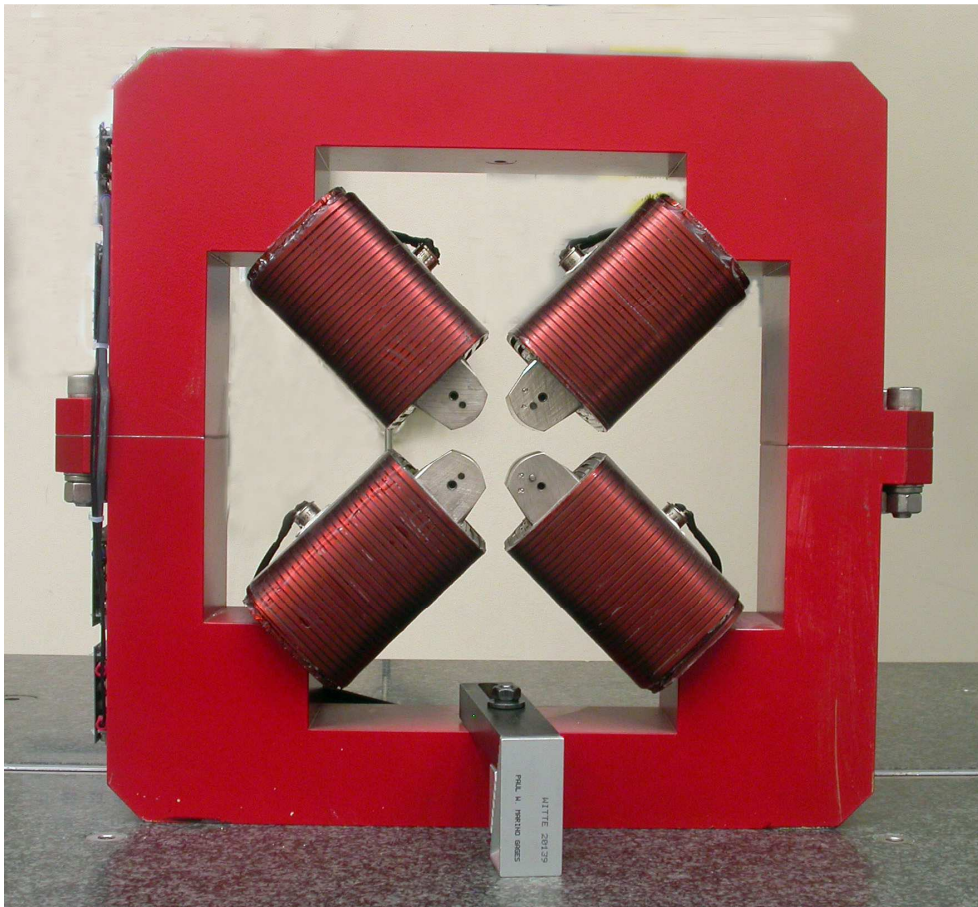


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4033

Mfg. S/N : 035

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	6.5075	8.8747	-1.2518
TB 2	6.5081	8.8732	1.2495
TB 3	-6.4919	8.8881	1.2521
TB 4	-6.4920	8.8891	-1.2492
TB A	6.5067	8.1873	-1.2516
TB B	6.5072	8.1861	1.2486
TB C	-6.4927	8.2007	1.2508
TB D	-6.4927	8.2019	-1.2491

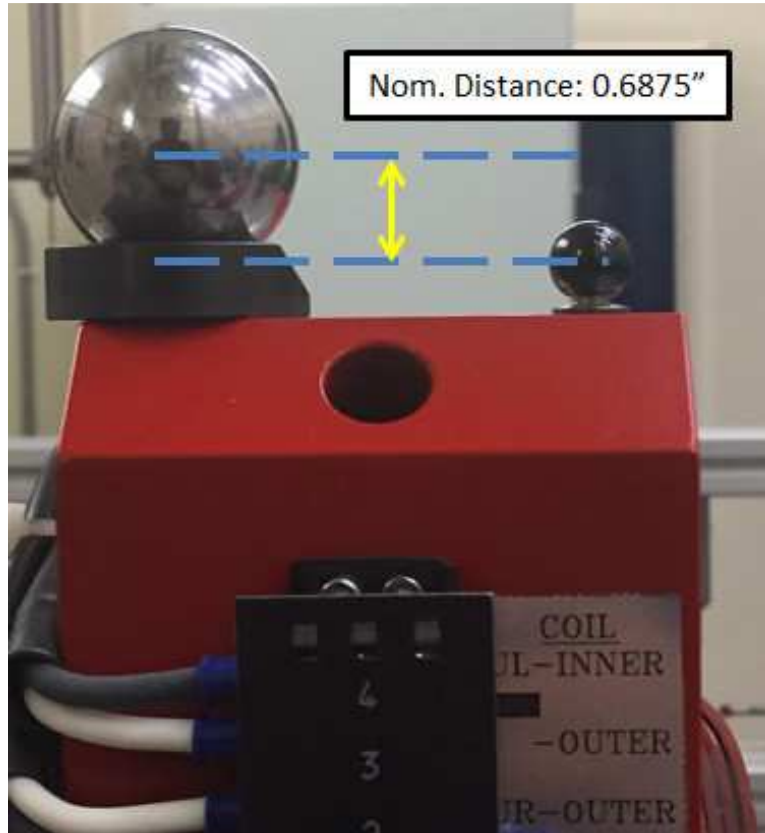
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

Dimensions in Inch

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



Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68745
TB 2	0.6875 ± 0.001	0.68711
TB 3	0.6875 ± 0.001	0.68739
TB 4	0.6875 ± 0.001	0.68723

Dimensions in Inch

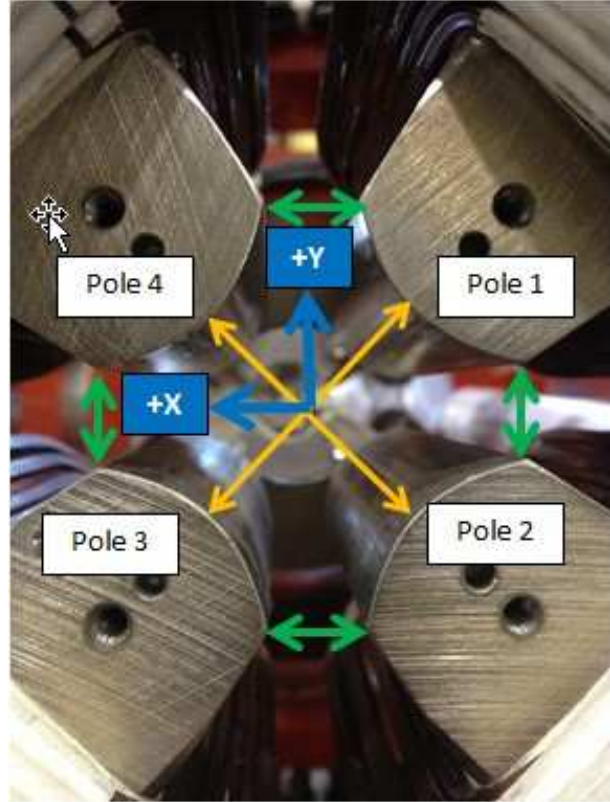
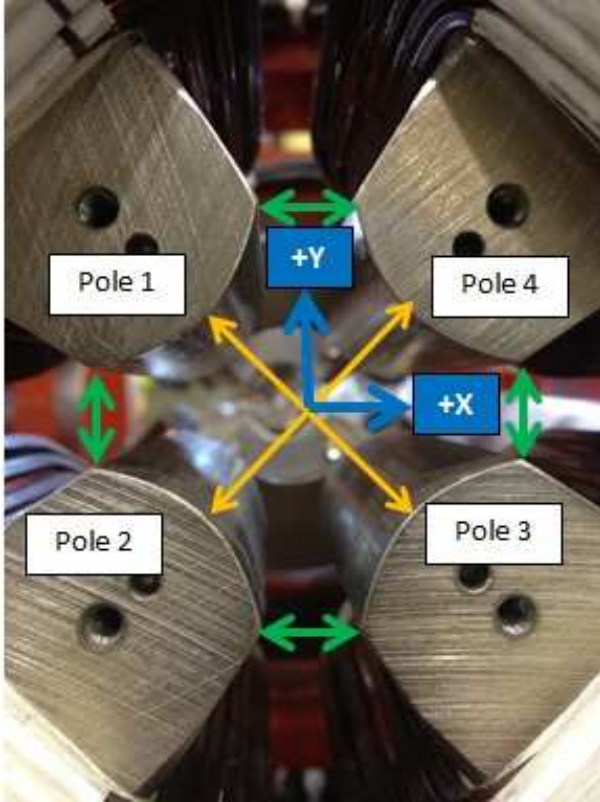
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



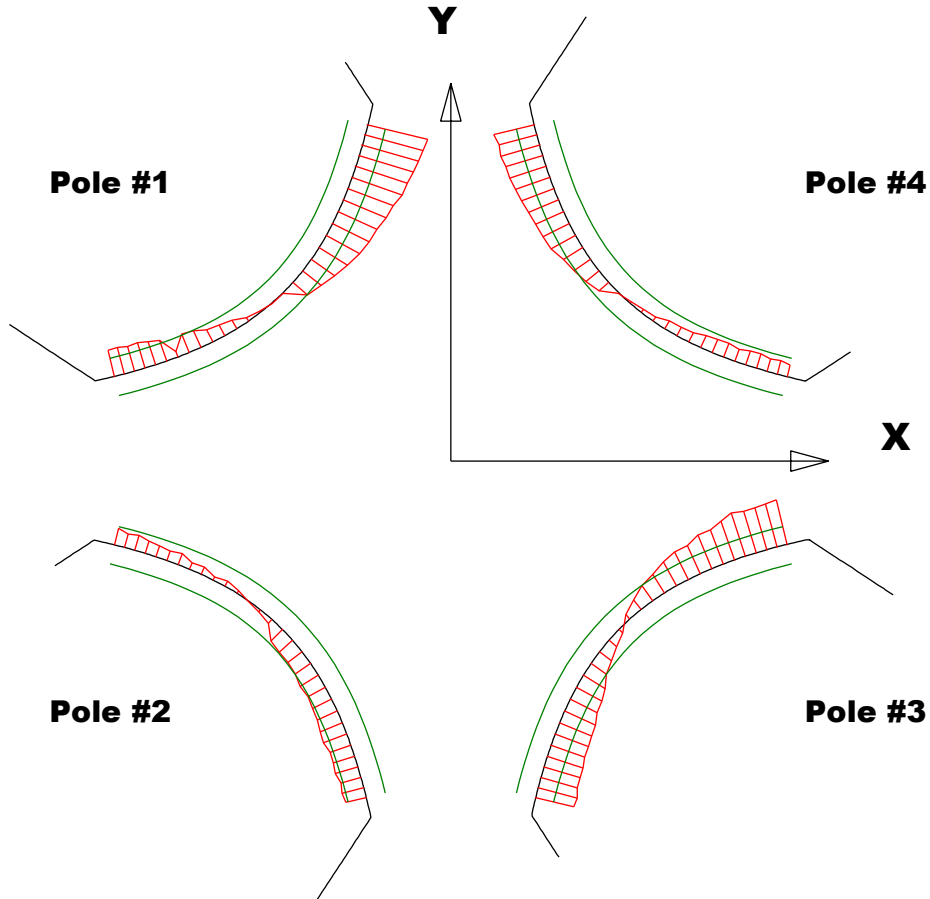
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26017	1.26032
Pole Tip Distance 2-4	1.260	1.26074	1.26027
Gap 1-2	.422	0.42217	0.42152
Gap 2-3	.422	0.42669	0.42685
Gap 3-4	.422	0.42021	0.42162
Gap 4-1	.422	0.41514	0.41392

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

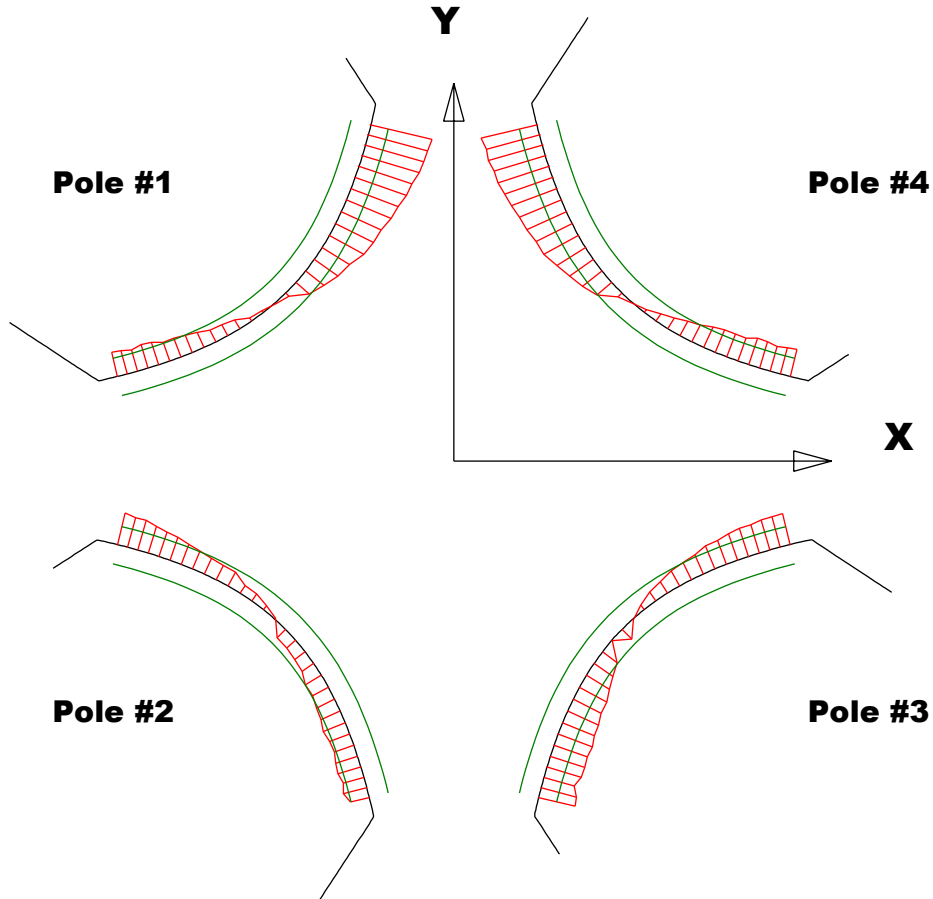
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00145	-0.00131	-0.00215	-0.0008
Max. Dev.	0.00327	0.00092	0.00244	0.00221

Barcode # : 4033

Mfg. S/N : 035

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

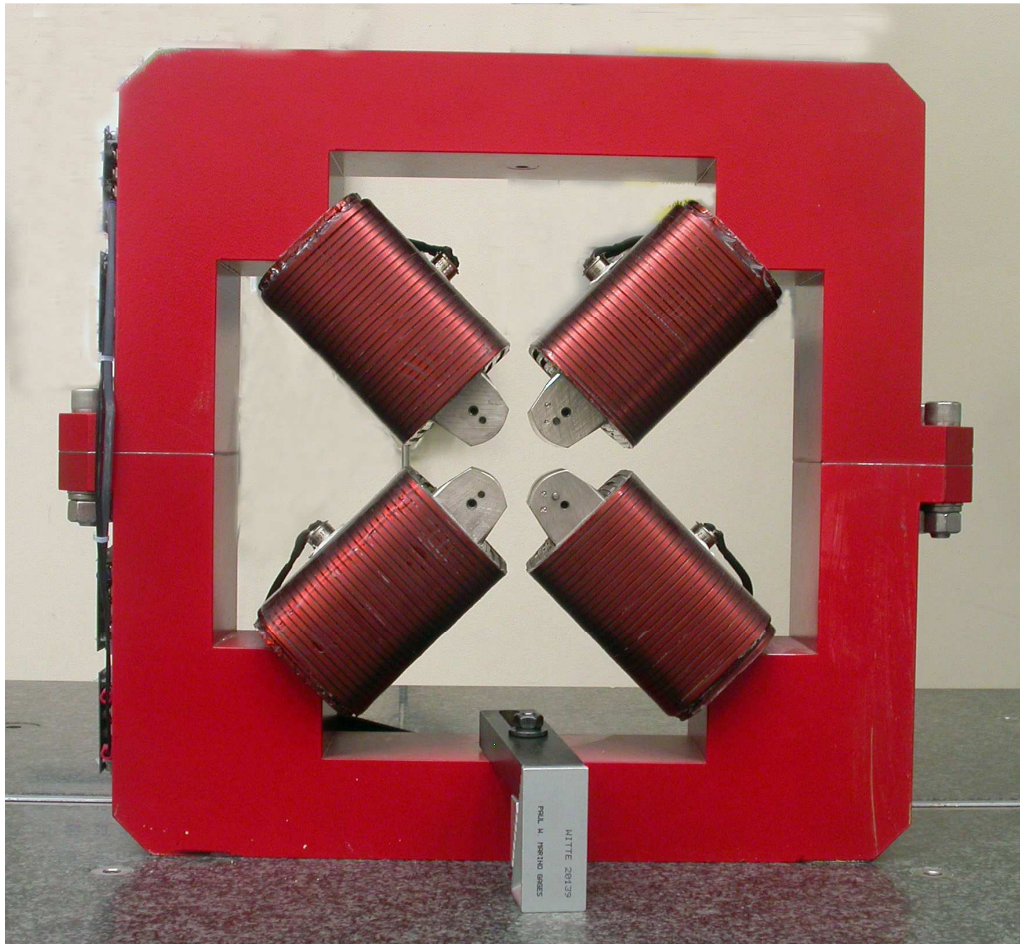
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00132	-0.00128	-0.00199	-0.00148
Max. Dev.	0.00334	0.00173	0.0017	0.00306

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



Angle in Decimal Degrees $^{\circ}$ = 0.06462

Angle in Milliradians = 1.12789

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