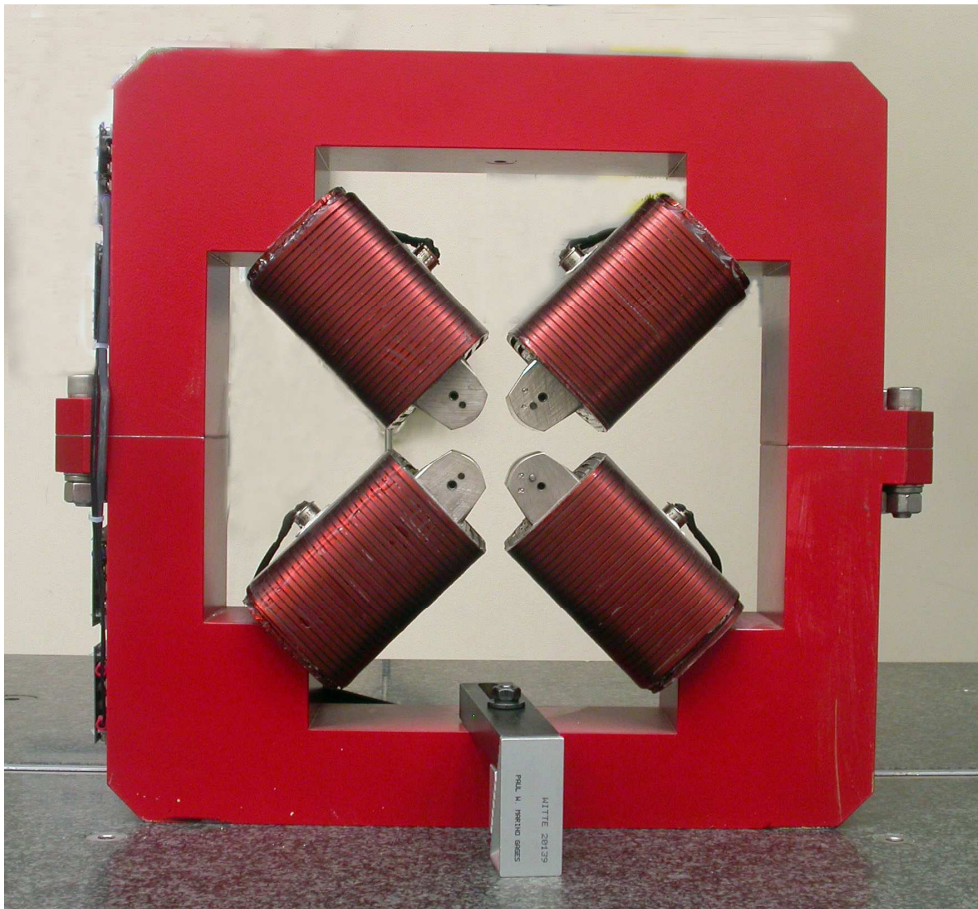


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4030

Mfg. S/N : 029

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	6.5214	8.8569	-1.2455
TB 2	6.5206	8.8553	1.2542
TB 3	-6.4783	8.8901	1.2530
TB 4	-6.4786	8.8917	-1.2468
TB A	6.5195	8.1697	-1.2455
TB B	6.5187	8.1679	1.2541
TB C	-6.4804	8.2030	1.2531
TB D	-6.4805	8.2045	-1.2471

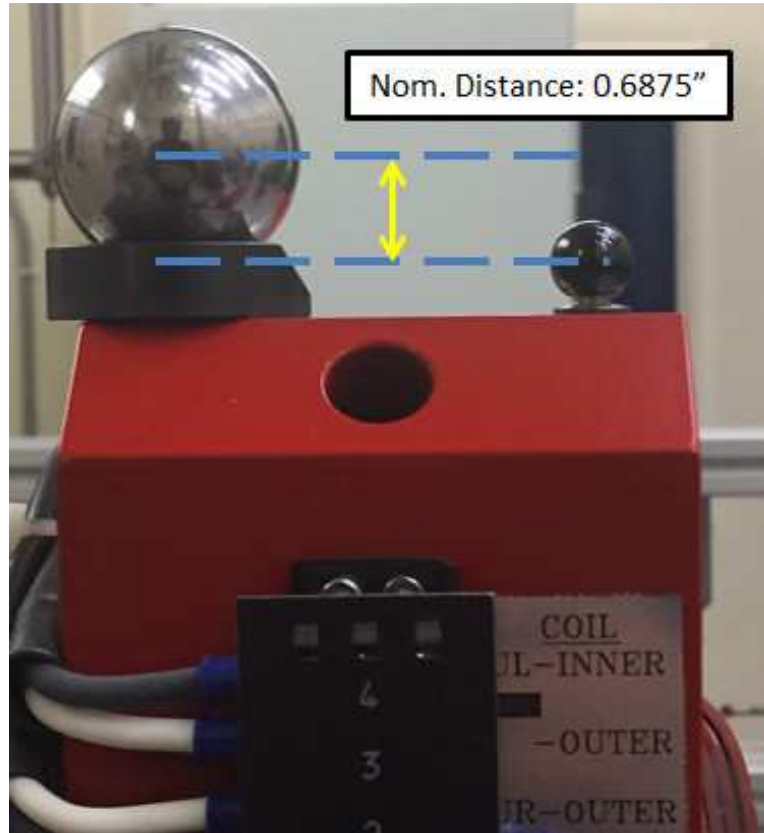
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68725
TB 2	0.6875 ± 0.001	0.68741
TB 3	0.6875 ± 0.001	0.68709
TB 4	0.6875 ± 0.001	0.68718

Dimensions in Inch

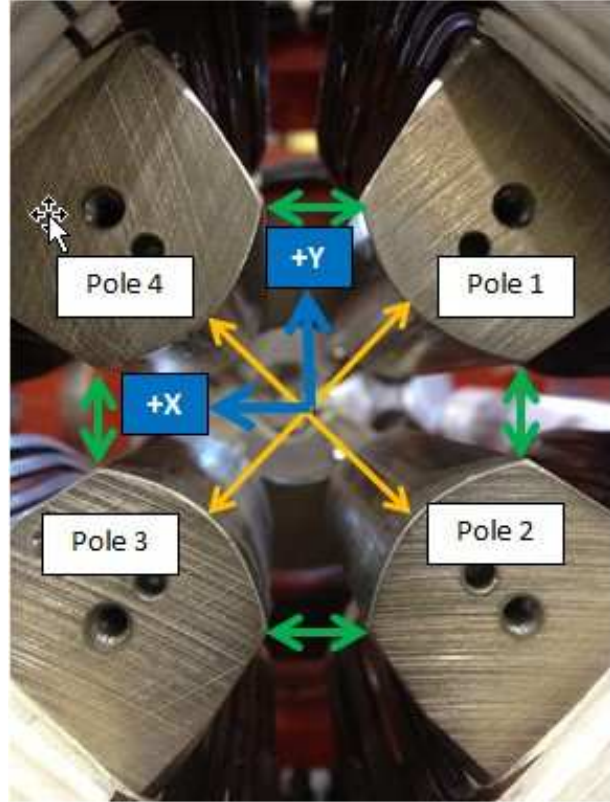
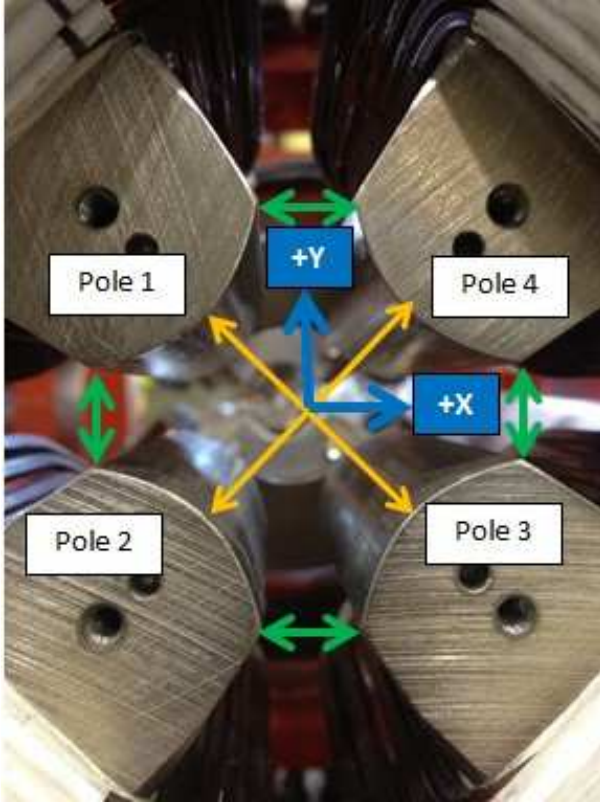
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



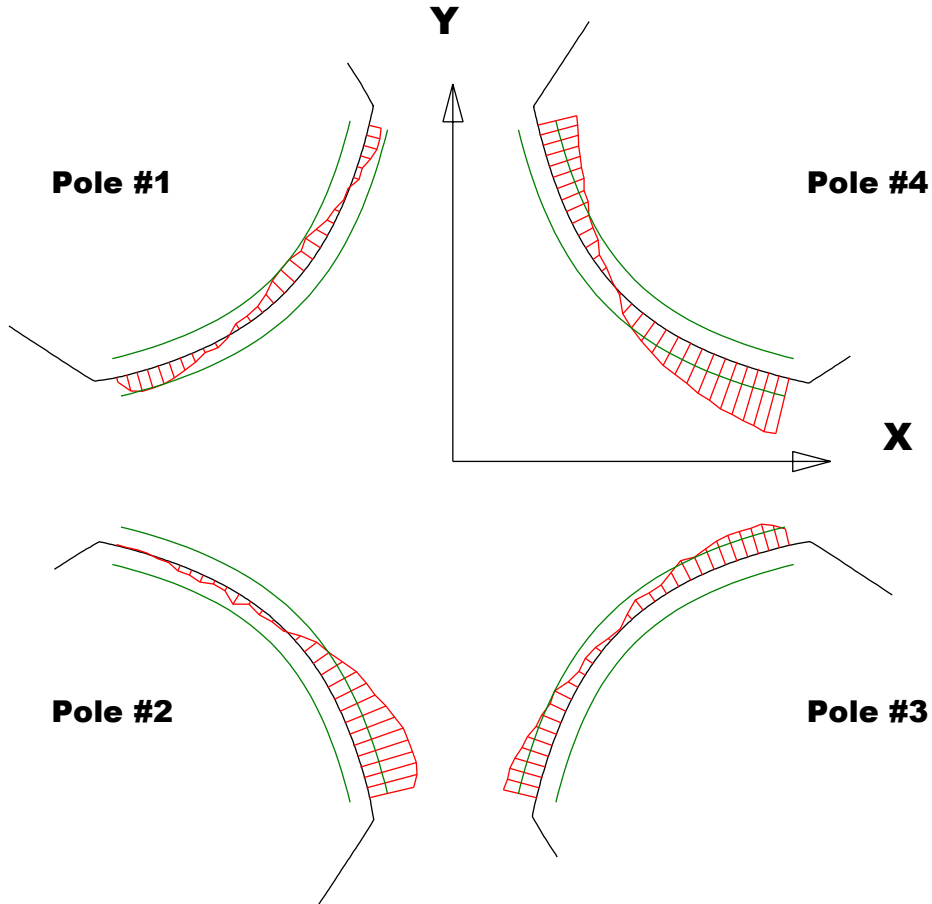
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26084	1.26152
Pole Tip Distance 2-4	1.260	1.25983	1.26074
Gap 1-2	.422	0.42562	0.42463
Gap 2-3	.422	0.42063	0.42416
Gap 3-4	.422	0.42019	0.41859
Gap 4-1	.422	0.4249	0.42507

Dimensions in Inch

Barcode # : 4030

Mfg. S/N : 029

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

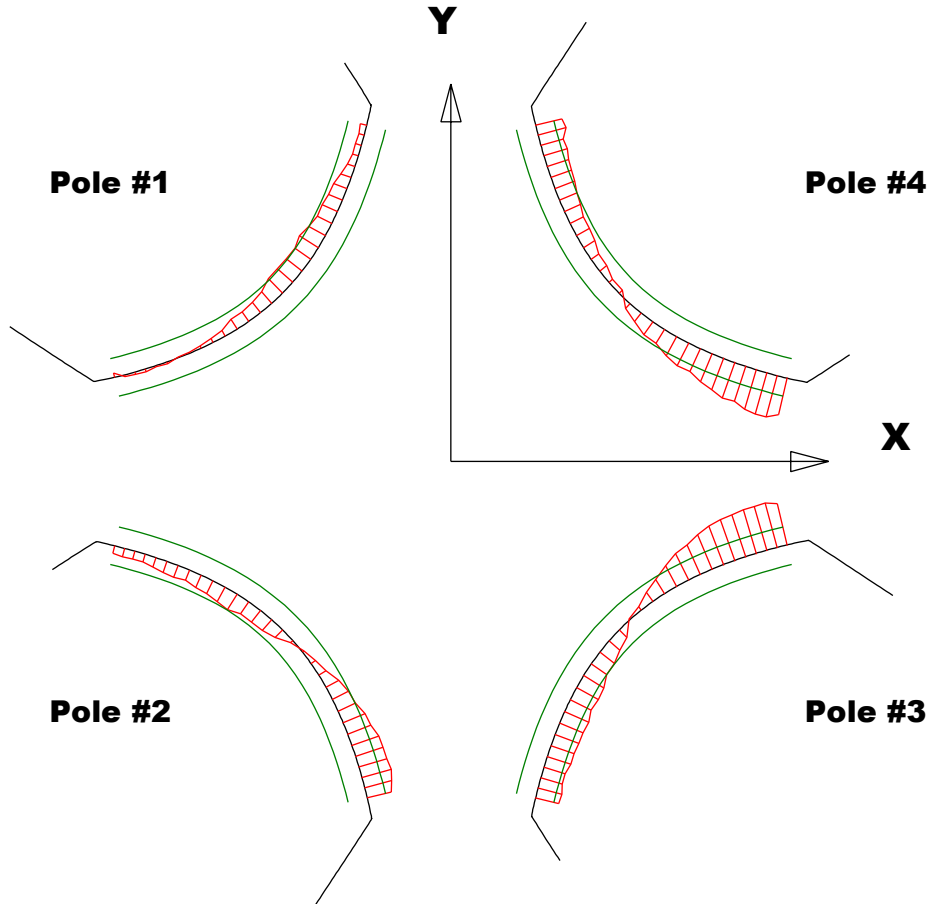
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.001	-0.00063	0.00006	-0.00212
Max. Dev.	0.00104	0.00287	0.00181	0.00307

Barcode # : 4030

Mfg. S/N : 029

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

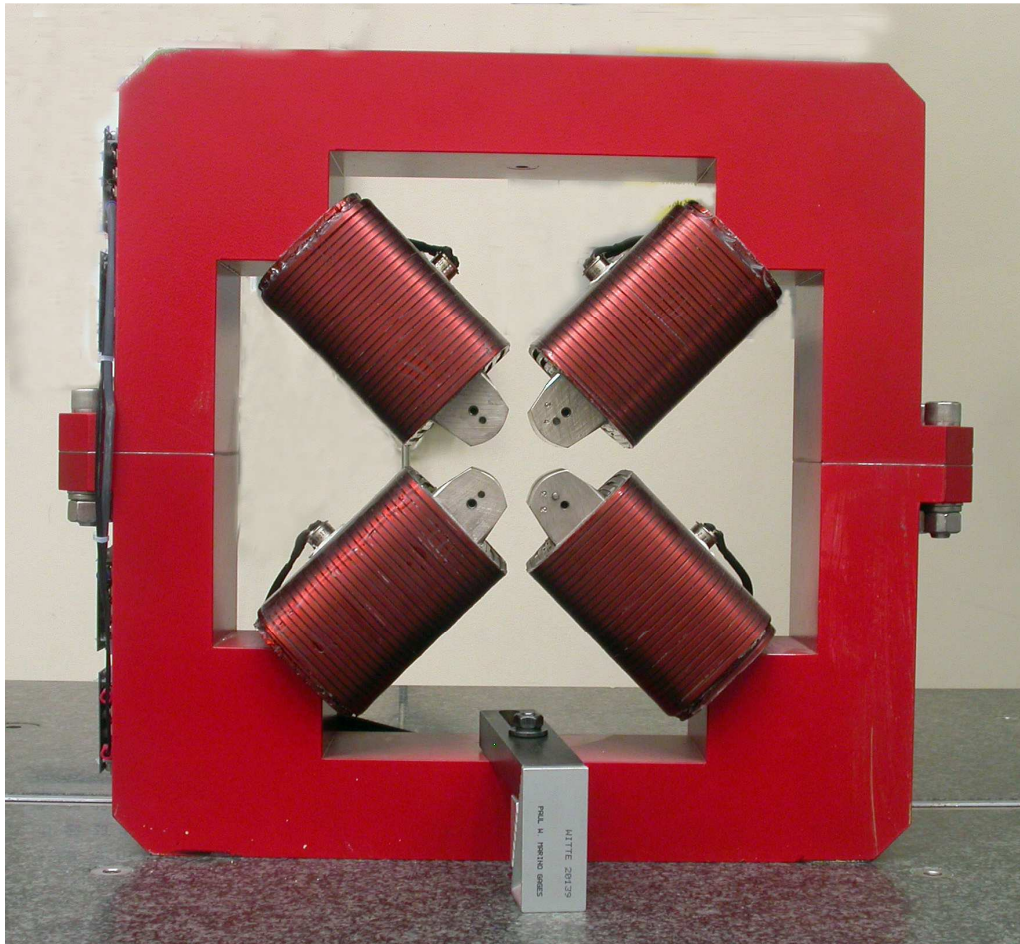
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00118	-0.00098	-0.00139	-0.00153
Max. Dev.	0.00015	0.00162	0.00244	0.00227

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



Angle in Decimal Degrees $^{\circ}$ = 0.15427

Angle in Milliradians = 2.69243

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