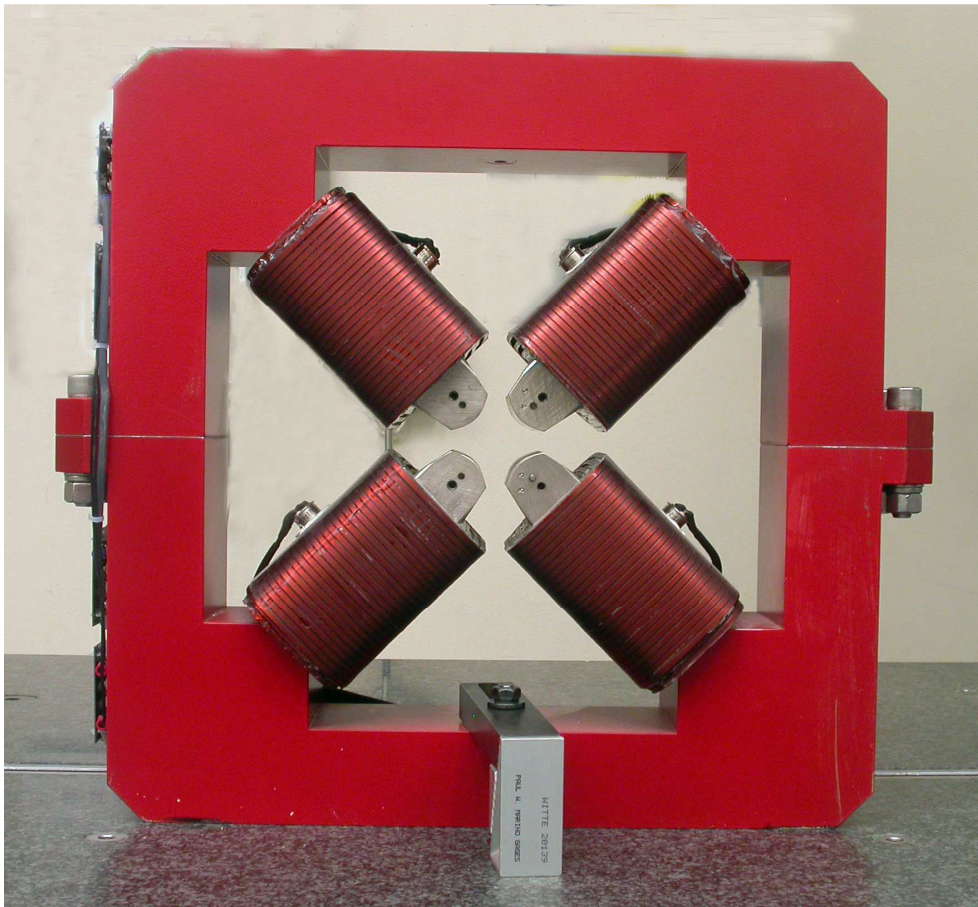


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4035

Mfg. S/N : 036

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	6.4948	8.8774	-1.2530
TB 2	6.4945	8.8763	1.2473
TB 3	-6.5046	8.8736	1.2481
TB 4	-6.5057	8.8747	-1.2522
TB A	6.4958	8.1905	-1.2518
TB B	6.4953	8.1889	1.2468
TB C	-6.5039	8.1864	1.2482
TB D	-6.5051	8.1873	-1.2525

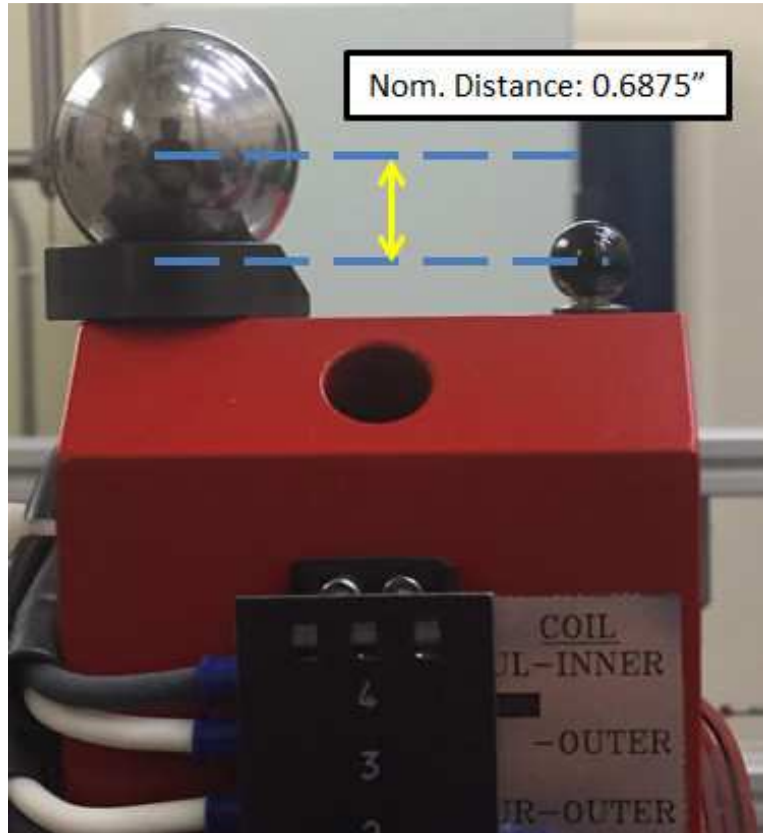
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68692
TB 2	0.6875 ± 0.001	0.68743
TB 3	0.6875 ± 0.001	0.68718
TB 4	0.6875 ± 0.001	0.68736

Dimensions in Inch

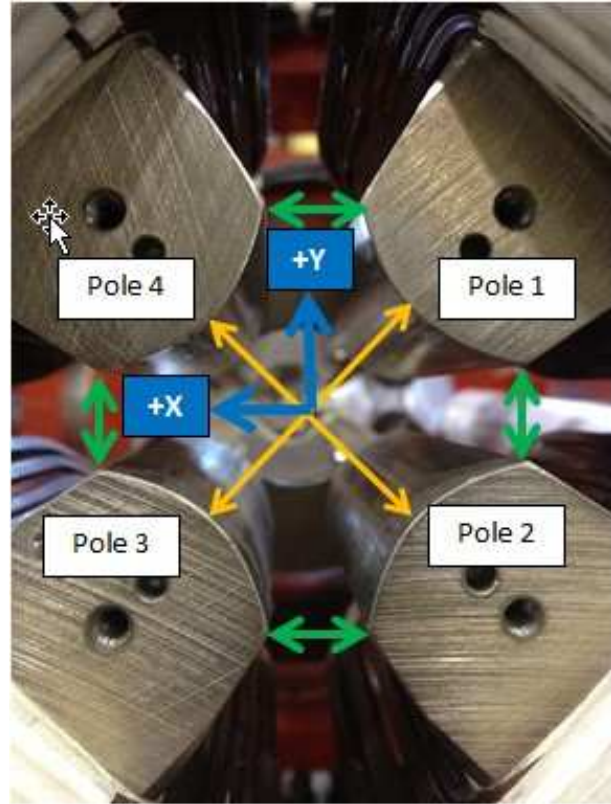
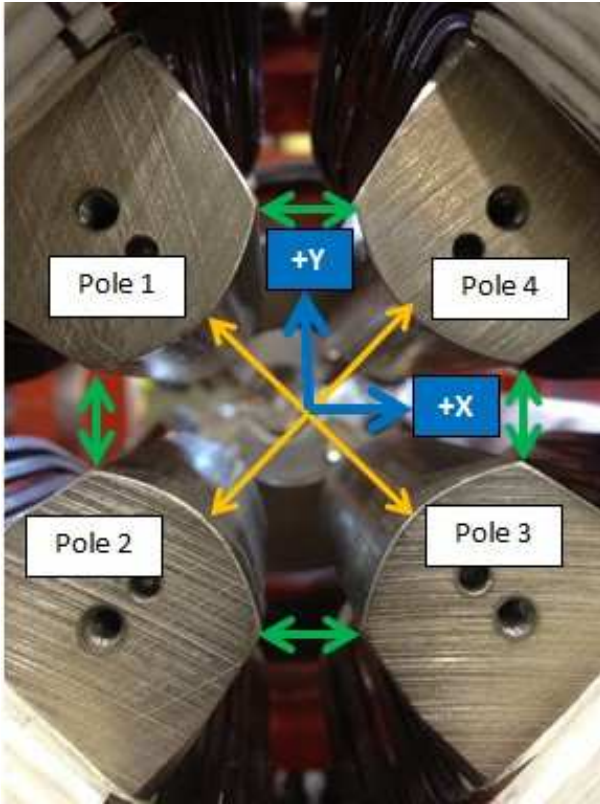
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



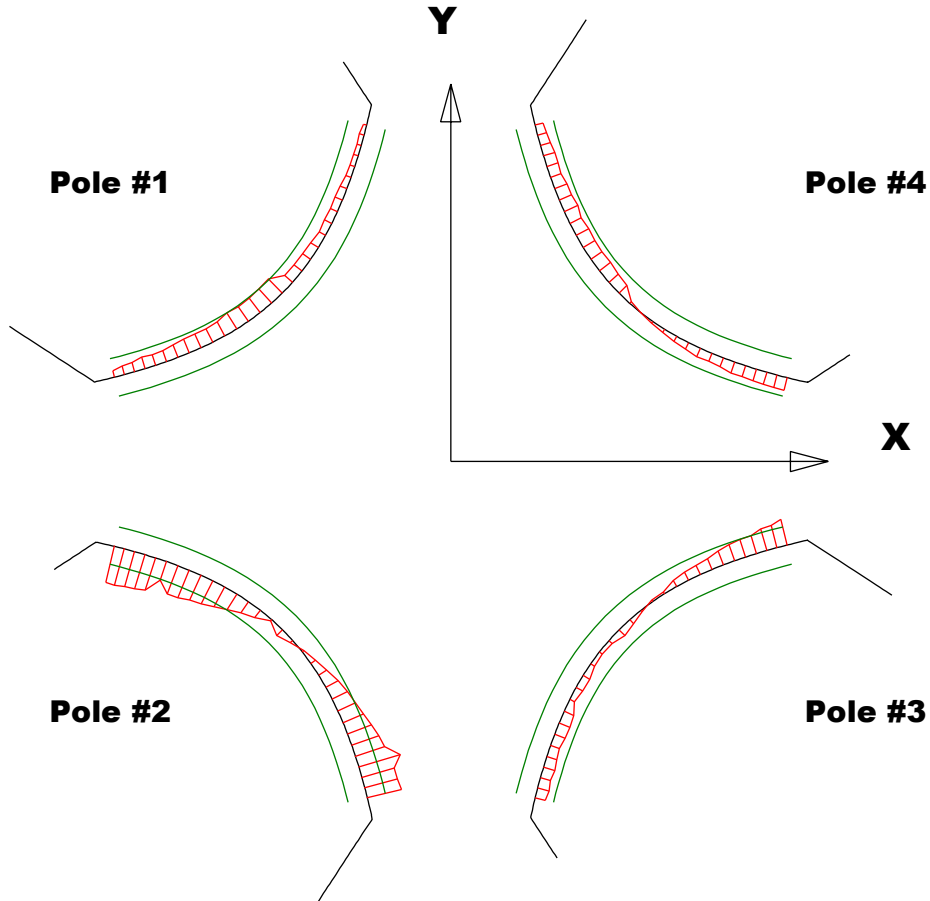
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26145	1.26187
Pole Tip Distance 2-4	1.260	1.26099	1.26034
Gap 1-2	.422	0.42512	0.42731
Gap 2-3	.422	0.42023	0.4193
Gap 3-4	.422	0.41822	0.41918
Gap 4-1	.422	0.42176	0.42215

Dimensions in Inch

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Mfg. S/N : 036

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

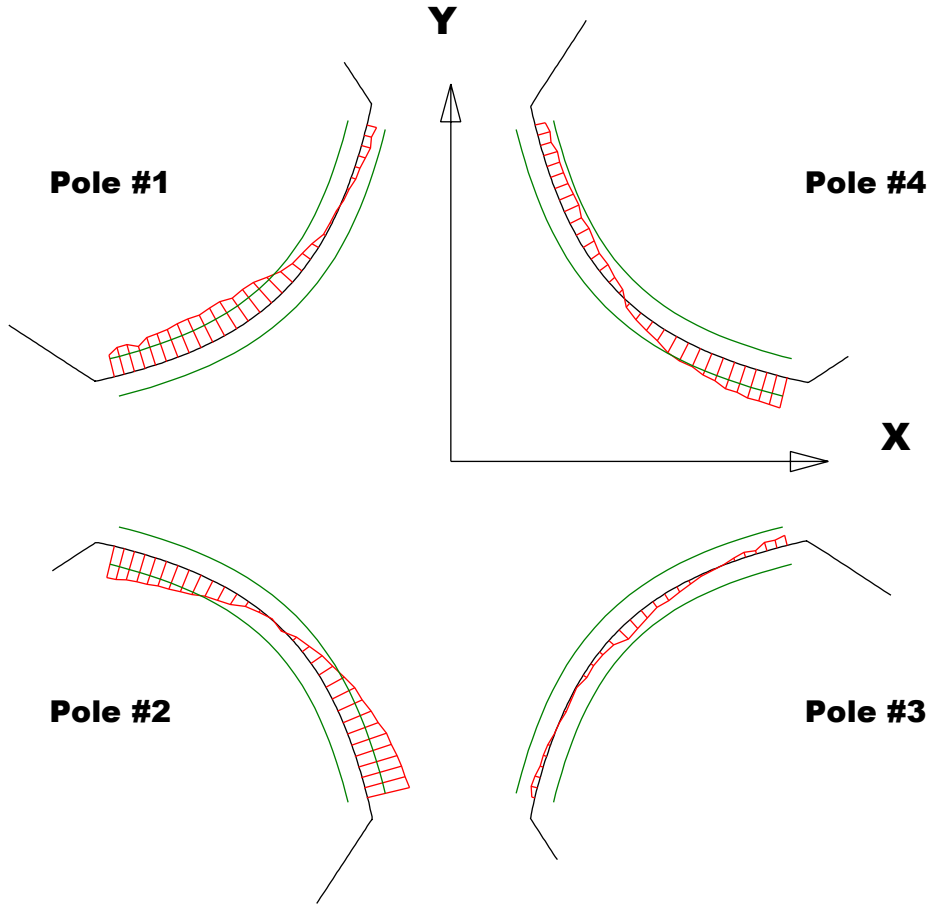
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00105	-0.002	-0.00063	-0.00079
Max. Dev.	-0.00018	0.00229	0.0014	0.0007

Barcode # : 4035

Mfg. S/N : 036

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

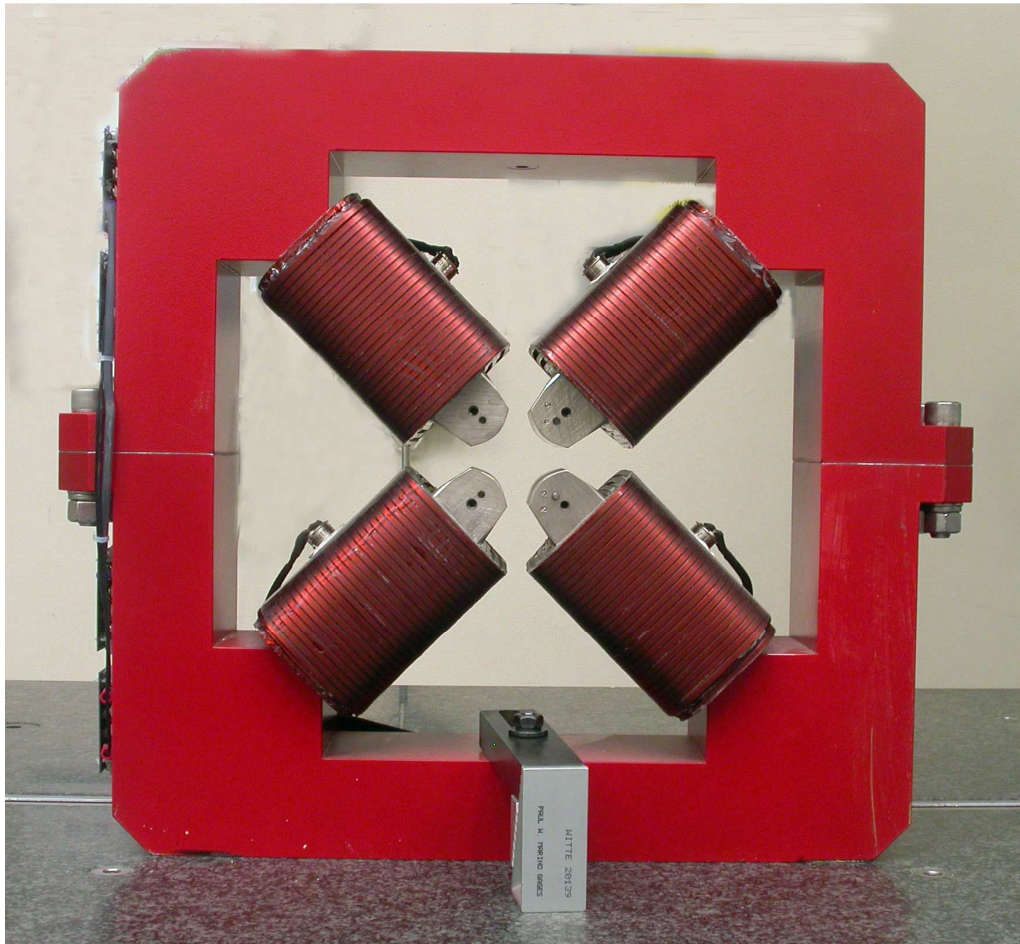
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.0017	-0.00171	-0.0007	-0.00084
Max. Dev.	0.00053	0.0023	0.00054	0.00164

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



Angle in Decimal Degrees ° = -0.01155

Angle in Milliradians = -0.20153

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