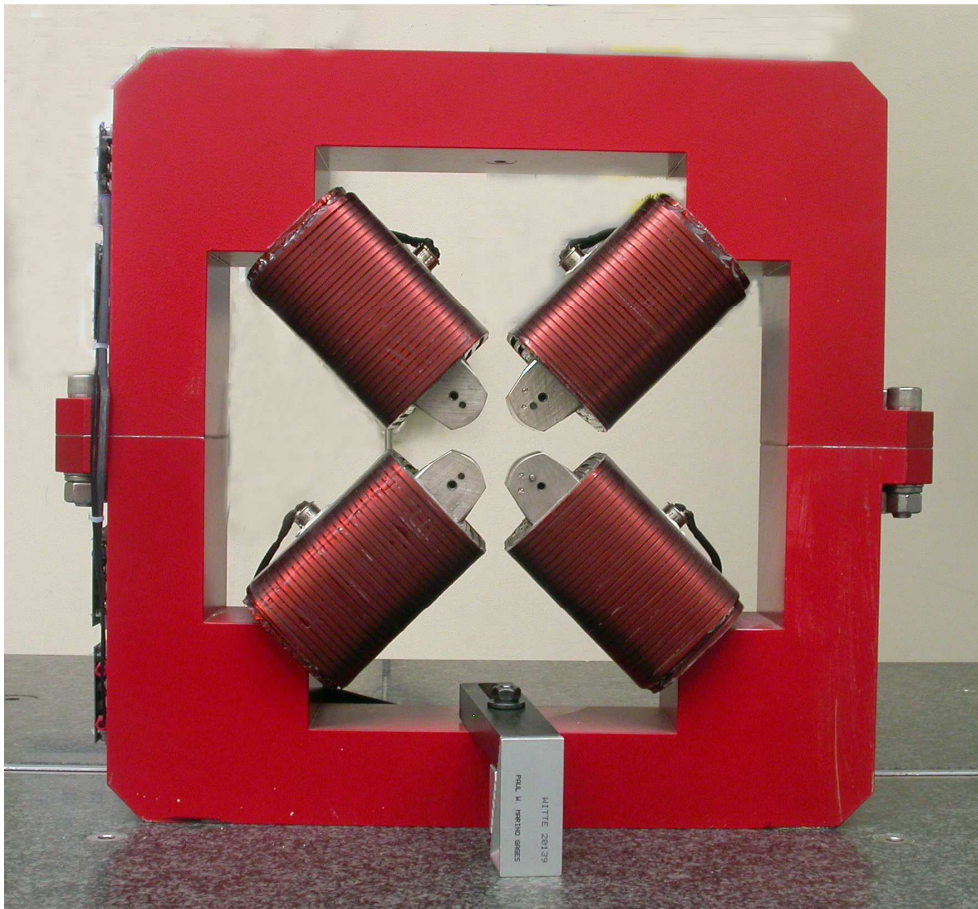


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4028

Mfg. S/N : 027

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	6.4894	8.8818	-1.2466
TB 2	6.4892	8.8815	1.2534
TB 3	-6.5096	8.8700	1.2515
TB 4	-6.5094	8.8706	-1.2482
TB A	6.4904	8.1948	-1.2470
TB B	6.4903	8.1942	1.2527
TB C	-6.5089	8.1828	1.2507
TB D	-6.5089	8.1836	-1.2487

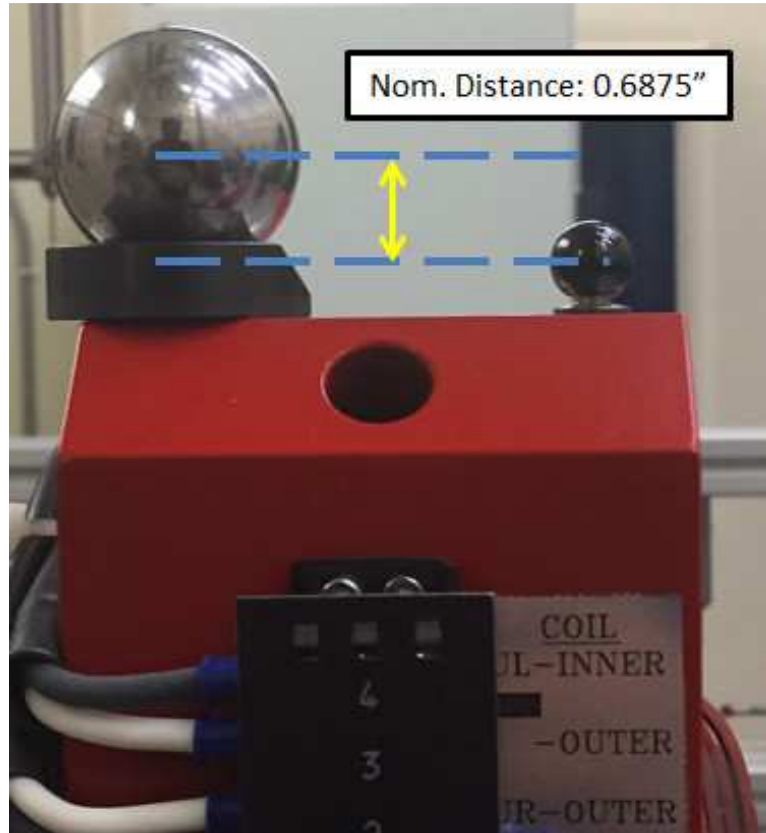
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68703
TB 2	0.6875 ± 0.001	0.68726
TB 3	0.6875 ± 0.001	0.68717
TB 4	0.6875 ± 0.001	0.68696

Dimensions in Inch

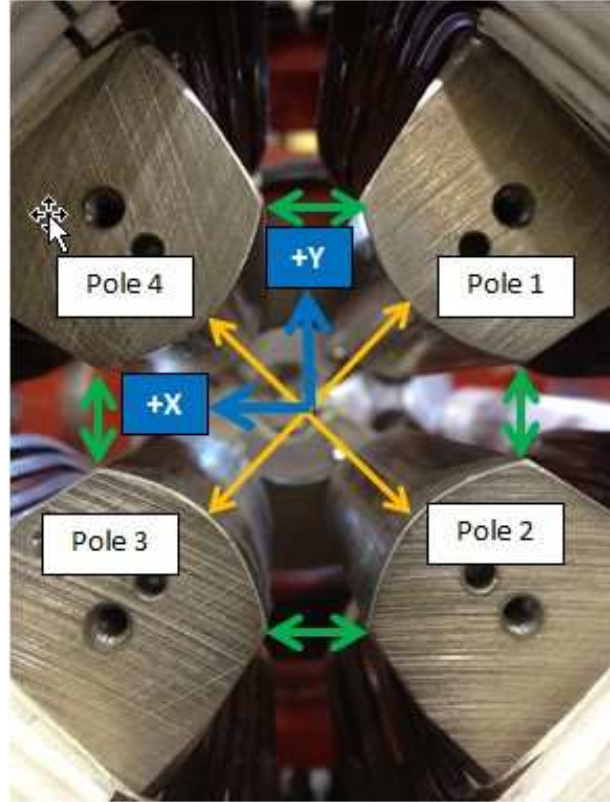
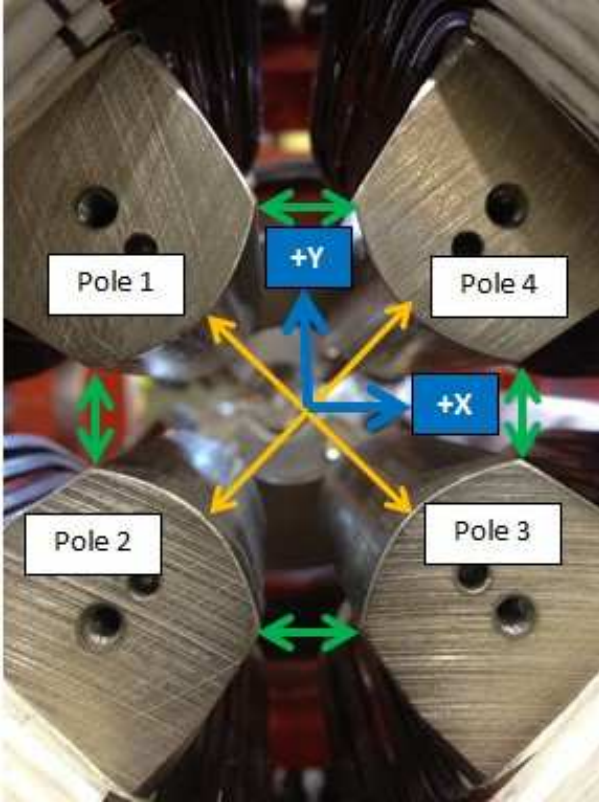
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



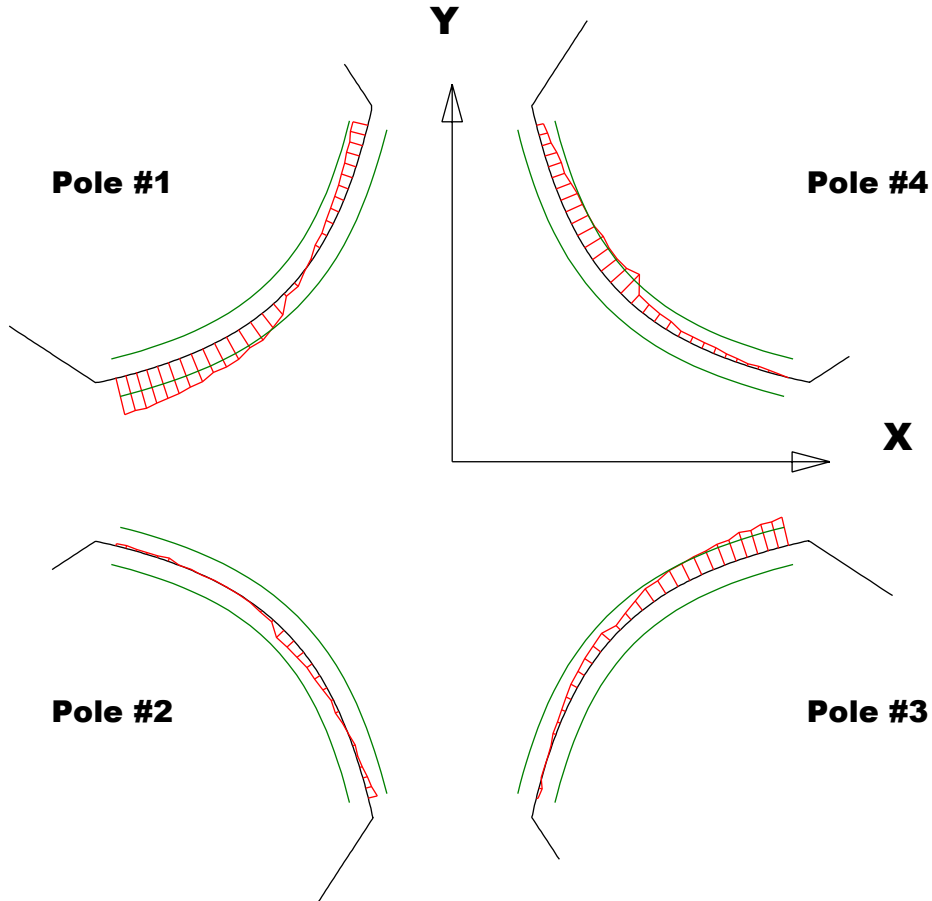
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.25944	1.2612
Pole Tip Distance 2-4	1.260	1.26186	1.25977
Gap 1-2	.422	0.42039	0.42158
Gap 2-3	.422	0.42135	0.41999
Gap 3-4	.422	0.41936	0.42134
Gap 4-1	.422	0.42465	0.42396

Dimensions in Inch

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Mfg. S/N : 027

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

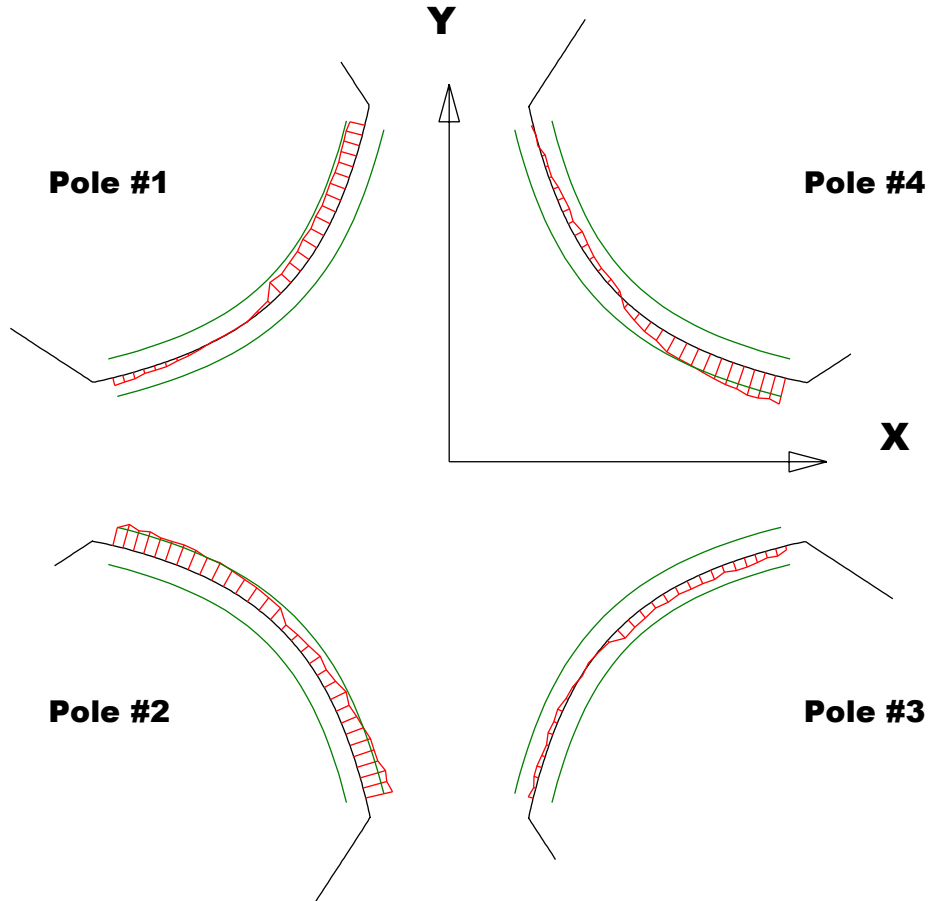
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00082	-0.00055	-0.00017	-0.0014
Max. Dev.	0.00199	0.00049	0.00154	0.00001

Barcode # : 4028

Mfg. S/N : 027

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

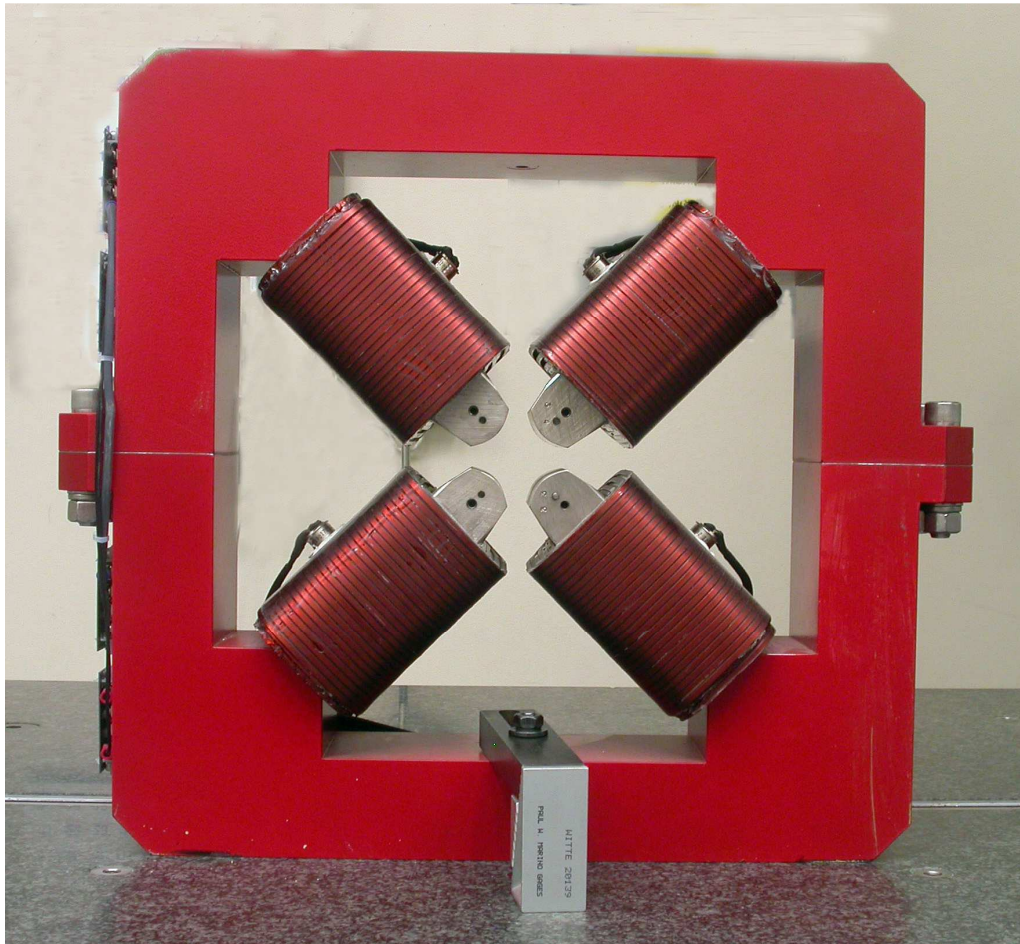
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00088	0.00037	-0.00059	-0.00047
Max. Dev.	0.00043	0.00148	0.00027	0.00142

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



Angle in Decimal Degrees $^{\circ}$ = -0.04991

Angle in Milliradians = -0.87111

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