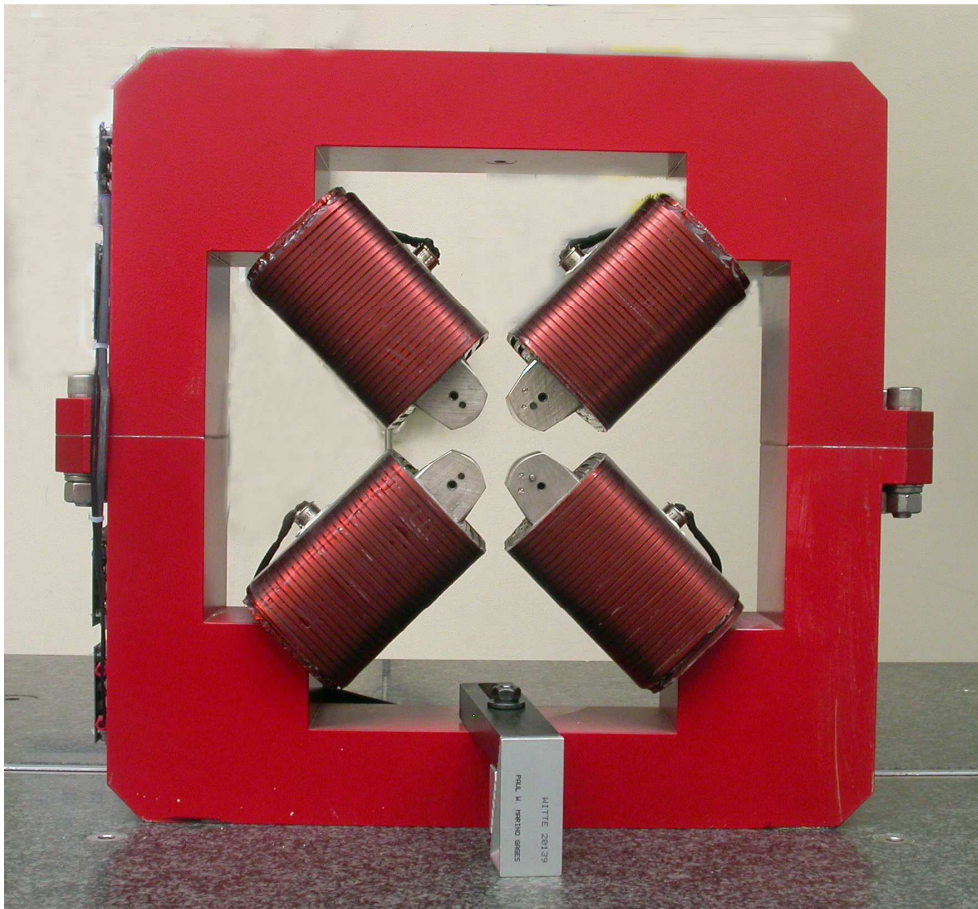


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4034

Mfg. S/N : 034

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	6.5052	8.8703	-1.2521
TB 2	6.5060	8.8691	1.2468
TB 3	-6.4929	8.8814	1.2464
TB 4	-6.4929	8.8818	-1.2539
TB A	6.5050	8.1825	-1.2529
TB B	6.5047	8.1819	1.2466
TB C	-6.4940	8.1939	1.2465
TB D	-6.4939	8.1944	-1.2531

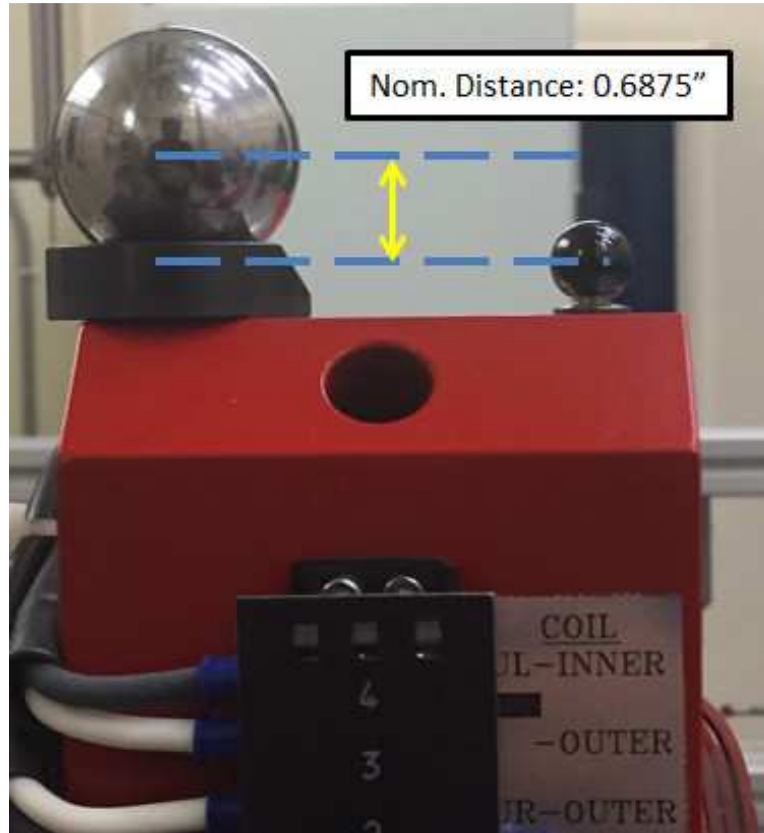
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68786
TB 2	0.6875 ± 0.001	0.68726
TB 3	0.6875 ± 0.001	0.68751
TB 4	0.6875 ± 0.001	0.68737

Dimensions in Inch

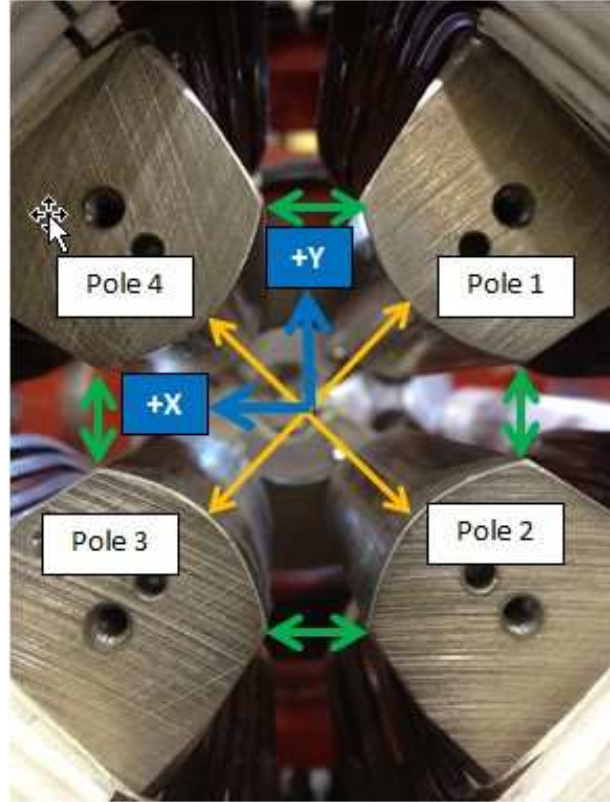
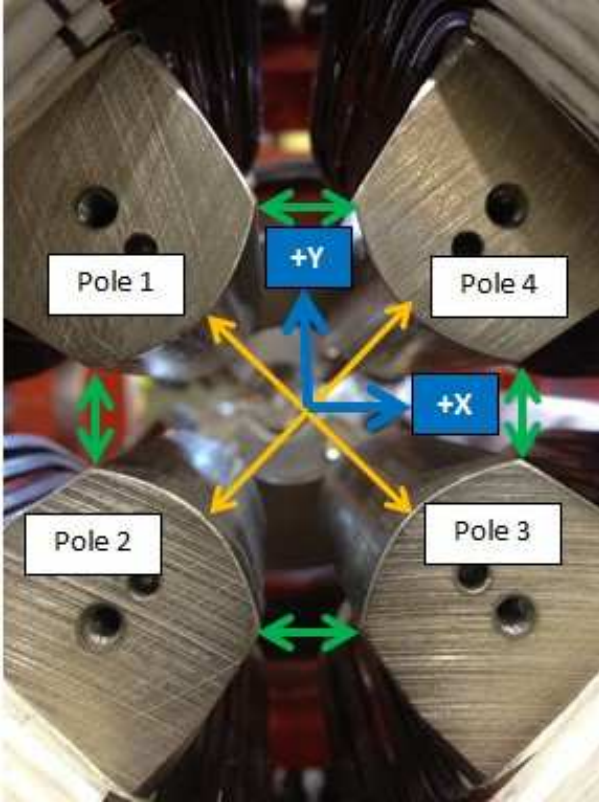
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



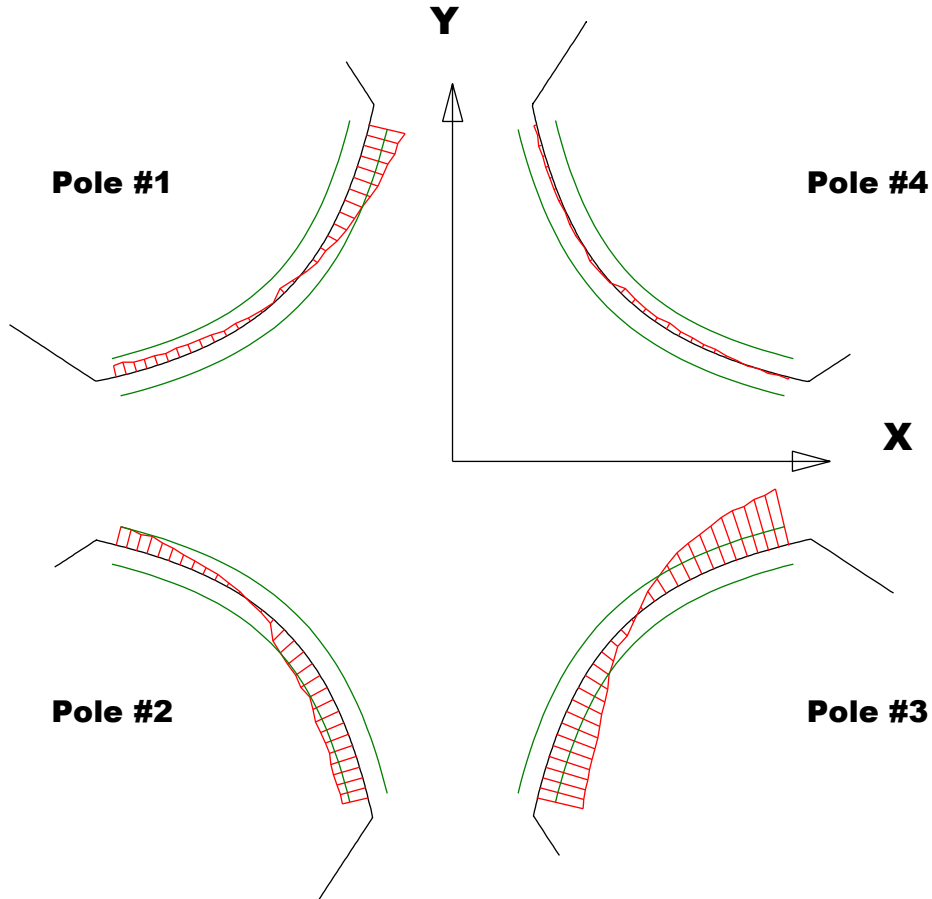
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26077	1.26086
Pole Tip Distance 2-4	1.260	1.26108	1.26031
Gap 1-2	.422	0.4213	0.4218
Gap 2-3	.422	0.42642	0.42461
Gap 3-4	.422	0.41799	0.41746
Gap 4-1	.422	0.42036	0.42079

Dimensions in Inch

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Mfg. S/N : 034

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

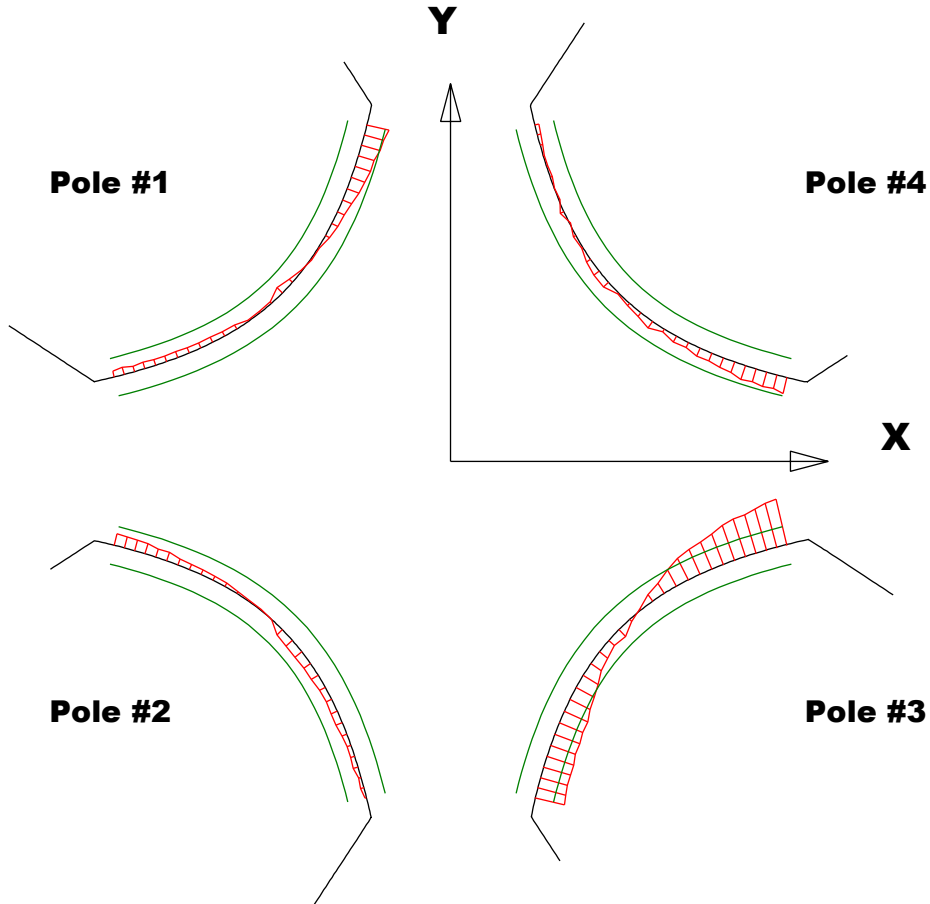
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00067	-0.00144	-0.00249	-0.00036
Max. Dev.	0.00197	0.00101	0.00303	0.00019

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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

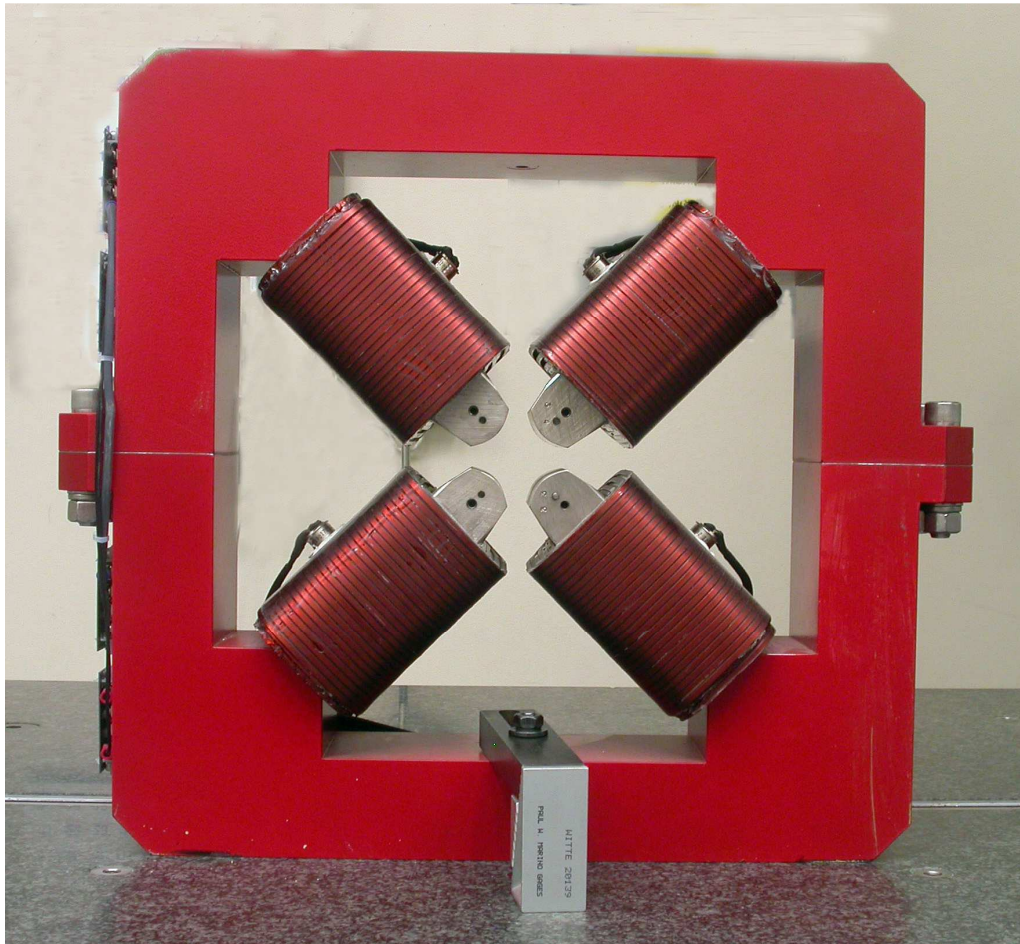
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00041	-0.00048	-0.00158	-0.00022
Max. Dev.	0.0012	0.00062	0.00247	0.00087

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



Angle in Decimal Degrees $^{\circ}$ = 0.05268

Angle in Milliradians = 0.91939

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