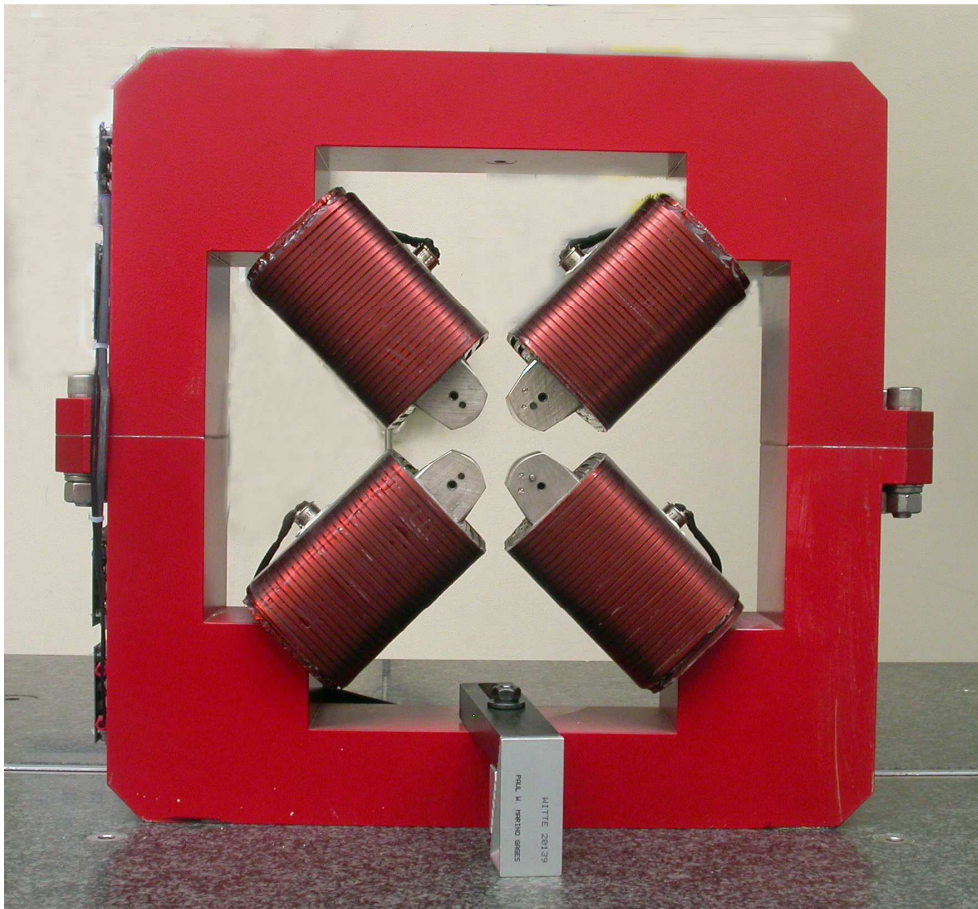


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4026

Mfg. S/N : 023

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	6.5055	8.8675	-1.2492
TB 2	6.5046	8.8667	1.2512
TB 3	-6.4971	8.8852	1.2488
TB 4	-6.4955	8.8857	-1.2491
TB A	6.5044	8.1805	-1.2490
TB B	6.5034	8.1797	1.2507
TB C	-6.4951	8.1963	1.2492
TB D	-6.4946	8.1971	-1.2506

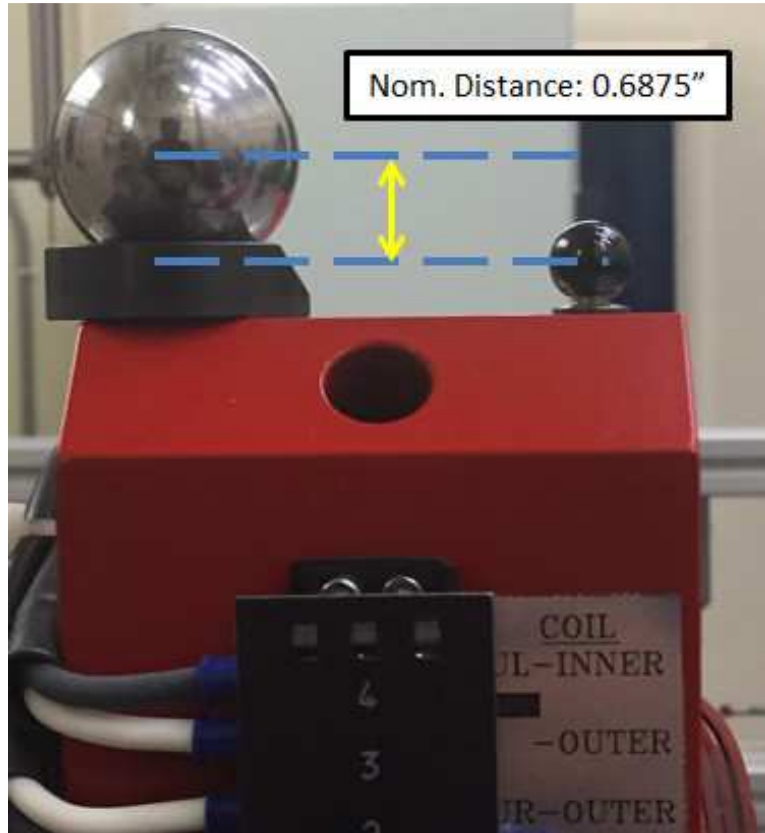
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68708
TB 2	0.6875 ± 0.001	0.68698
TB 3	0.6875 ± 0.001	0.68882
TB 4	0.6875 ± 0.001	0.68856

Dimensions in Inch

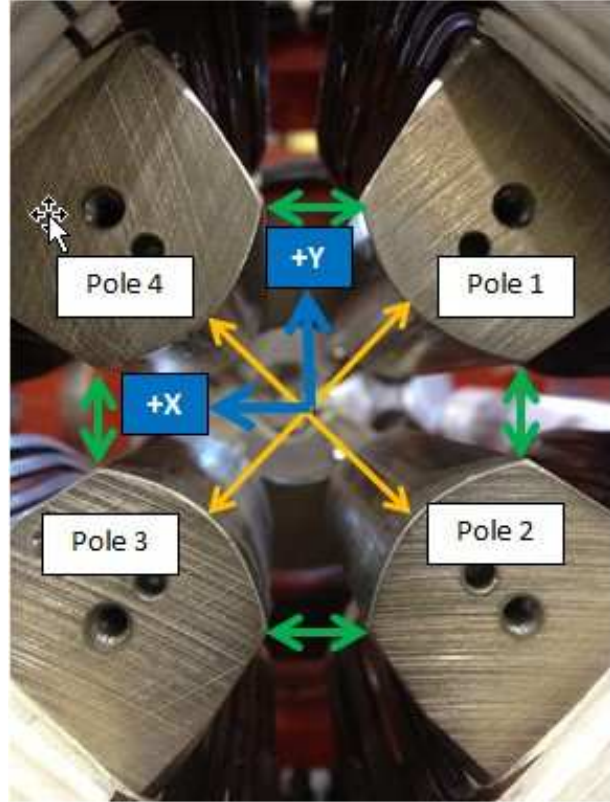
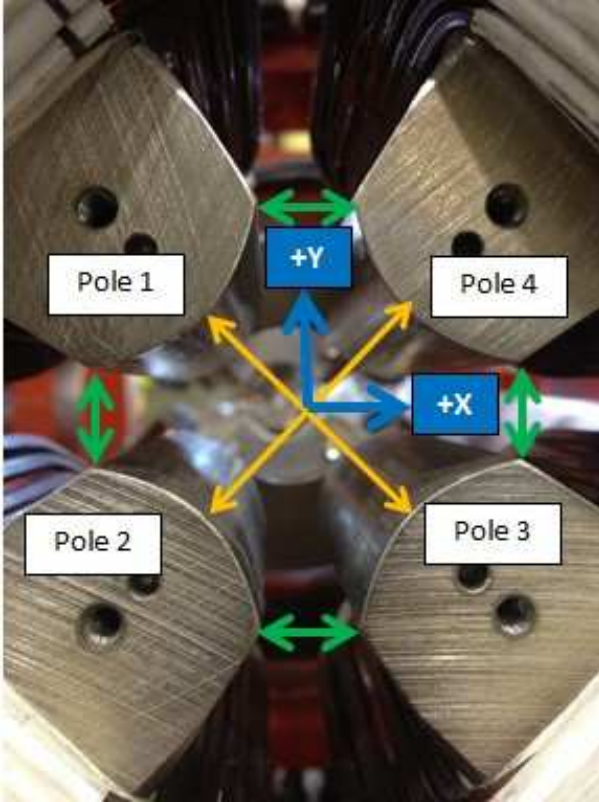
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



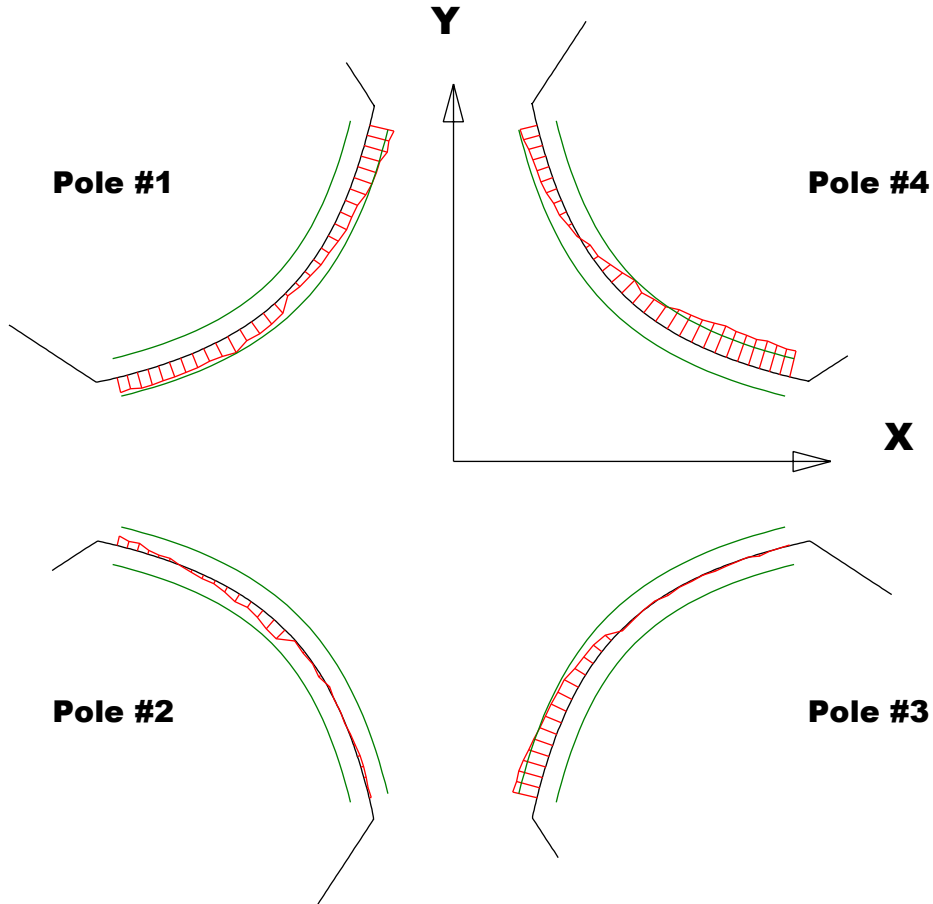
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.25976	1.26152
Pole Tip Distance 2-4	1.260	1.26142	1.26153
Gap 1-2	.422	0.42096	0.42048
Gap 2-3	.422	0.42049	0.42089
Gap 3-4	.422	0.42319	0.4252
Gap 4-1	.422	0.41802	0.41829

Dimensions in Inch

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Mfg. S/N : 023

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

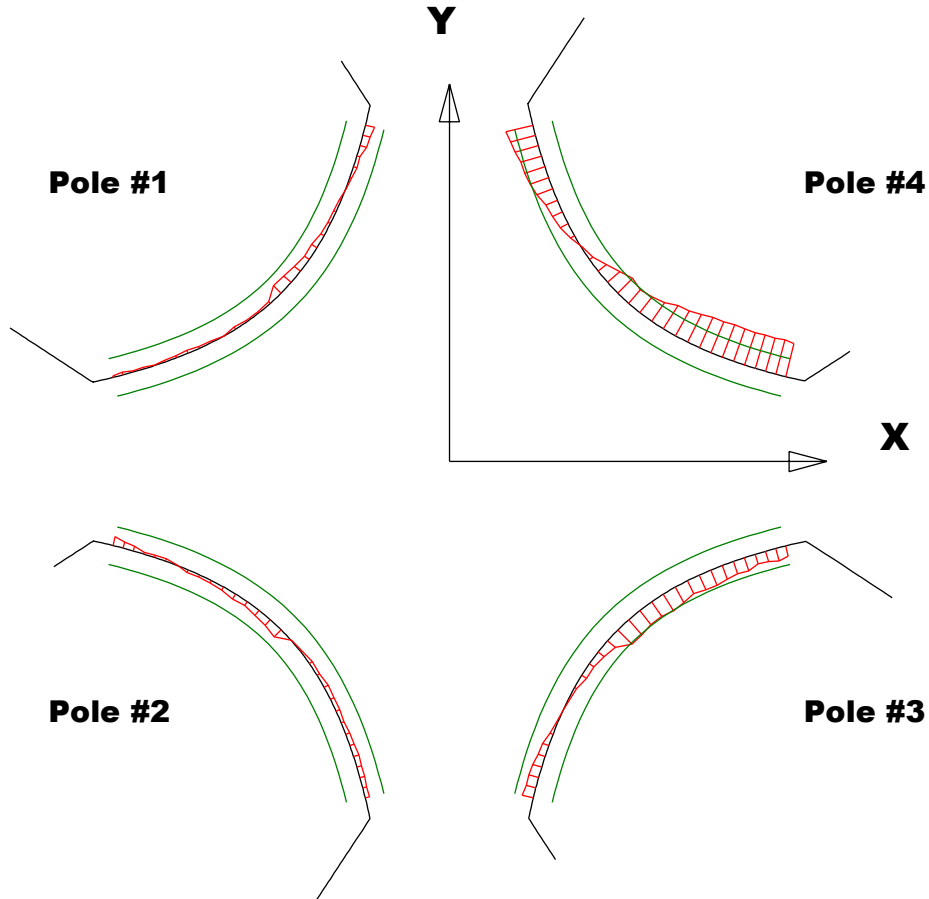
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	0.00019	-0.00065	-0.0001	-0.00154
Max. Dev.	0.00133	0.00051	0.00132	0.00093

Barcode # : 4026

Mfg. S/N : 023

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

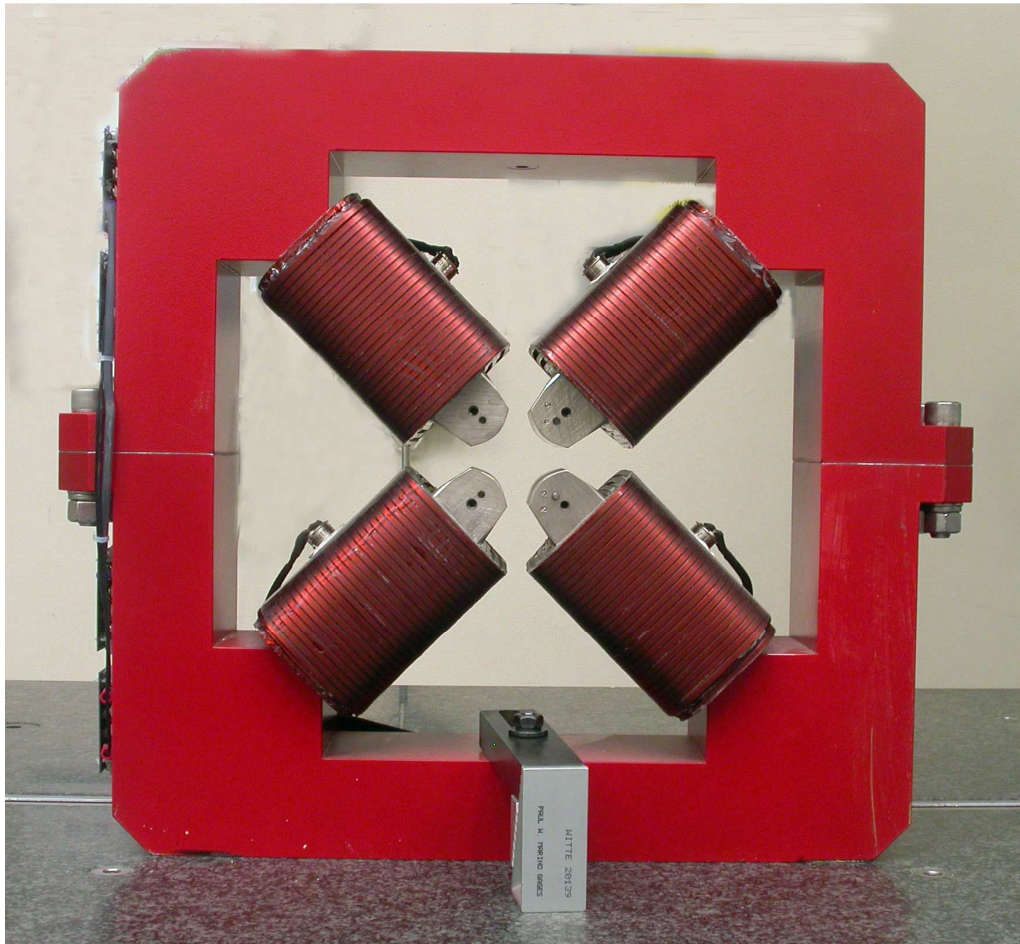
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00056	-0.00051	-0.00106	-0.00189
Max. Dev.	0.0005	0.00048	0.0006	0.00147

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



Angle in Decimal Degrees $^{\circ}$ = 0.07311

Angle in Milliradians = 1.27607

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