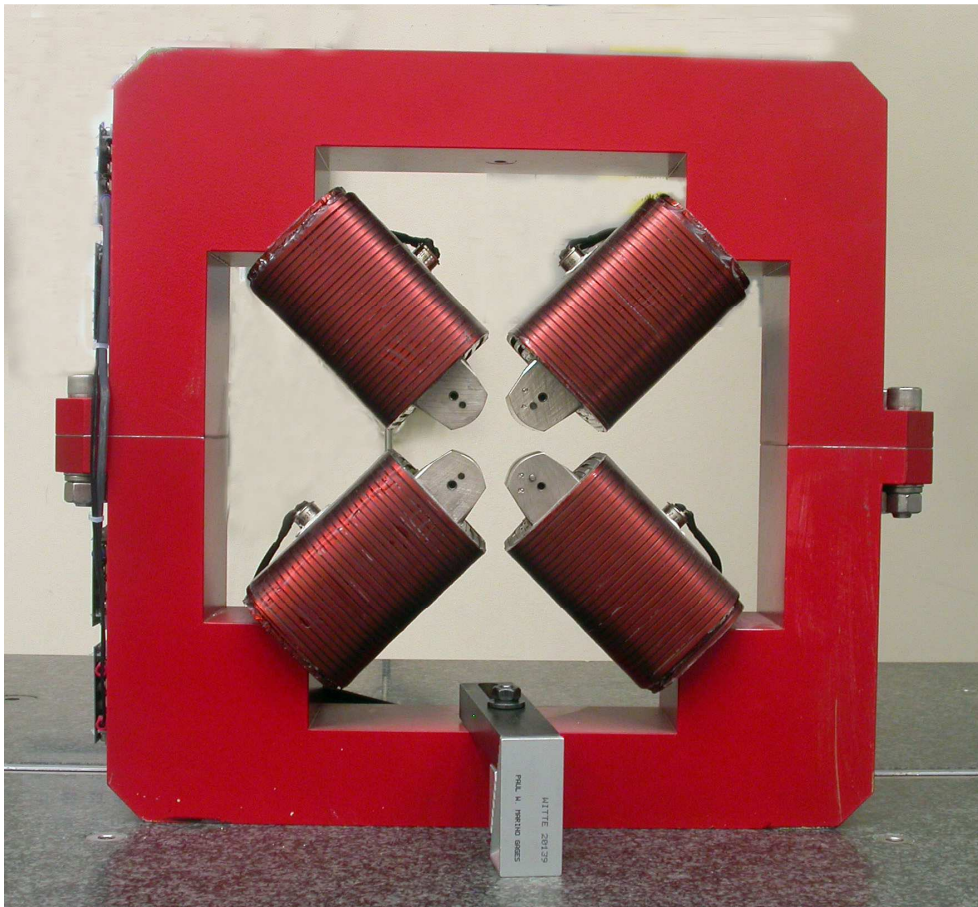


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4023

Mfg. S/N : 026

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	6.5028	8.8726	-1.2488
TB 2	6.5030	8.8712	1.2502
TB 3	-6.4960	8.8793	1.2527
TB 4	-6.4974	8.8804	-1.2468
TB A	6.5023	8.1852	-1.2499
TB B	6.5025	8.1837	1.2495
TB C	-6.4964	8.1920	1.2517
TB D	-6.4973	8.1936	-1.2477

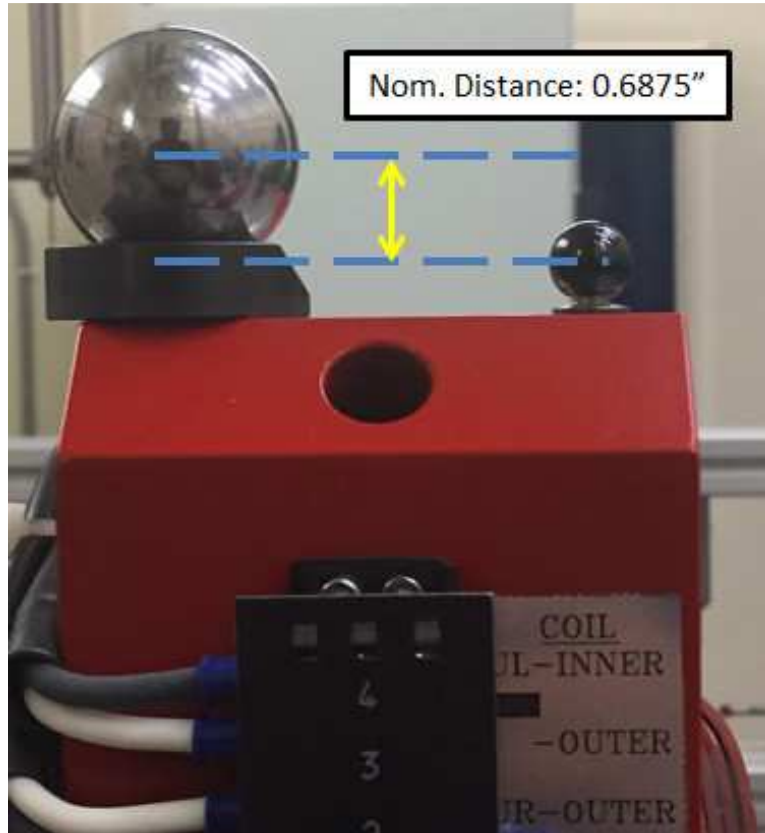
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68741
TB 2	0.6875 ± 0.001	0.68747
TB 3	0.6875 ± 0.001	0.68725
TB 4	0.6875 ± 0.001	0.6868

Dimensions in Inch

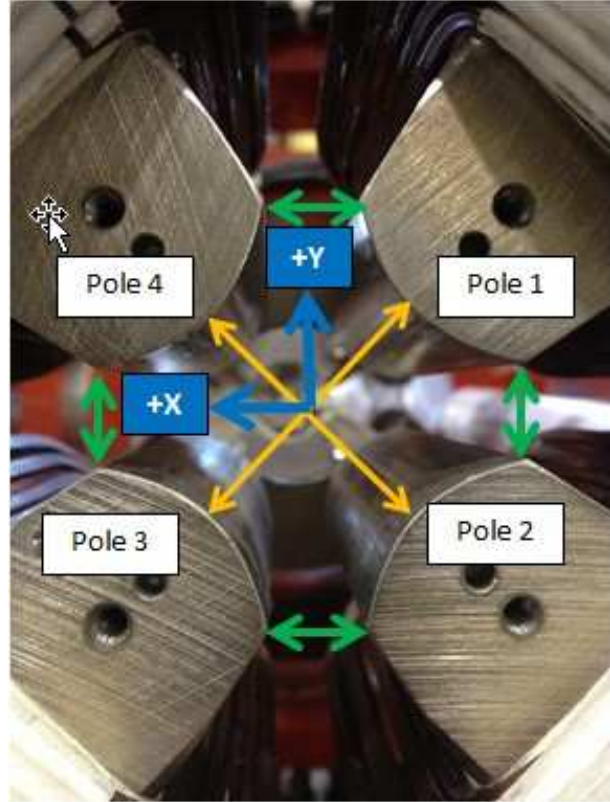
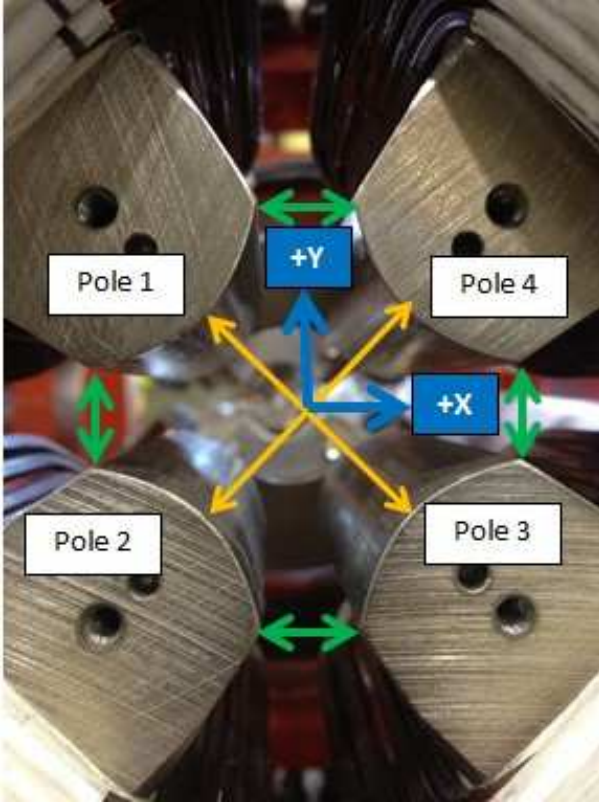
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



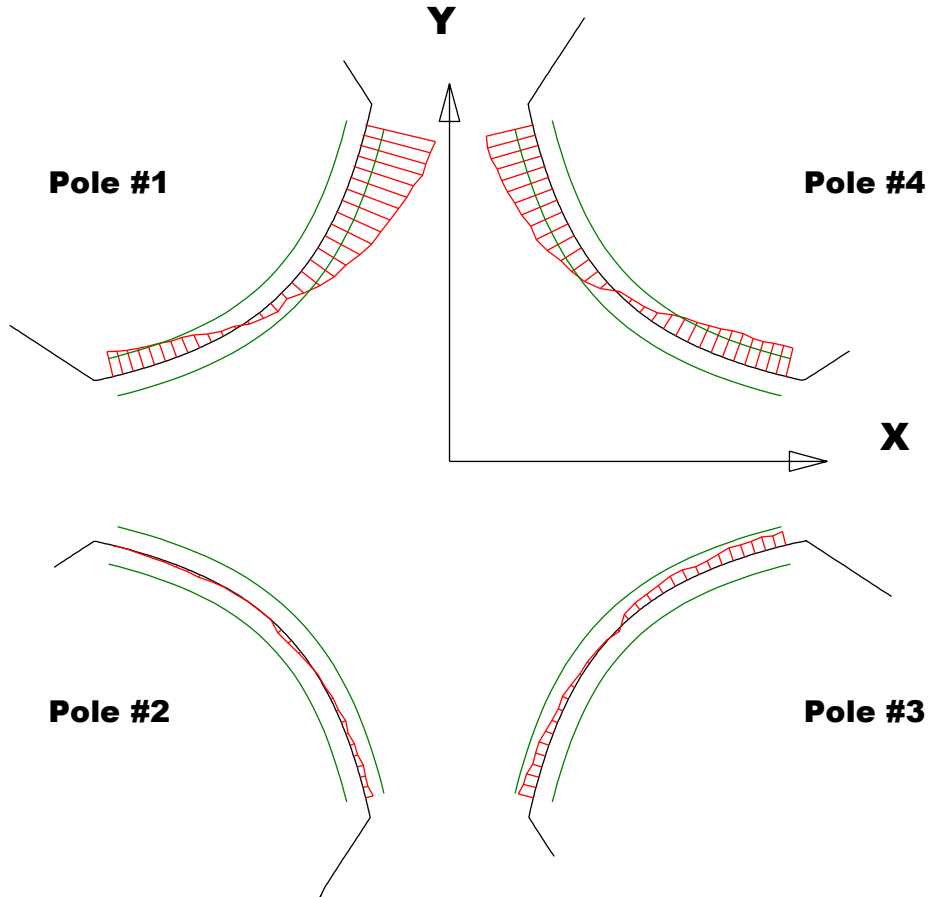
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.25963	1.26065
Pole Tip Distance 2-4	1.260	1.26028	1.25979
Gap 1-2	.422	0.42589	0.42745
Gap 2-3	.422	0.42011	0.42022
Gap 3-4	.422	0.42553	0.42429
Gap 4-1	.422	0.41437	0.41369

Dimensions in Inch

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Mfg. S/N : 026

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

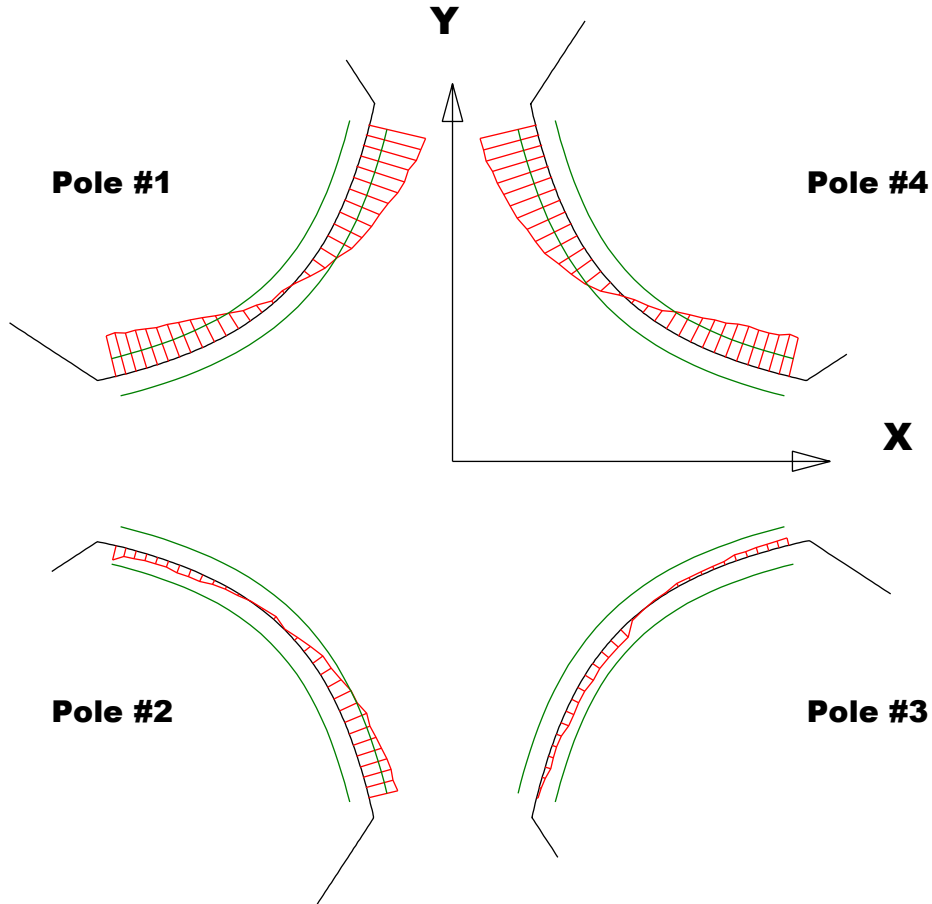
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00137	-0.00025	-0.00012	-0.00157
Max. Dev.	0.00376	0.00042	0.00082	0.00262

Barcode # : 4023

Mfg. S/N : 026

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

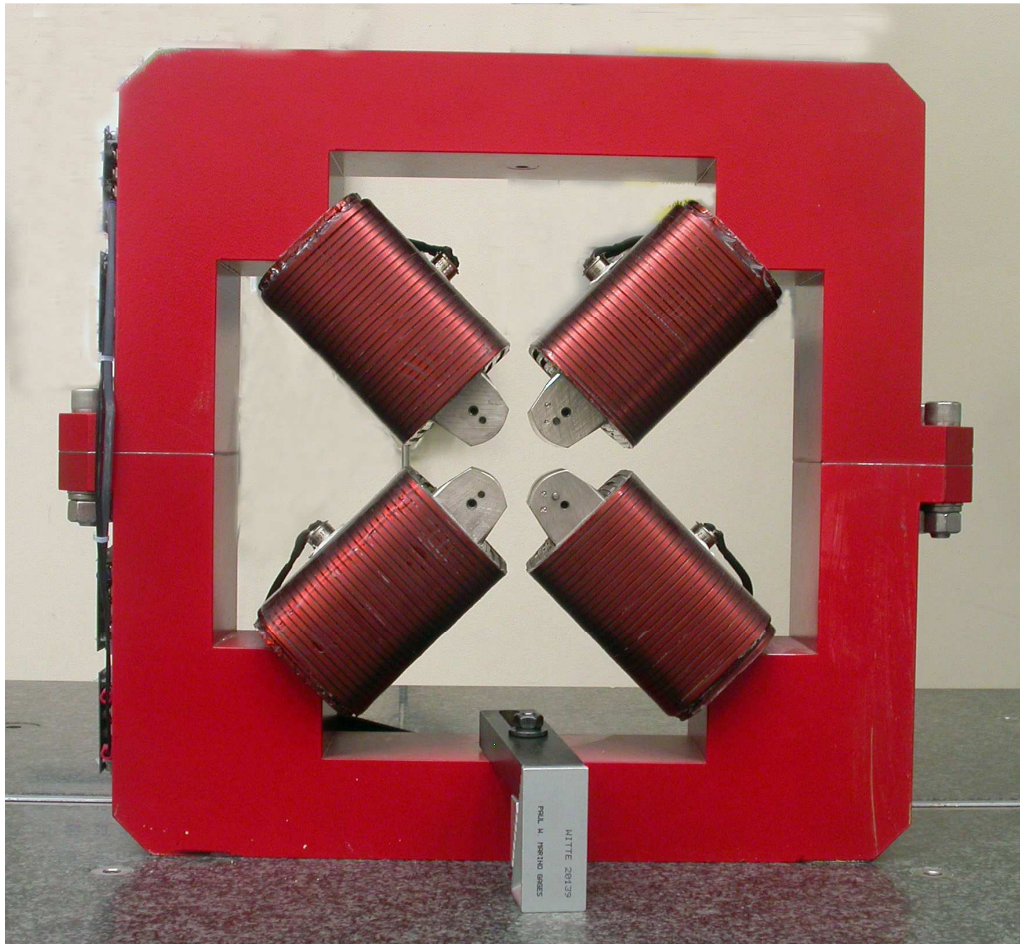
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00226	-0.00078	-0.00057	-0.00218
Max. Dev.	0.00307	0.00157	0.0004	0.00304

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



Angle in Decimal Degrees $^{\circ}$ = 0.03559

Angle in Milliradians = 0.62110

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