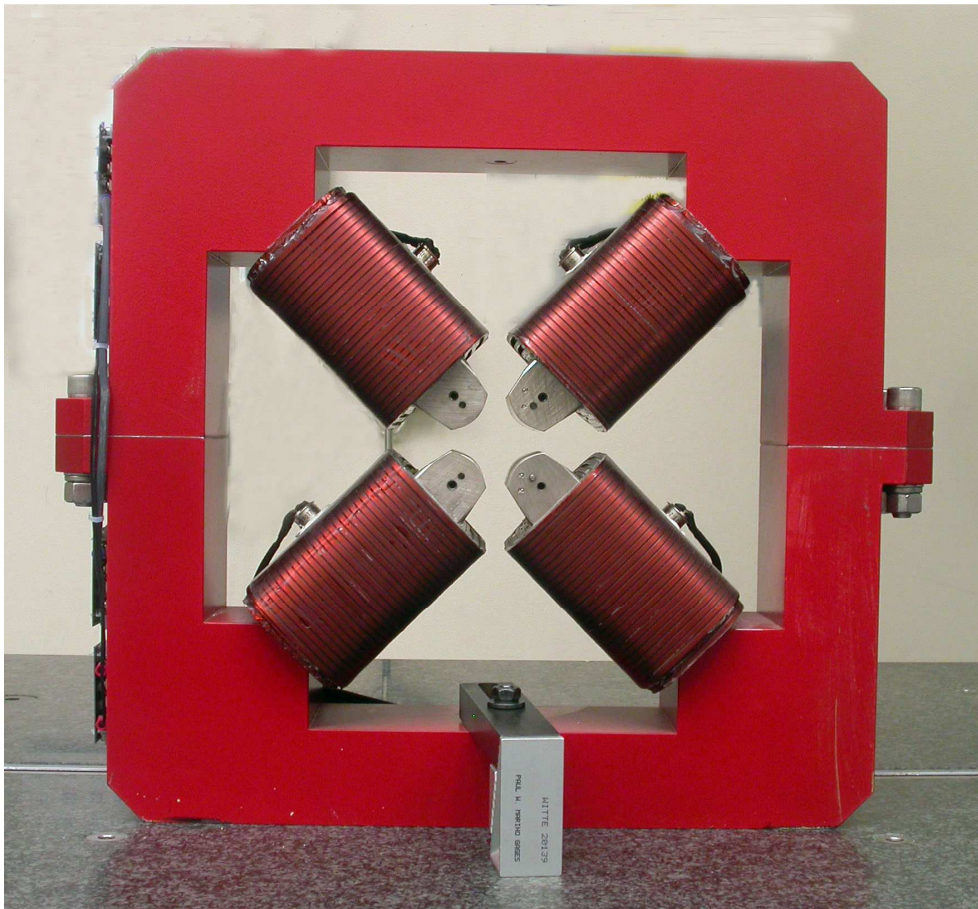


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4022

Mfg. S/N : 024

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	6.5053	8.8683	-1.2531
TB 2	6.5050	8.8681	1.2464
TB 3	-6.4942	8.8783	1.2448
TB 4	-6.4947	8.8788	-1.2549
TB A	6.5045	8.1821	-1.2535
TB B	6.5043	8.1815	1.2466
TB C	-6.4944	8.1915	1.2452
TB D	-6.4952	8.1915	-1.2550

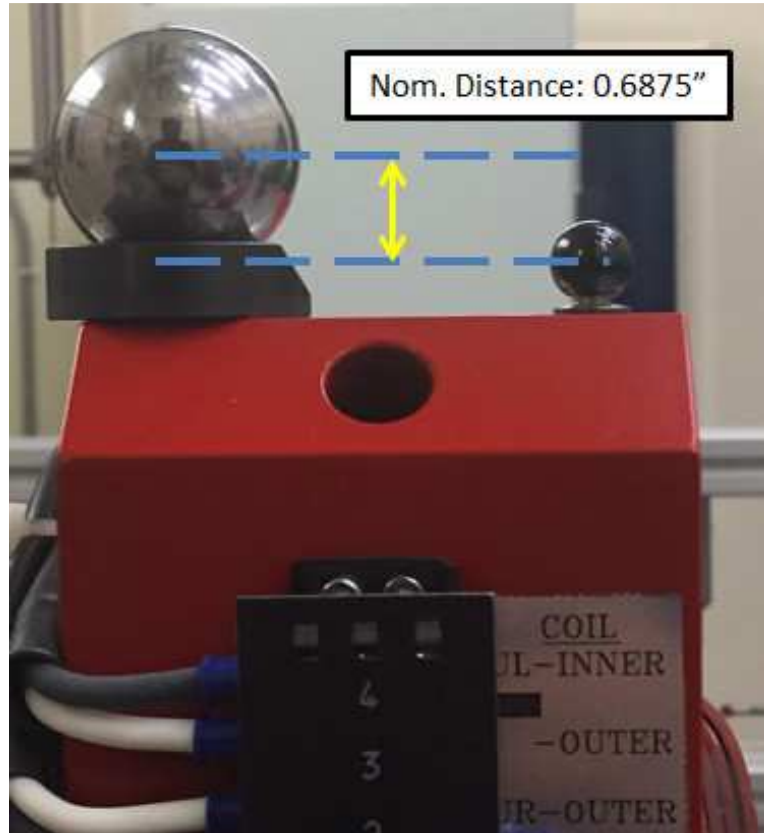
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68622
TB 2	0.6875 ± 0.001	0.6866
TB 3	0.6875 ± 0.001	0.68671
TB 4	0.6875 ± 0.001	0.68735

Dimensions in Inch

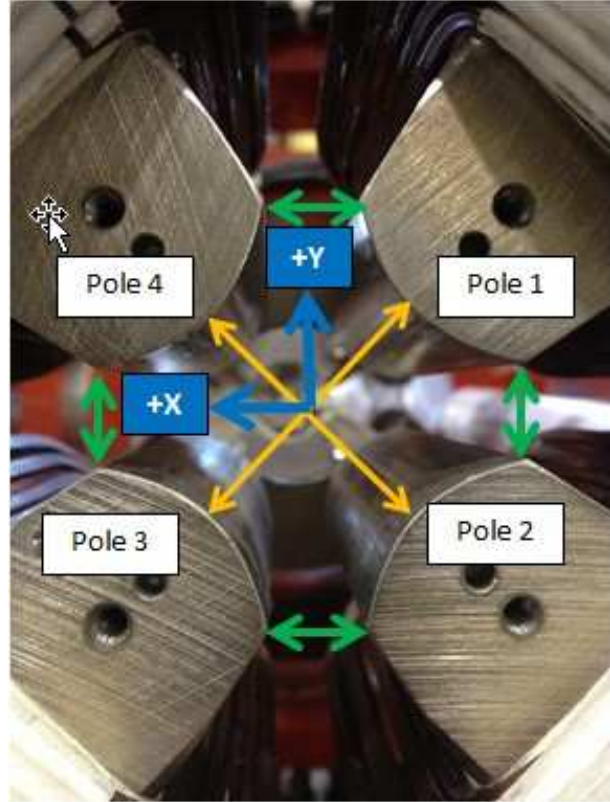
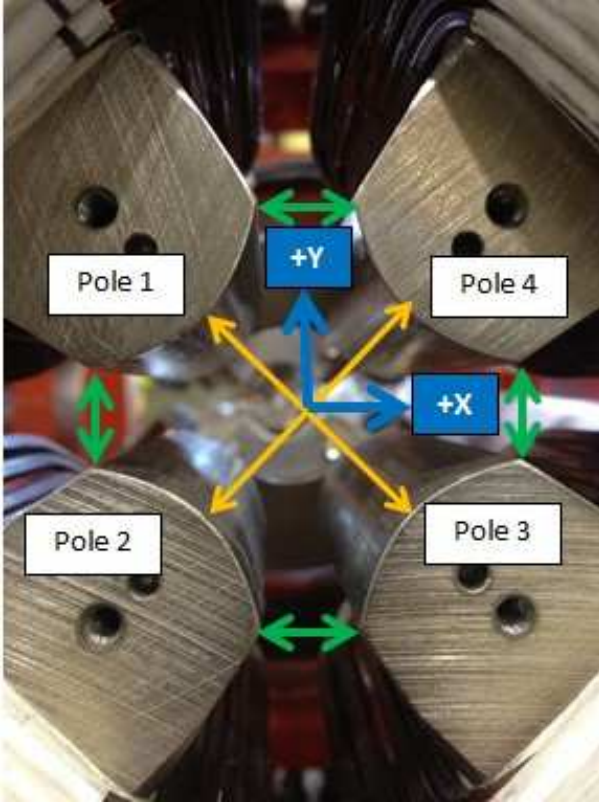
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



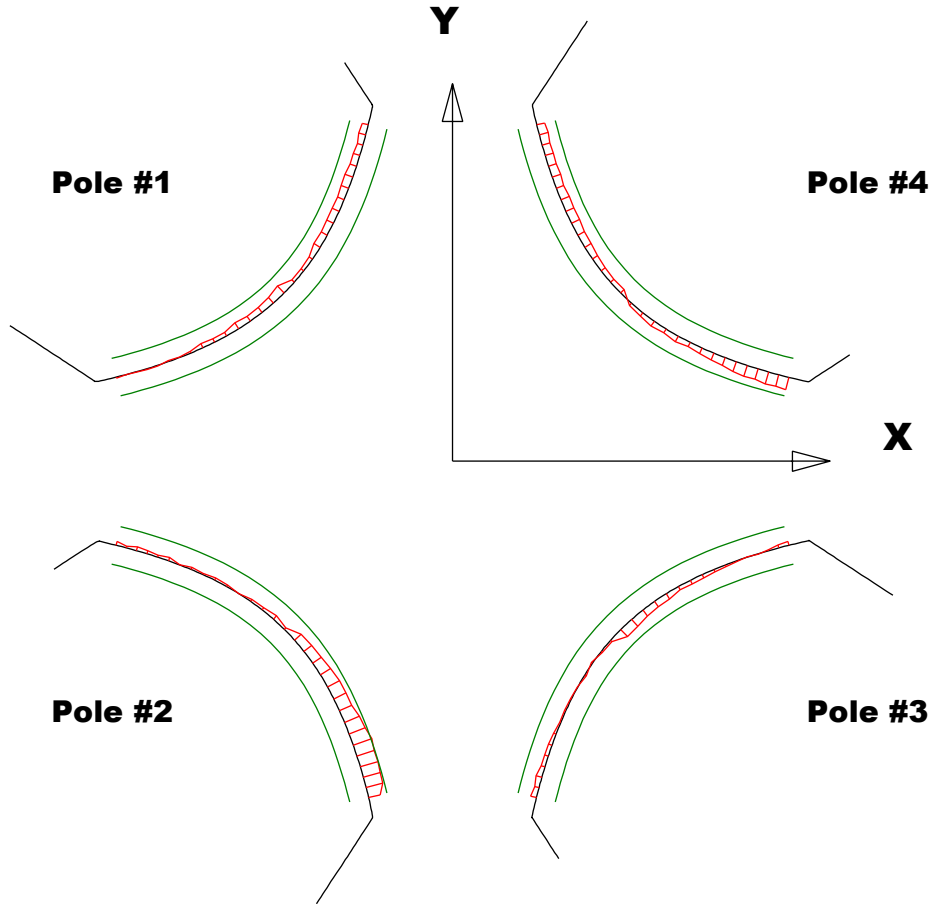
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26097	1.26124
Pole Tip Distance 2-4	1.260	1.26011	1.25985
Gap 1-2	.422	0.42289	0.42258
Gap 2-3	.422	0.42196	0.42234
Gap 3-4	.422	0.4205	0.41957
Gap 4-1	.422	0.42376	0.42597

Dimensions in Inch

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Mfg. S/N : 024

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

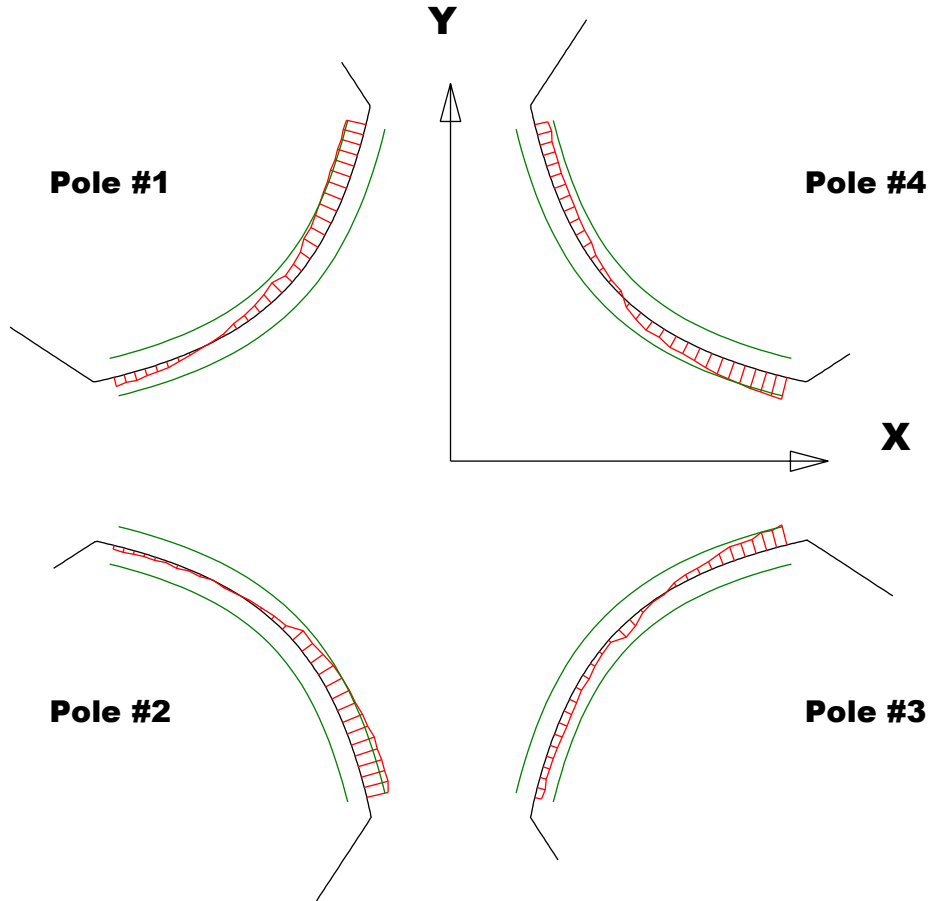
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00051	-0.00001	-0.00052	-0.00049
Max. Dev.	0.00006	0.00105	0.00033	0.00068

Barcode # : 4022

Mfg. S/N : 024

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

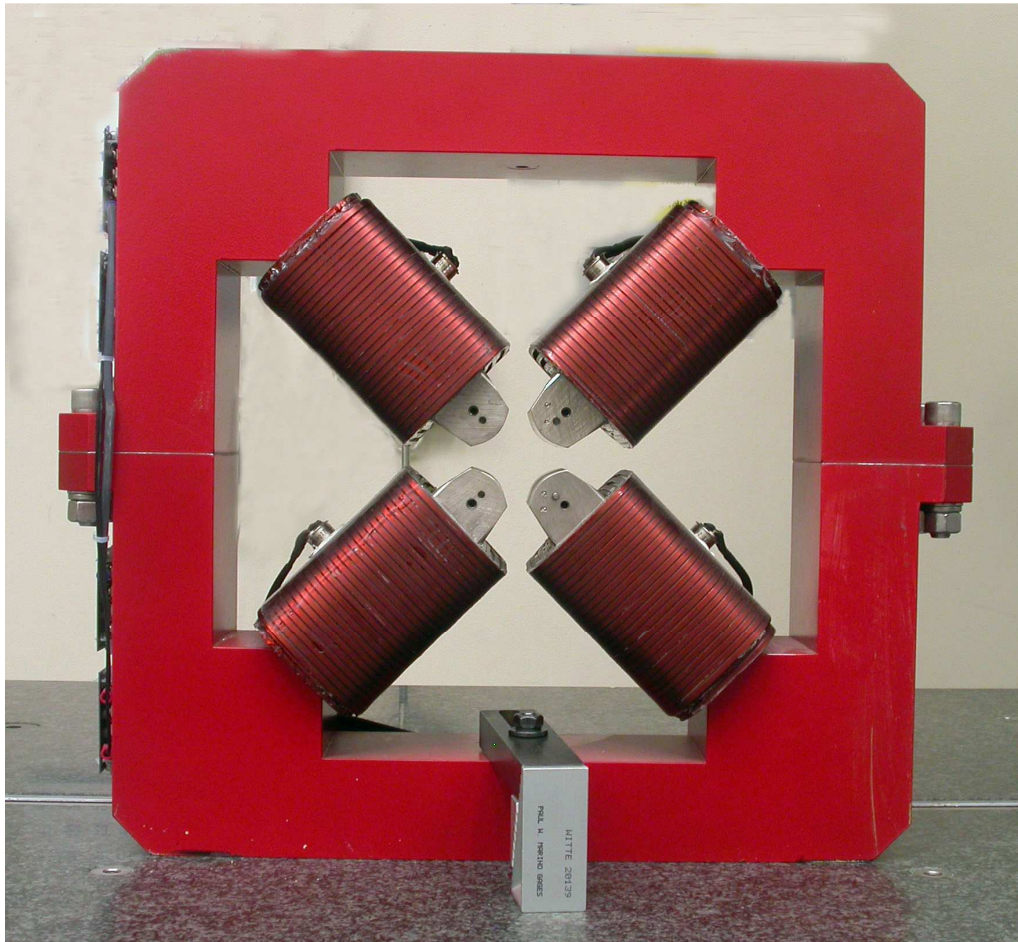
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00112	-0.00023	-0.00056	-0.00078
Max. Dev.	0.0005	0.00131	0.0011	0.00119

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



Angle in Decimal Degrees $^{\circ}$ = 0.04497

Angle in Milliradians = 0.78492

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