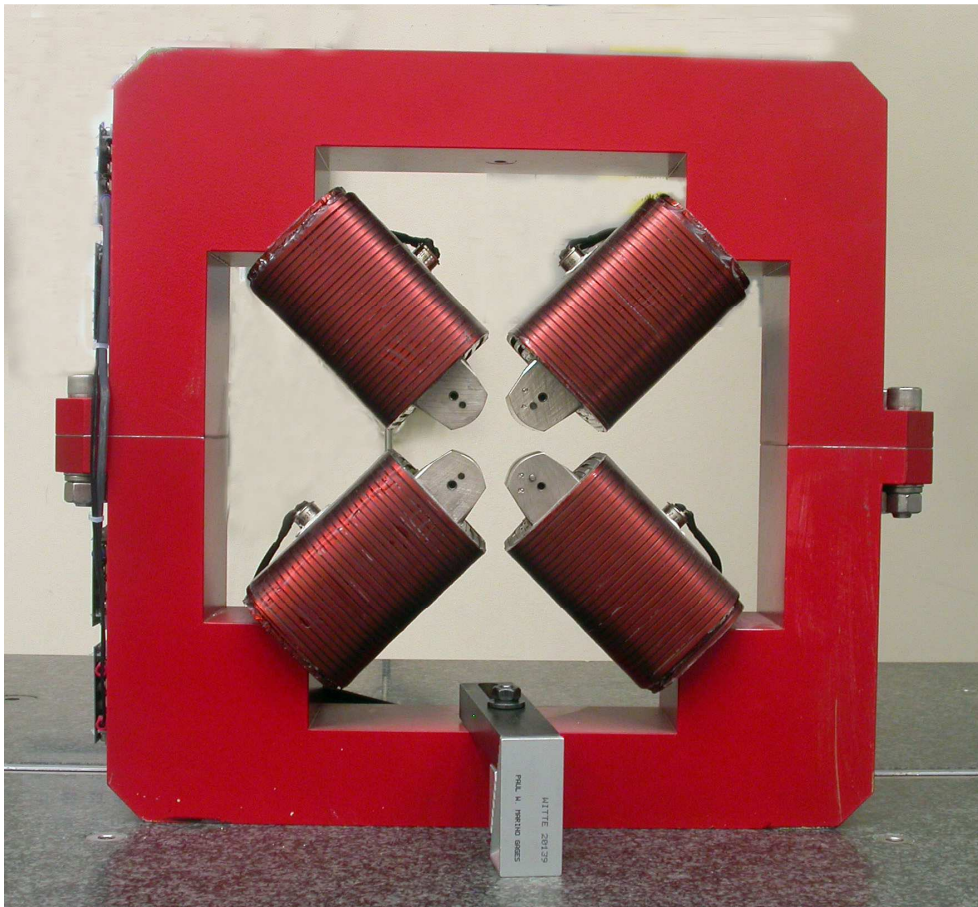


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4024

Mfg. S/N : 025

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	6.4820	8.8892	-1.2484
TB 2	6.4823	8.8883	1.2520
TB 3	-6.5175	8.8644	1.2534
TB 4	-6.5178	8.8651	-1.2472
TB A	6.4830	8.2021	-1.2484
TB B	6.4834	8.2019	1.2520
TB C	-6.5165	8.1773	1.2529
TB D	-6.5161	8.1785	-1.2468

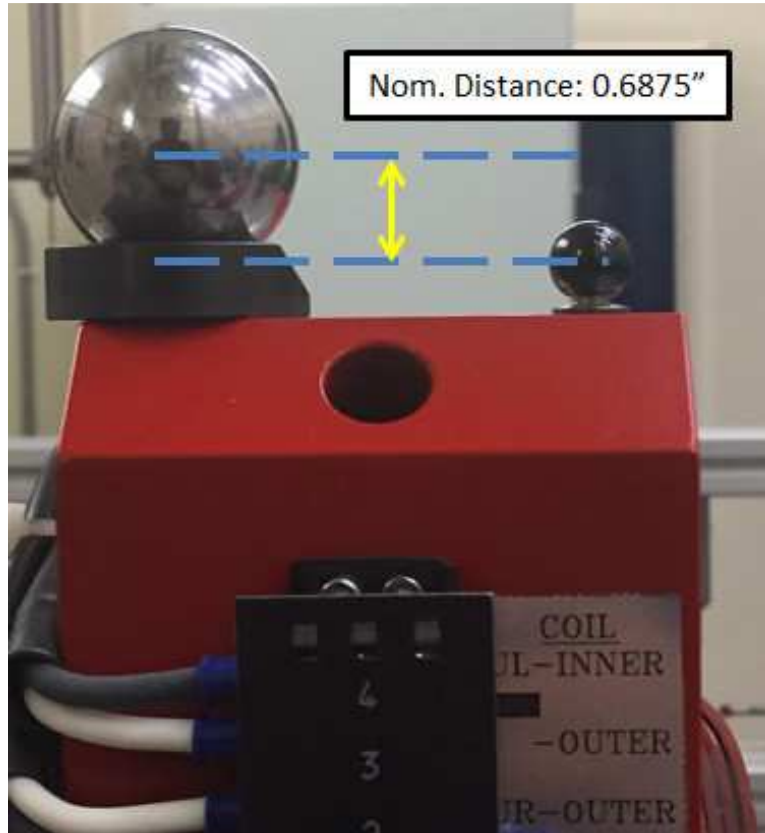
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68714
TB 2	0.6875 ± 0.001	0.68642
TB 3	0.6875 ± 0.001	0.68707
TB 4	0.6875 ± 0.001	0.68657

Dimensions in Inch

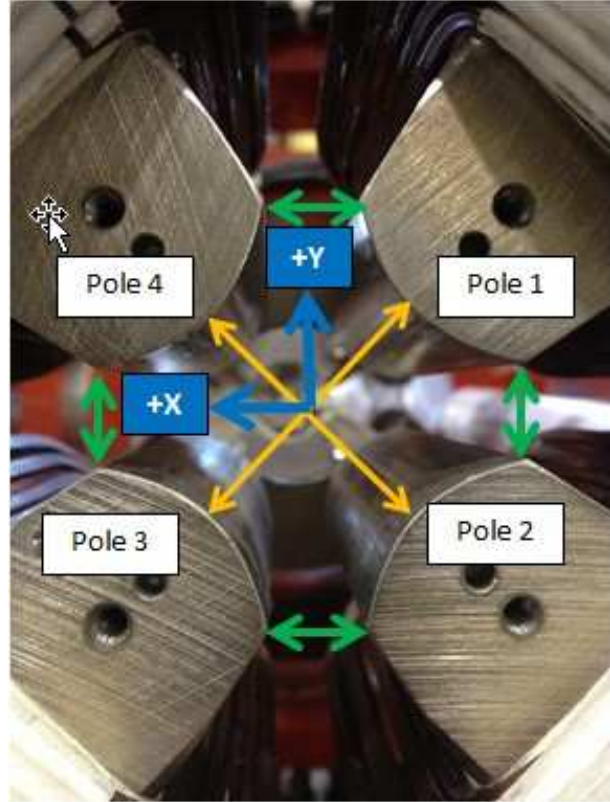
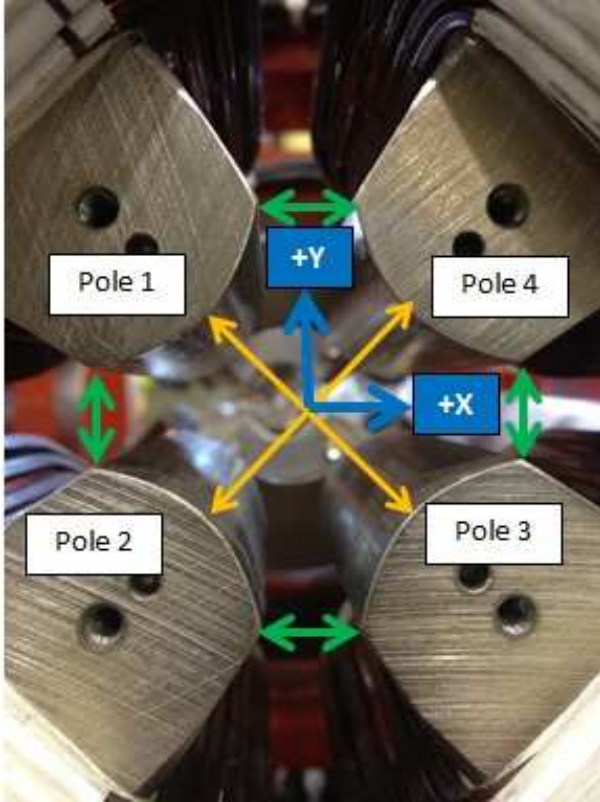
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



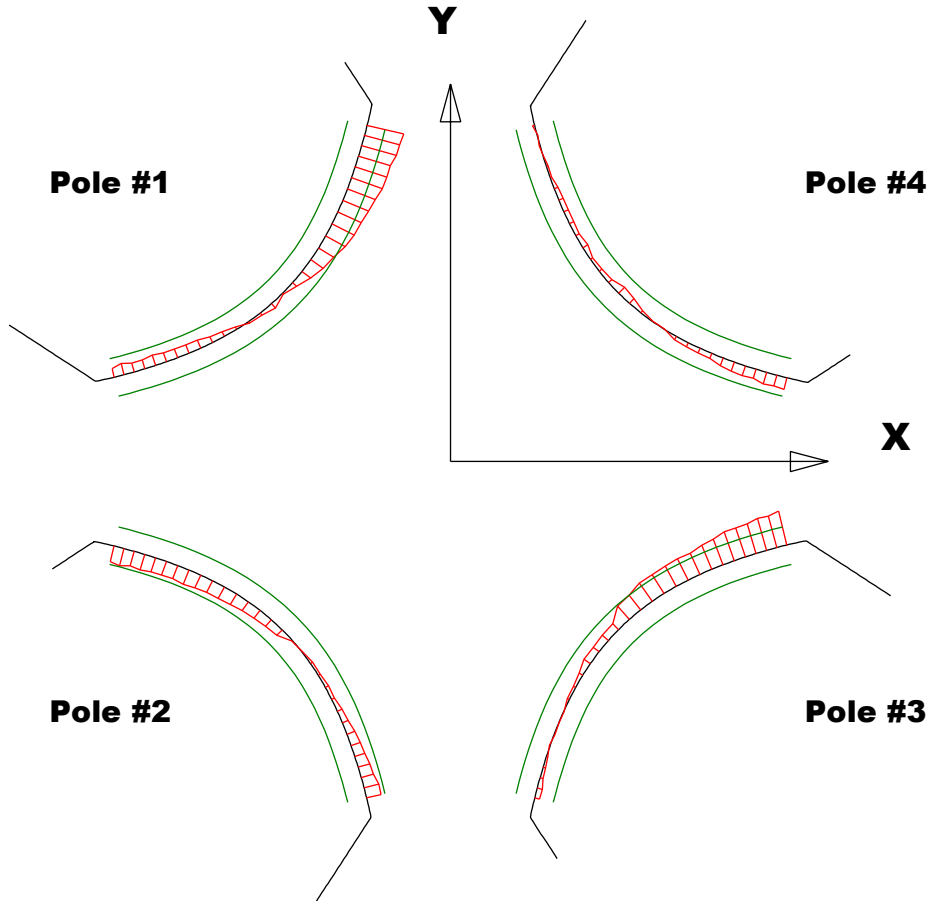
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.25942	1.25966
Pole Tip Distance 2-4	1.260	1.26082	1.26079
Gap 1-2	.422	0.42495	0.42525
Gap 2-3	.422	0.42295	0.42164
Gap 3-4	.422	0.42001	0.4198
Gap 4-1	.422	0.41993	0.4184

Dimensions in Inch

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Mfg. S/N : 025

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

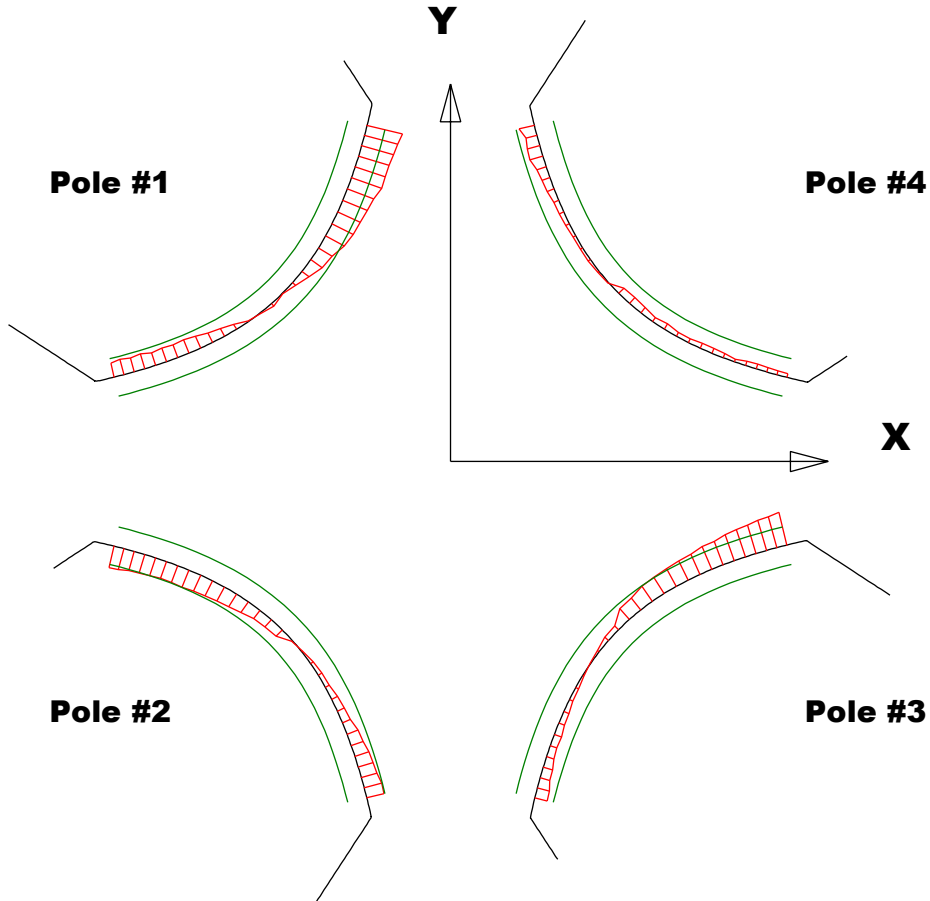
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00062	-0.00095	-0.00028	-0.00044
Max. Dev.	0.00201	0.00081	0.00186	0.00065

Barcode # : 4024

Mfg. S/N : 025

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

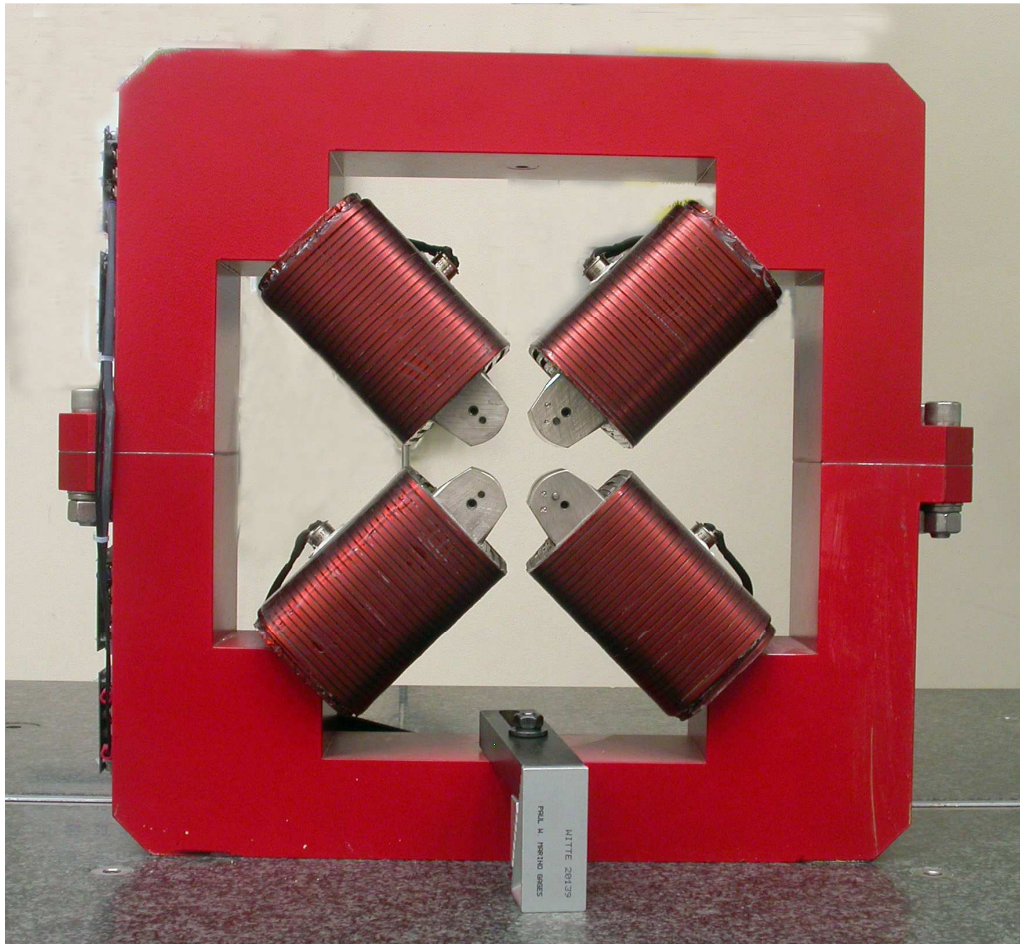
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00084	-0.00118	-0.00067	-0.00042
Max. Dev.	0.00194	0.00096	0.00178	0.00083

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



Angle in Decimal Degrees $^{\circ}$ = -0.10549

Angle in Milliradians = -1.84110

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