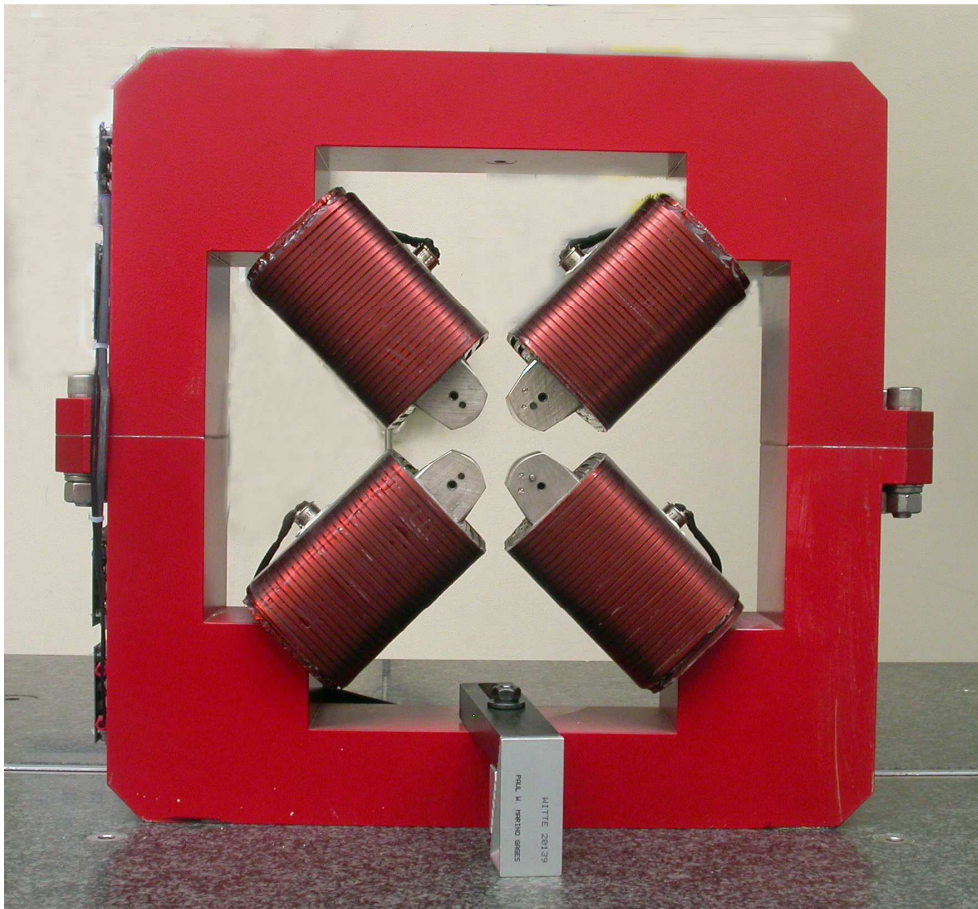


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4037

Mfg. S/N : 039

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	6.4970	8.8770	-1.2512
TB 2	6.4974	8.8760	1.2486
TB 3	-6.5016	8.8793	1.2484
TB 4	-6.5021	8.8800	-1.2515
TB A	6.4970	8.1894	-1.2522
TB B	6.4970	8.1885	1.2478
TB C	-6.5012	8.1917	1.2478
TB D	-6.5020	8.1928	-1.2519

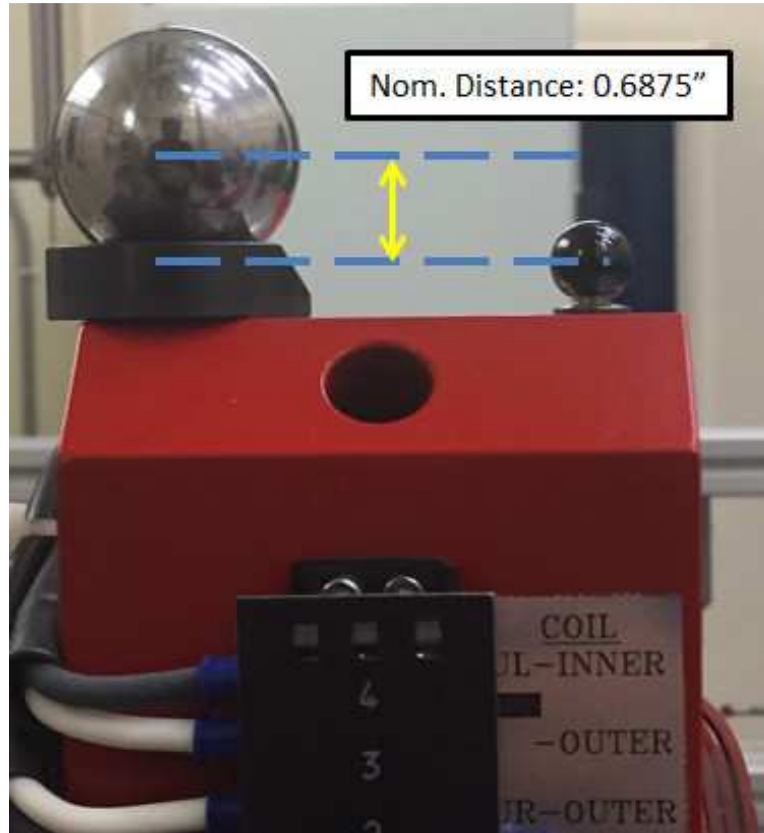
Tooling Ball Locations (1-4) are 1 inch above unpainted surface pads
 Tooling Ball Locations (A-D) are 5/16 inch above unpainted surface pads

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	0.68755
TB 2	0.6875 ± 0.001	0.6875
TB 3	0.6875 ± 0.001	0.68759
TB 4	0.6875 ± 0.001	0.68723

Dimensions in Inch

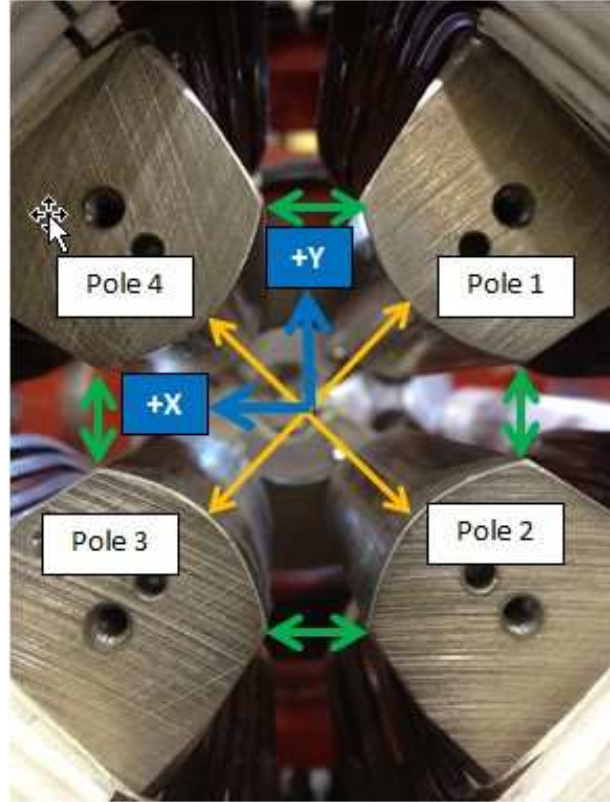
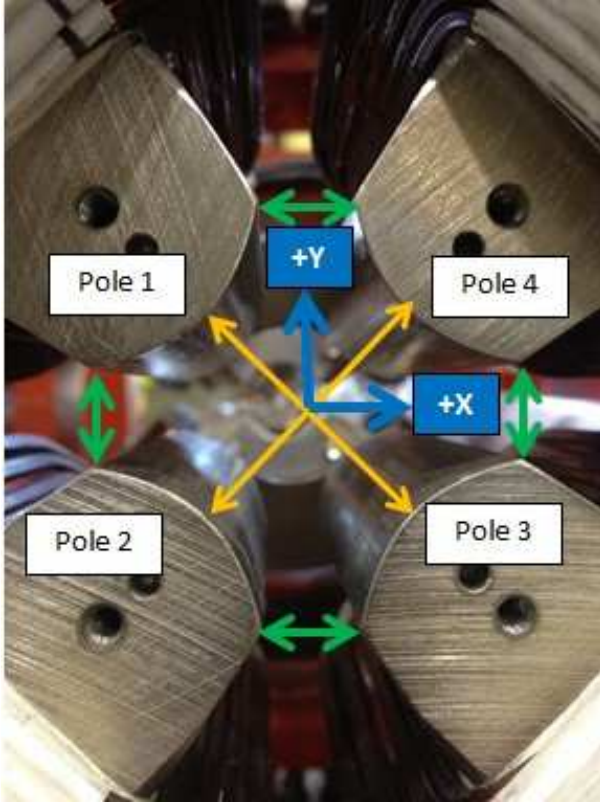
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Pole Tip Gap Measurements

Pole Tips View from Downstream

Pole Tips View from Upstream



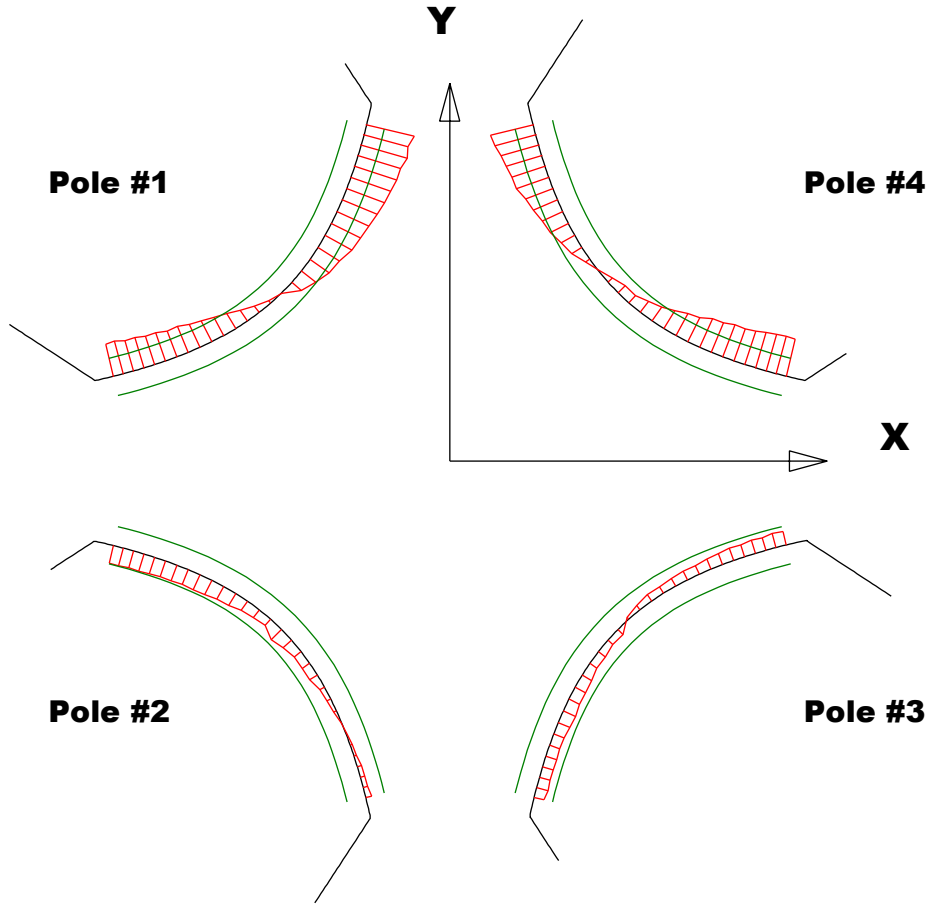
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26029	1.26092
Pole Tip Distance 2-4	1.260	1.26123	1.26065
Gap 1-2	.422	0.42665	0.42809
Gap 2-3	.422	0.42331	0.42439
Gap 3-4	.422	0.42399	0.42178
Gap 4-1	.422	0.41503	0.41545

Dimensions in Inch

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Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

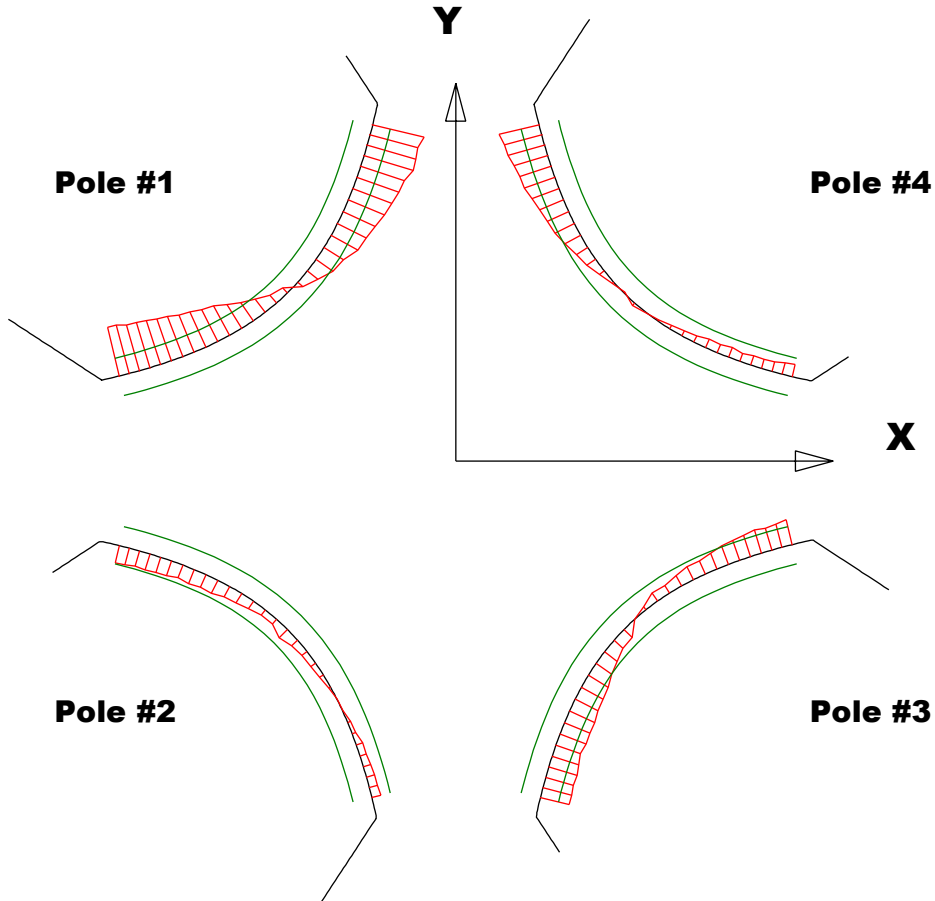
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.0018	-0.00097	-0.00072	-0.00206
Max. Dev.	0.00261	0.00032	0.00077	0.00232

Barcode # : 4037

Mfg. S/N : 039

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

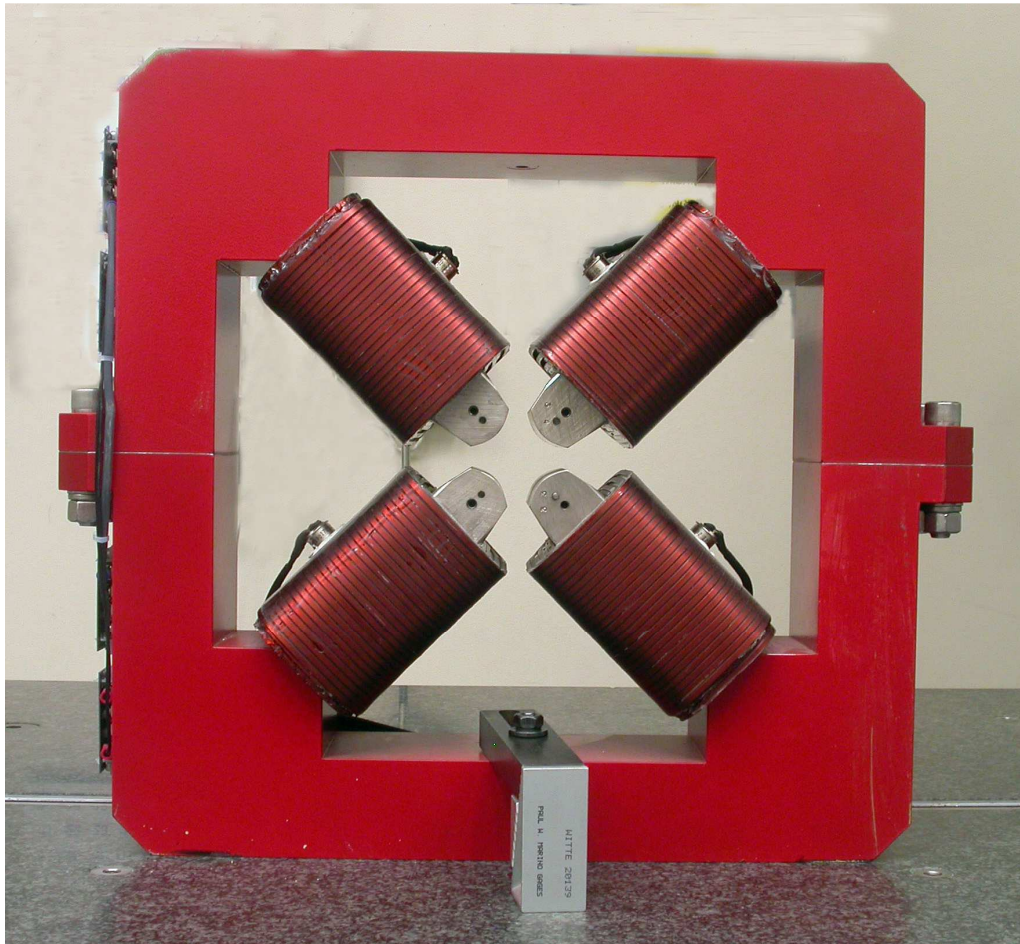
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00266	-0.00094	-0.00159	-0.00067
Max. Dev.	0.00282	0.00049	0.00136	0.00219

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



Angle in Decimal Degrees $^{\circ}$ = 0.01349

Angle in Milliradians = 0.23548

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