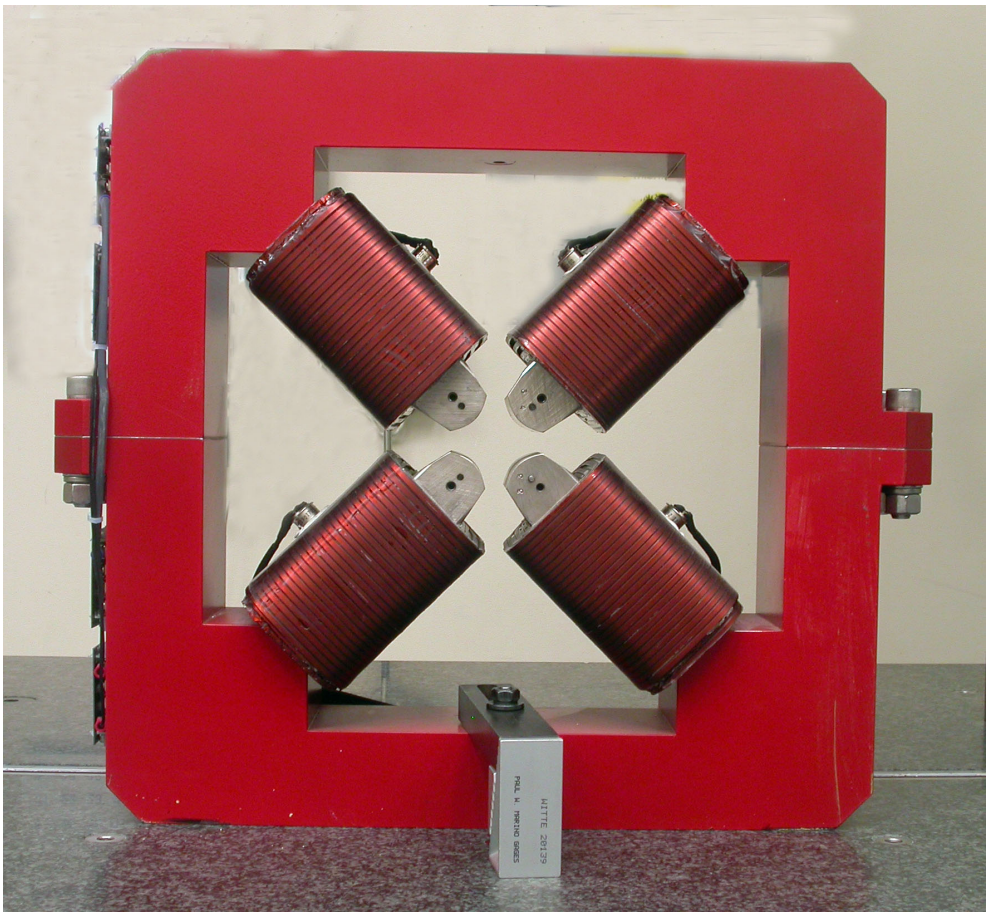
LCLS II Magnet Fiducialization Report
Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4175

Mfg. S/N : 046

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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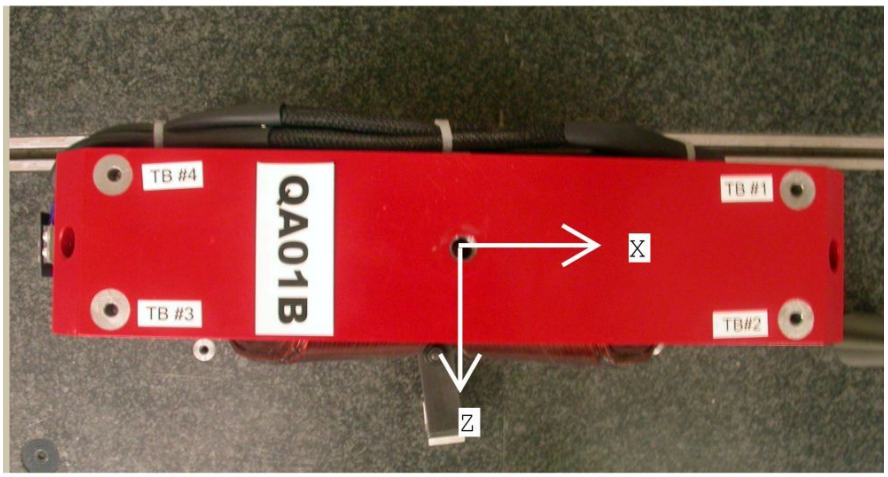
Tooling Ball Locations



Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	6.4939	8.8836	-1.2430
TB 2	6.4933	8.8839	1.2546
TB 3	-6.5060	8.8740	1.2494
TB 4	-6.5057	8.8740	-1.2485
TB A	6.4945	8.1951	-1.2448
TB B	6.4945	8.1955	1.2553
TB C	-6.5066	8.1859	1.2505
TB D	-6.5055	8.1860	-1.2490

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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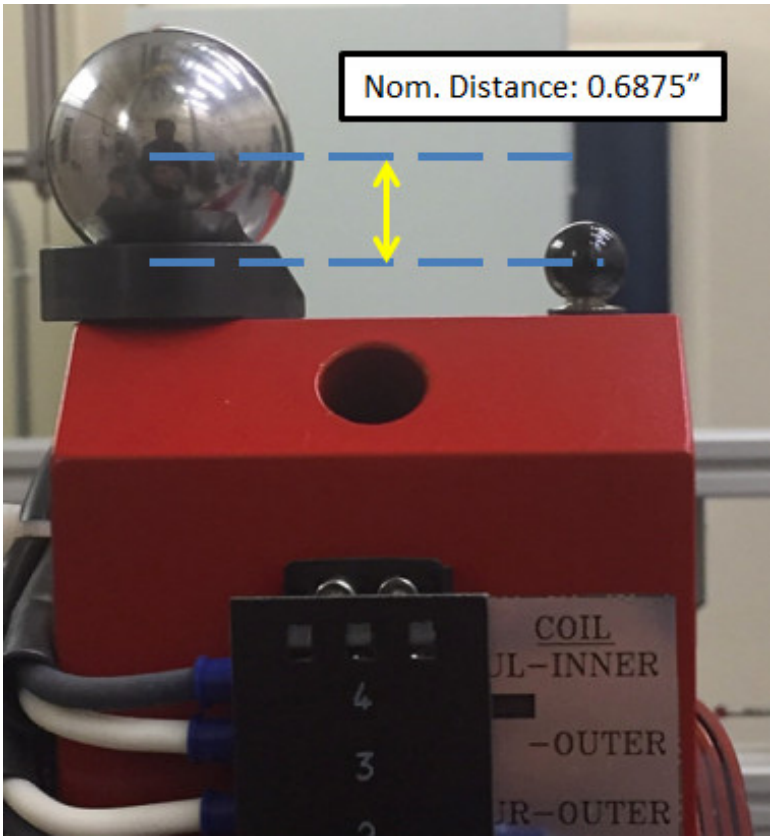
1" Tooling Ball to 5/16" Tooling Ball Difference



Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68848
TB 2	0.6875 ± 0.001	0.68842
TB 3	0.6875 ± 0.001	0.68813
TB 4	0.6875 ± 0.001	0.68798

Dimensions in Inch

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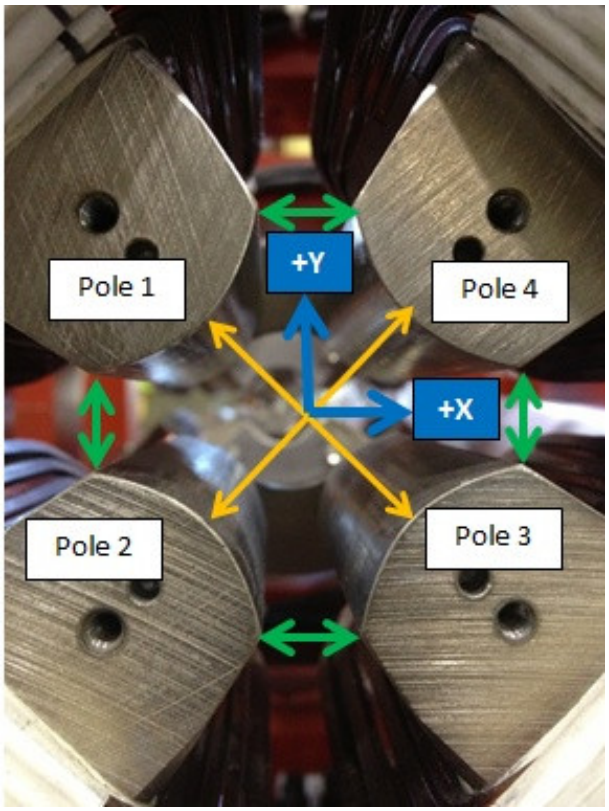
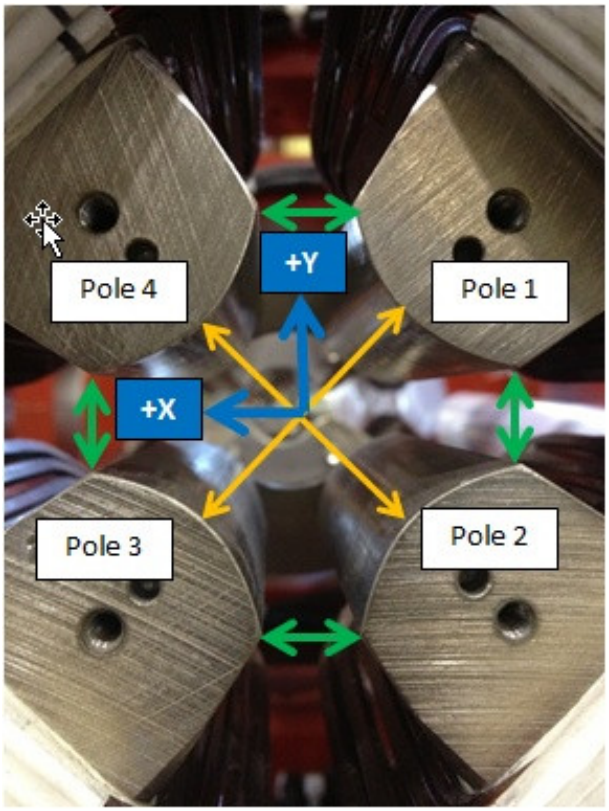
Pole Tip Gap Measurements

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	1.2599	1.25945
Pole Tip Distance 2-4	1.260	1.26062	1.25979
Gap 1-2	.422	0.42123	0.42358
Gap 2-3	.422	0.42132	0.41692
Gap 3-4	.422	0.4184	0.42211
Gap 4-1	.422	0.42197	0.41938

Dimensions in Inch

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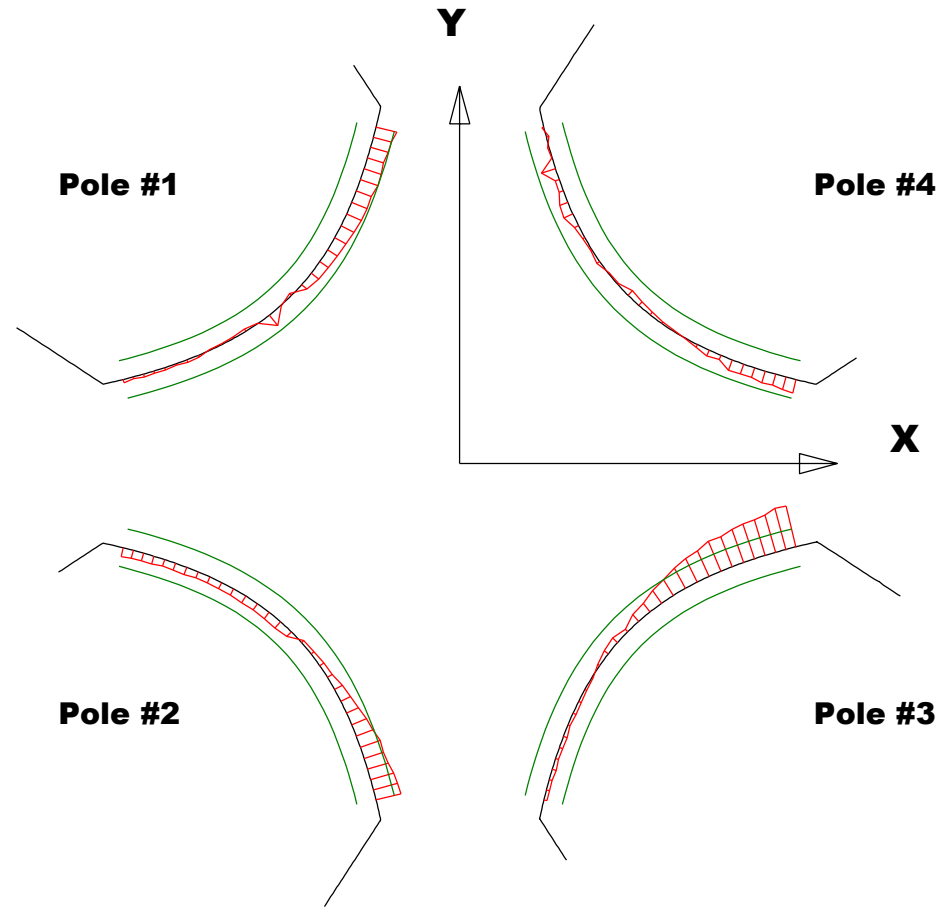
Composite Best-fit of Pole Tips, Downstream



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.	-0.00013	-0.00049	-0.00022	-0.00034
Max. Dev.	0.00114	0.00136	0.00226	0.00077

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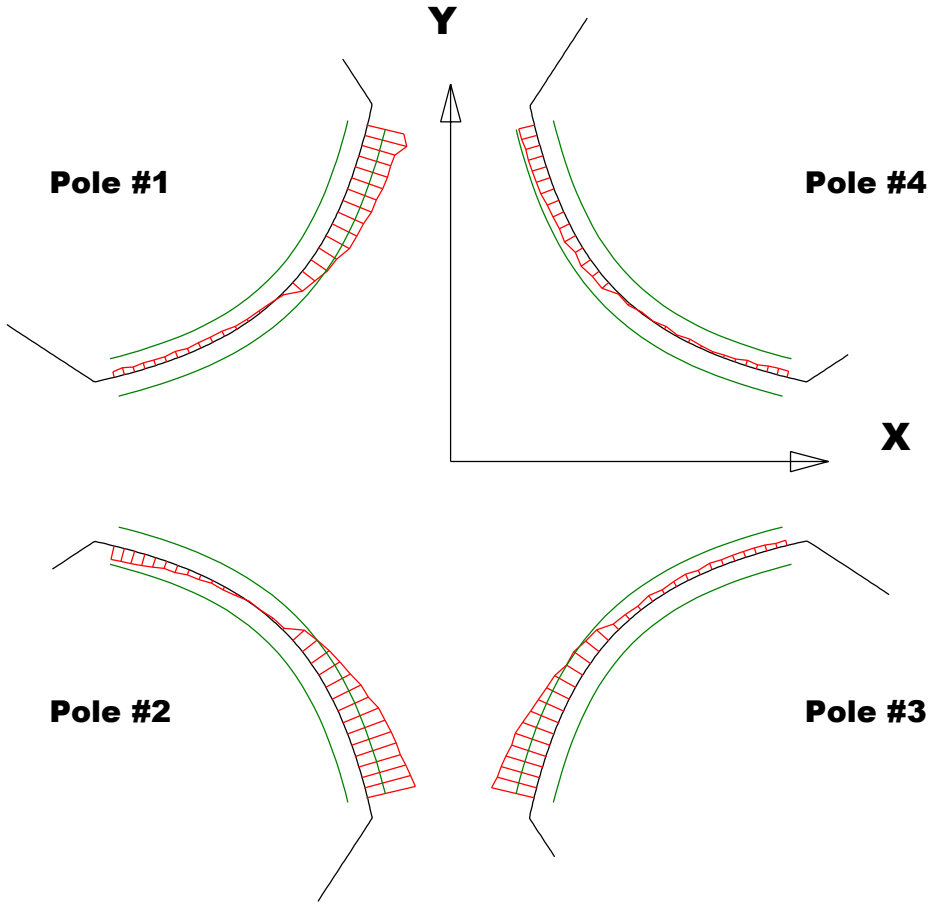
Composite Best-fit of Pole Tips, Upstream



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.	-0.00038	-0.00073	0.00024	-0.00035
Max. Dev.	0.00231	0.00262	0.00232	0.00086

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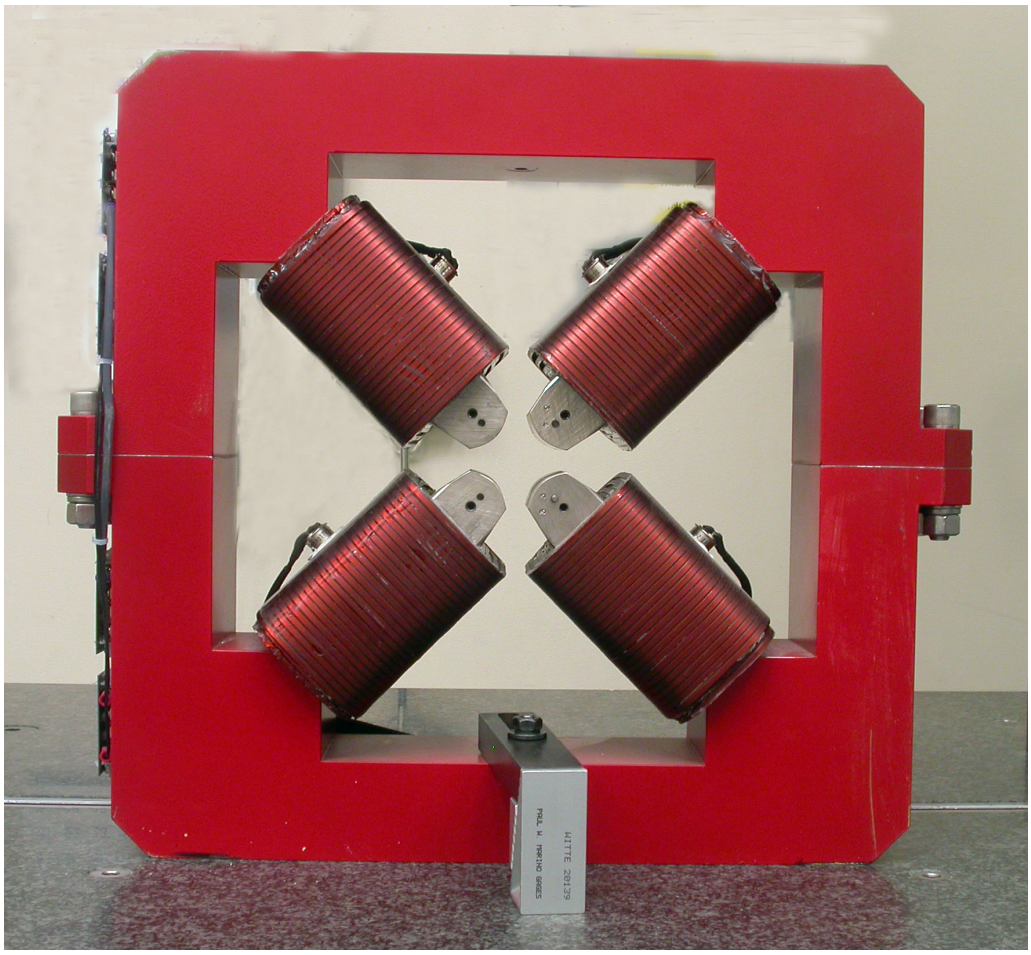
Angle of the Composite Pole Tip Best-Fit In Relation to Tooling Ball Plane



Angle in Decimal Degrees ° = -0.04144

Angle in Milliradians = -0.72319

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