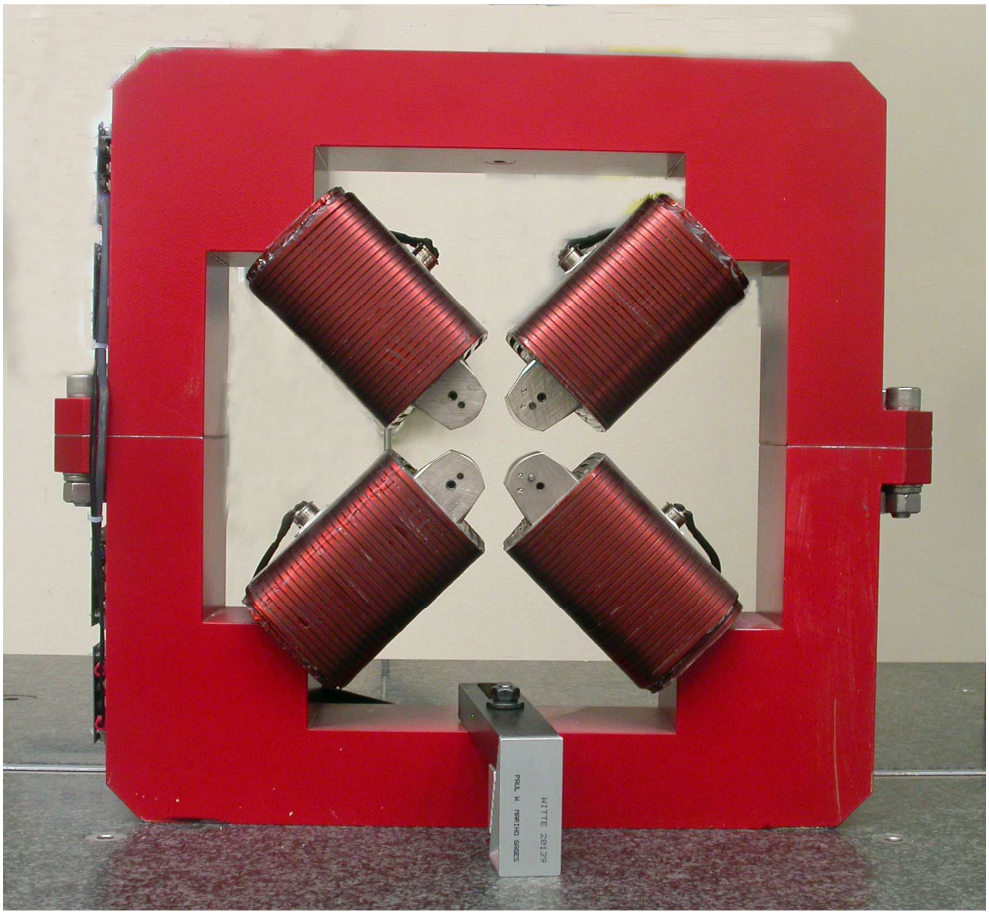
LCLS II Magnet Fiducialization Report
Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4027

Mfg. S/N : 031

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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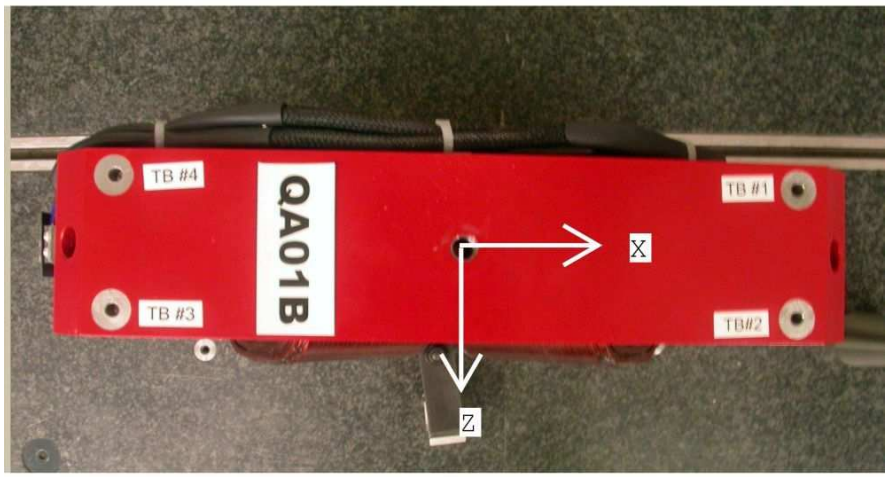
Tooling Ball Locations



Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	6.4857	8.8826	-1.2411
TB 2	6.4857	8.8804	1.2590
TB 3	-6.5134	8.8651	1.2561
TB 4	-6.5128	8.8672	-1.2432
TB A	6.4871	8.1951	-1.2410
TB B	6.4865	8.1934	1.2588
TB C	-6.5128	8.1780	1.2555
TB D	-6.5121	8.1800	-1.2443

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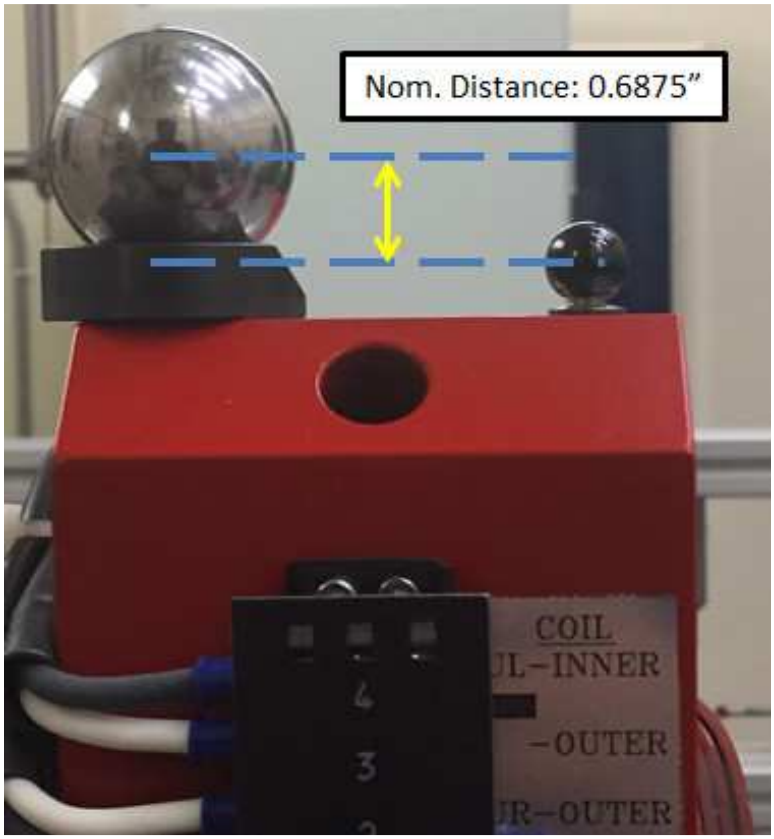
1" Tooling Ball to 5/16" Tooling Ball Difference



Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68752
TB 2	0.6875 ± 0.001	0.68699
TB 3	0.6875 ± 0.001	0.6871
TB 4	0.6875 ± 0.001	0.68721

Dimensions in Inch

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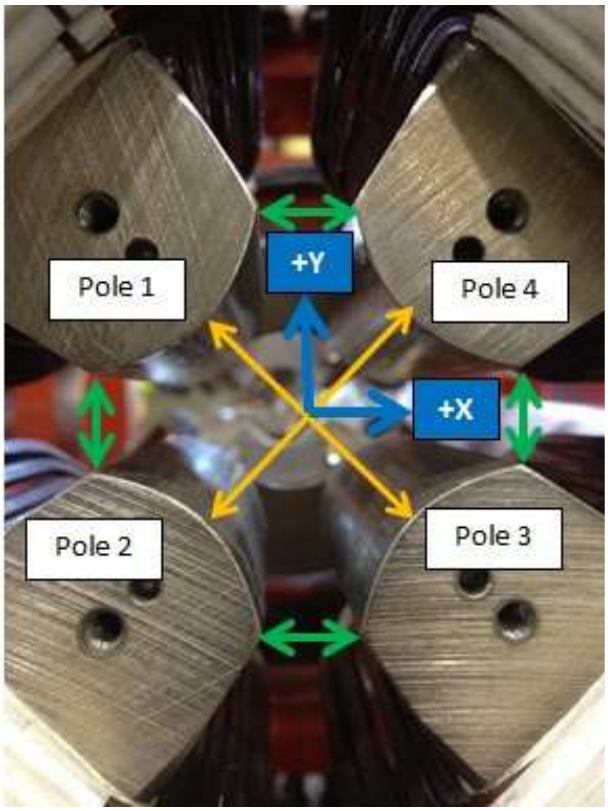
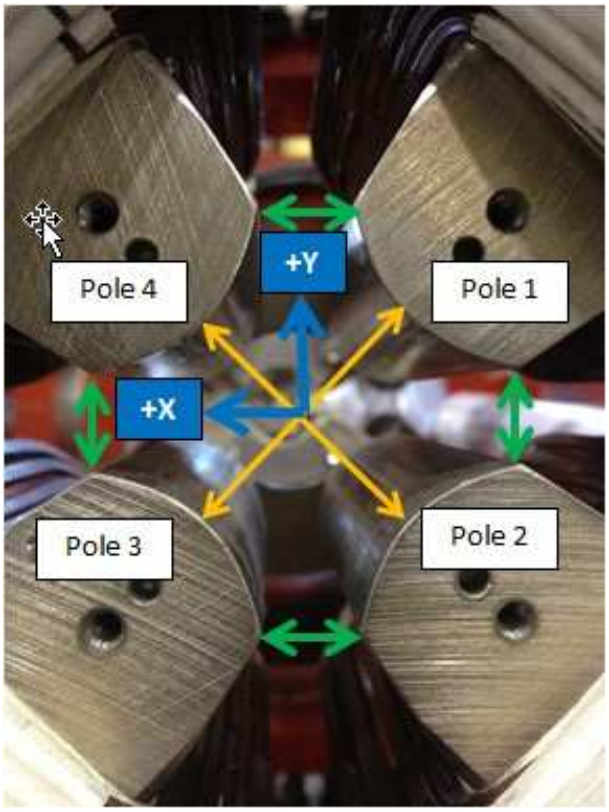
Pole Tip Gap Measurements

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	1.26014	1.26111
Pole Tip Distance 2-4	1.260	1.25855	1.26012
Gap 1-2	.422	0.41405	0.41461
Gap 2-3	.422	0.43038	0.43199
Gap 3-4	.422	0.41699	0.4183
Gap 4-1	.422	0.41764	0.41836

Dimensions in Inch

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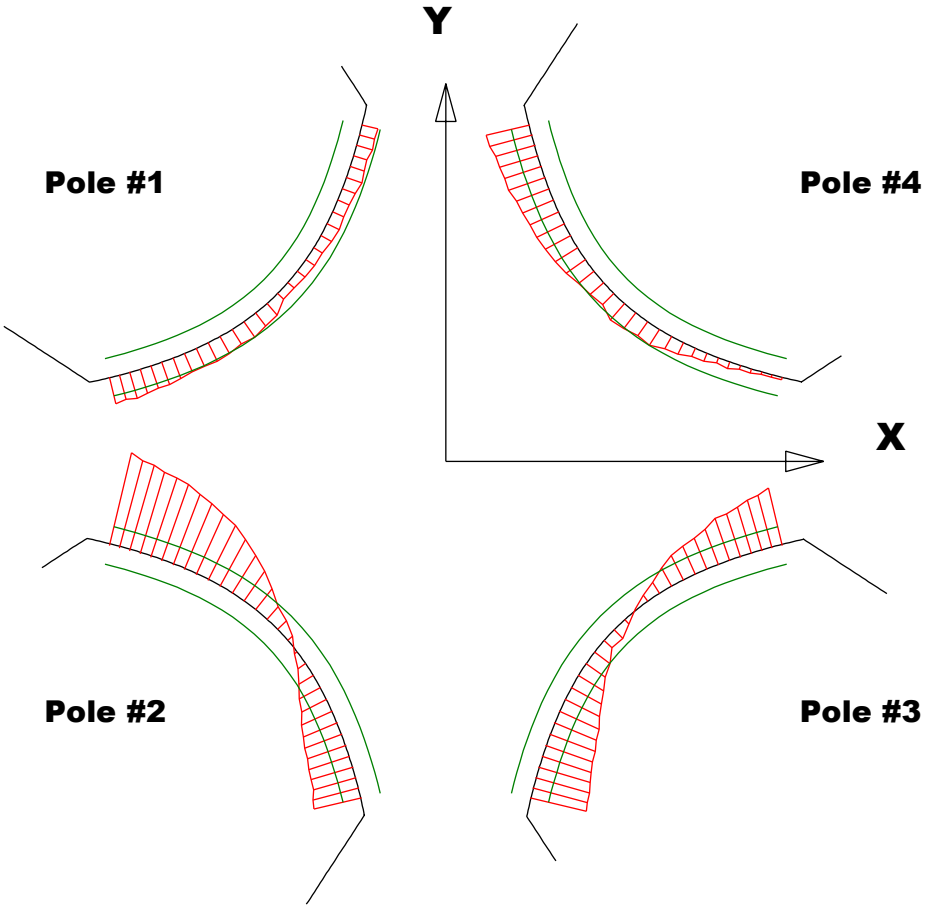
Composite Best-fit of Pole Tips, Downstream



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.	0.00044	-0.00255	-0.00302	0.00013
Max. Dev.	0.00143	0.00497	0.00308	0.00234

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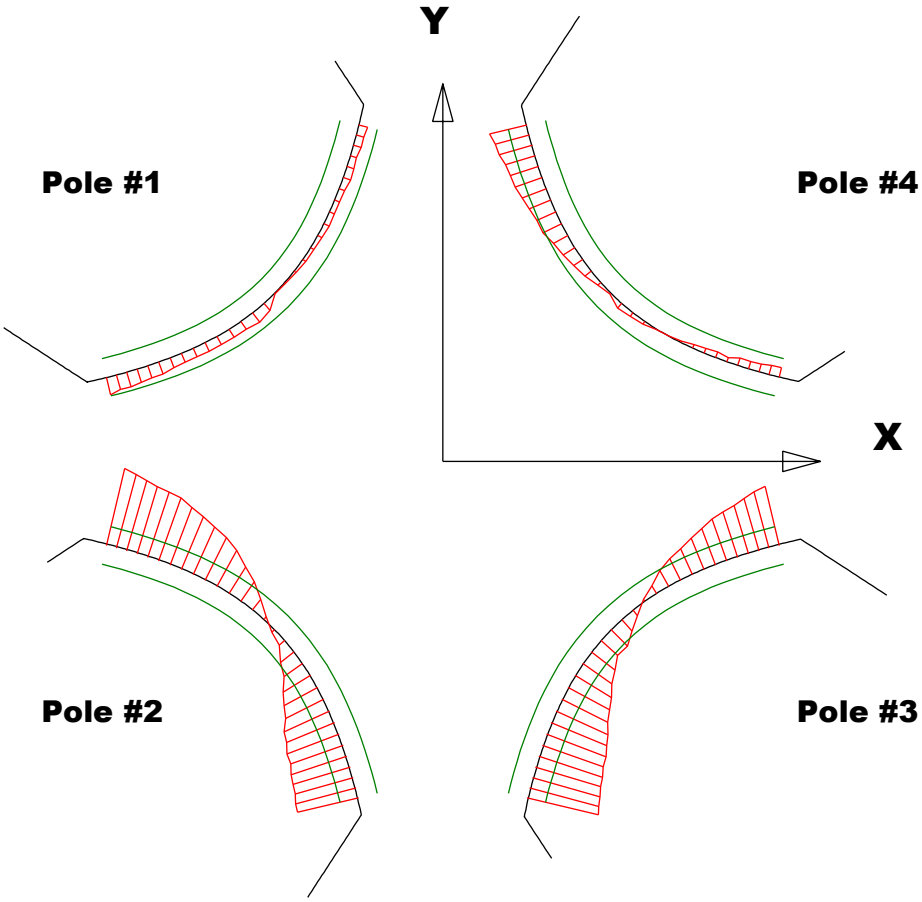
Composite Best-fit of Pole Tips, Upstream



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.	0.00003	-0.00328	-0.00383	-0.00052
Max. Dev.	0.00094	0.00413	0.00318	0.00199

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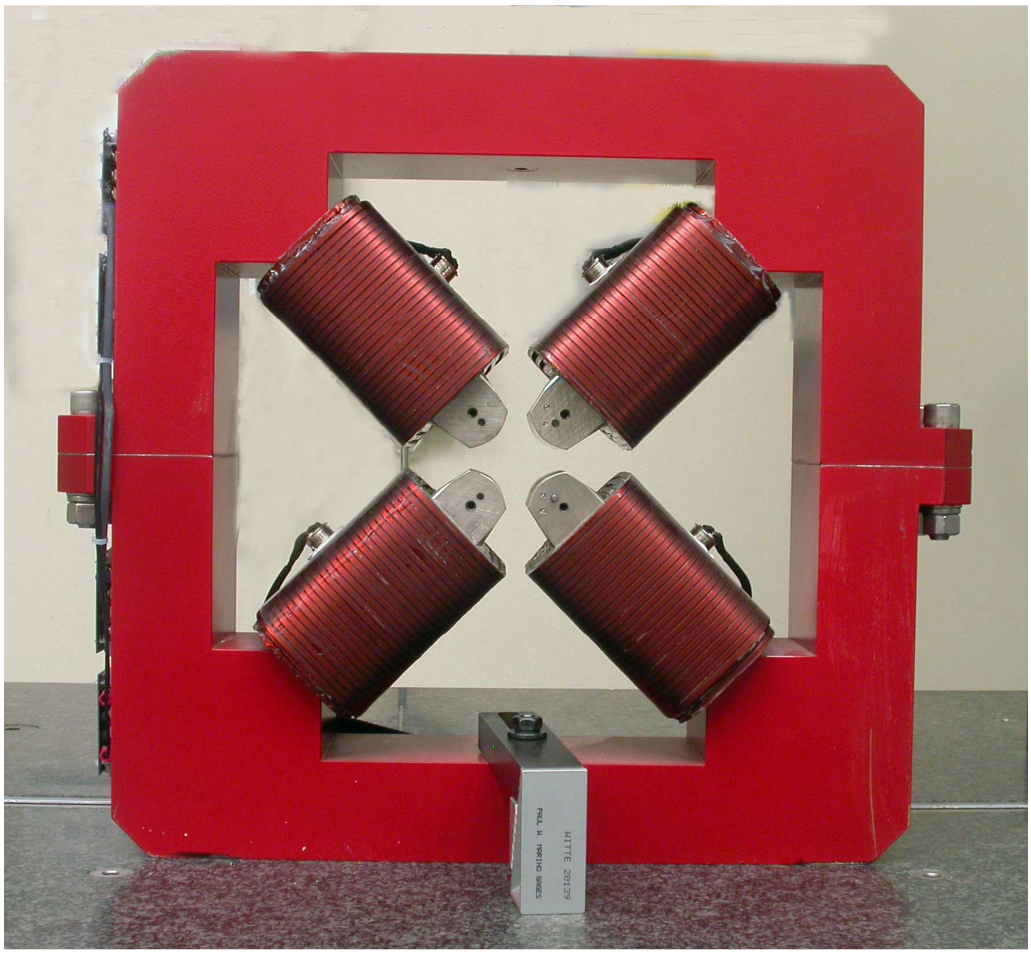
Angle of the Composite Pole Tip Best-Fit In Relation to Tooling Ball Plane



Angle in Decimal Degrees ° = -0.06686

Angle in Milliradians = -1.16700

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