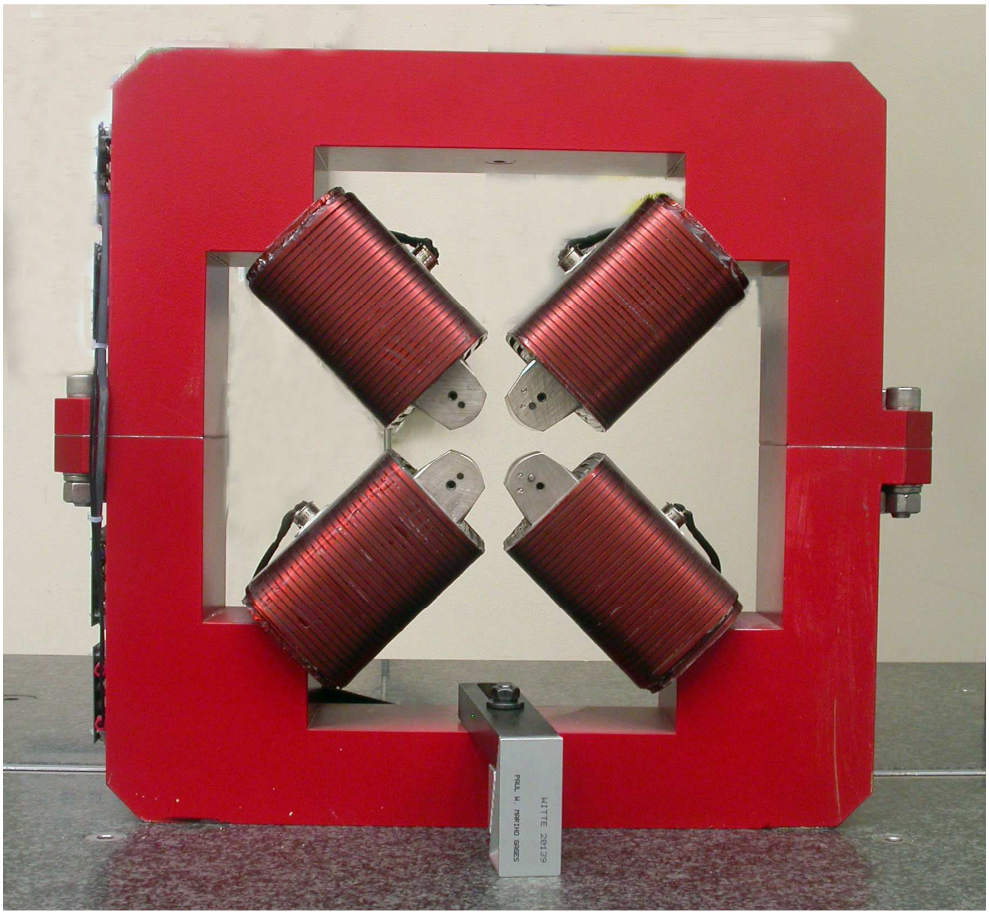
LCLS II Magnet Fiducialization Report
Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4039

Mfg. S/N : 040

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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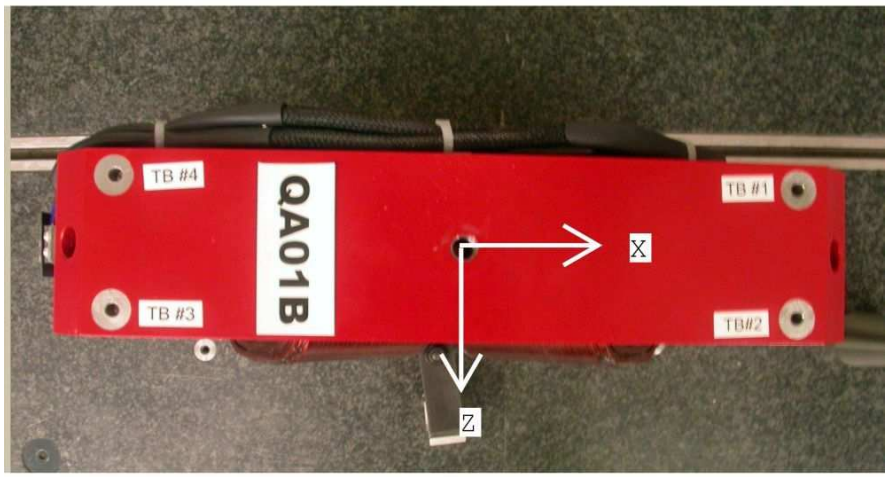
Tooling Ball Locations



Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	6.5068	8.8701	-1.2506
TB 2	6.5048	8.8706	1.2506
TB 3	-6.4927	8.8838	1.2498
TB 4	-6.4925	8.8841	-1.2502
TB A	6.5070	8.1825	-1.2500
TB B	6.5063	8.1818	1.2498
TB C	-6.4931	8.1964	1.2495
TB D	-6.4926	8.1970	-1.2498

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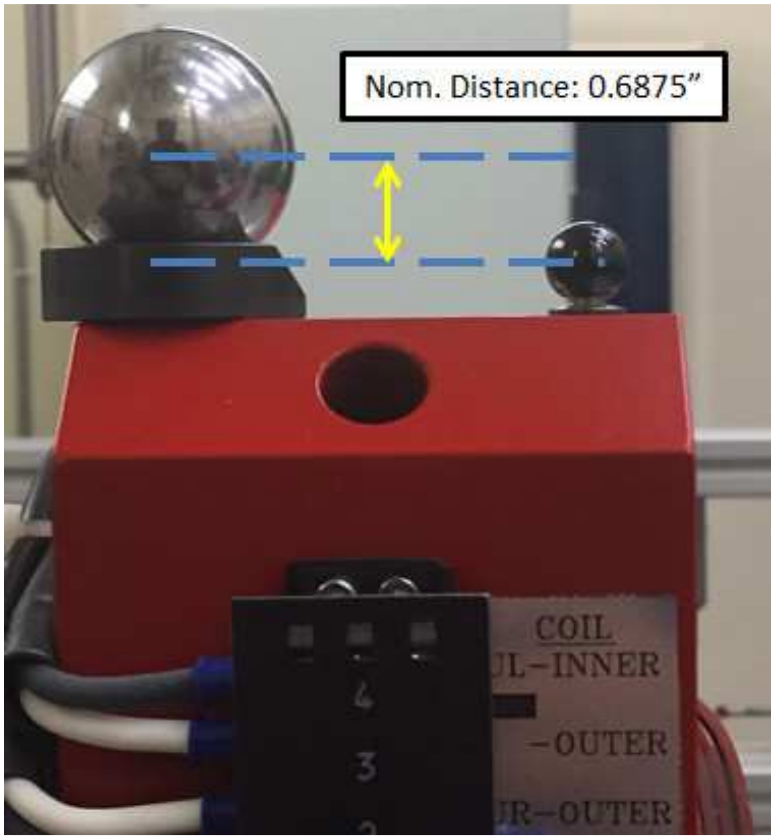
1" Tooling Ball to 5/16" Tooling Ball Difference



Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68762
TB 2	0.6875 ± 0.001	0.68878
TB 3	0.6875 ± 0.001	0.68741
TB 4	0.6875 ± 0.001	0.68713

Dimensions in Inch

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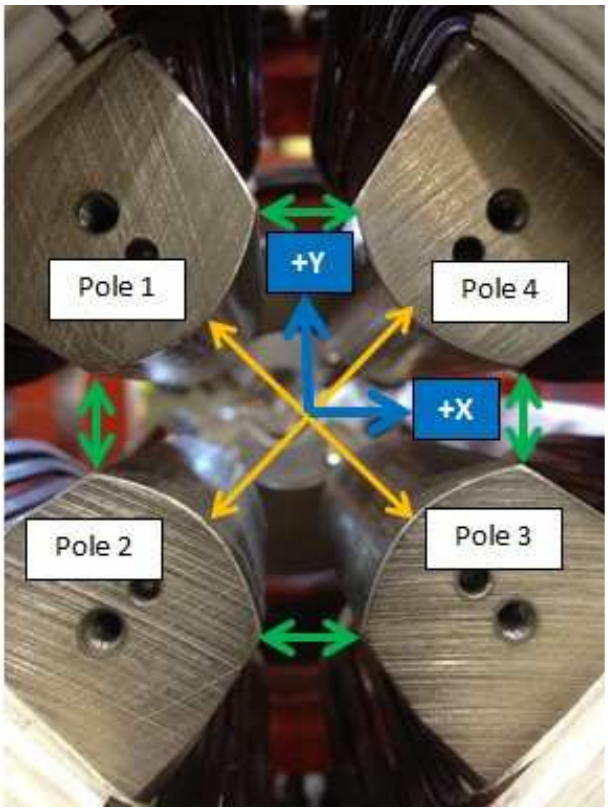
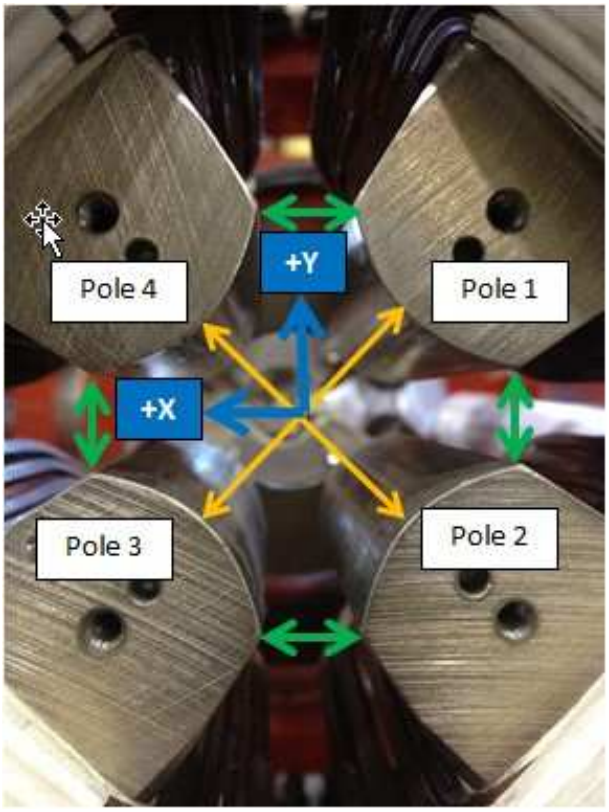
Pole Tip Gap Measurements

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	1.26056	1.26179
Pole Tip Distance 2-4	1.260	1.26125	1.26066
Gap 1-2	.422	0.42276	0.42215
Gap 2-3	.422	0.42328	0.42561
Gap 3-4	.422	0.42283	0.42267
Gap 4-1	.422	0.41879	0.41932

Dimensions in Inch

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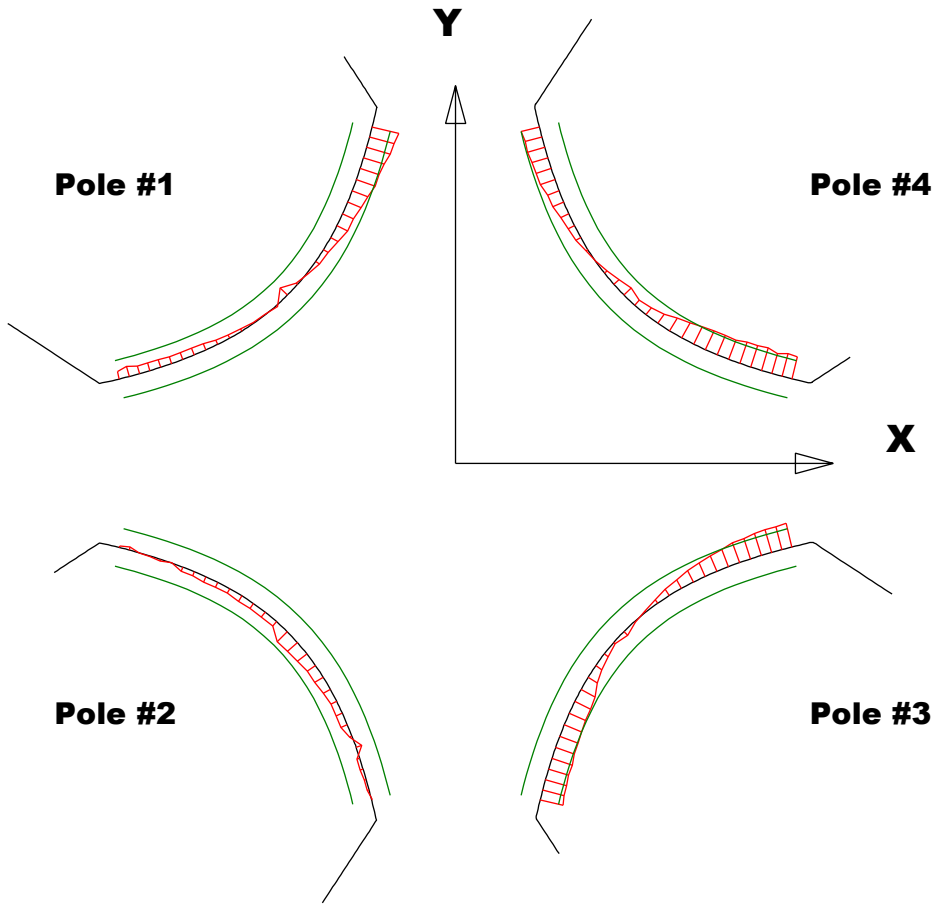
Composite Best-fit of Pole Tips, Downstream



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.	-0.00055	-0.00076	-0.00124	-0.00126
Max. Dev.	0.00146	0.00032	0.0013	0.00101

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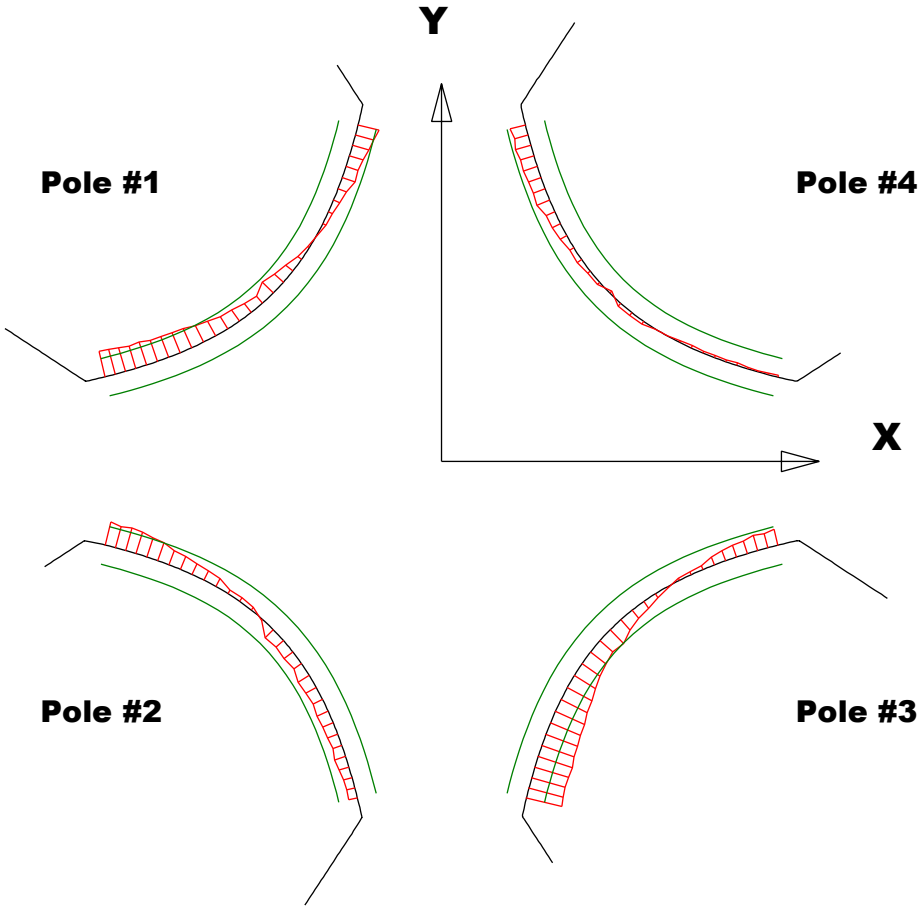
Composite Best-fit of Pole Tips, Upstream



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.	-0.00139	-0.0007	-0.00194	-0.00015
Max. Dev.	0.00115	0.00126	0.00088	0.00085

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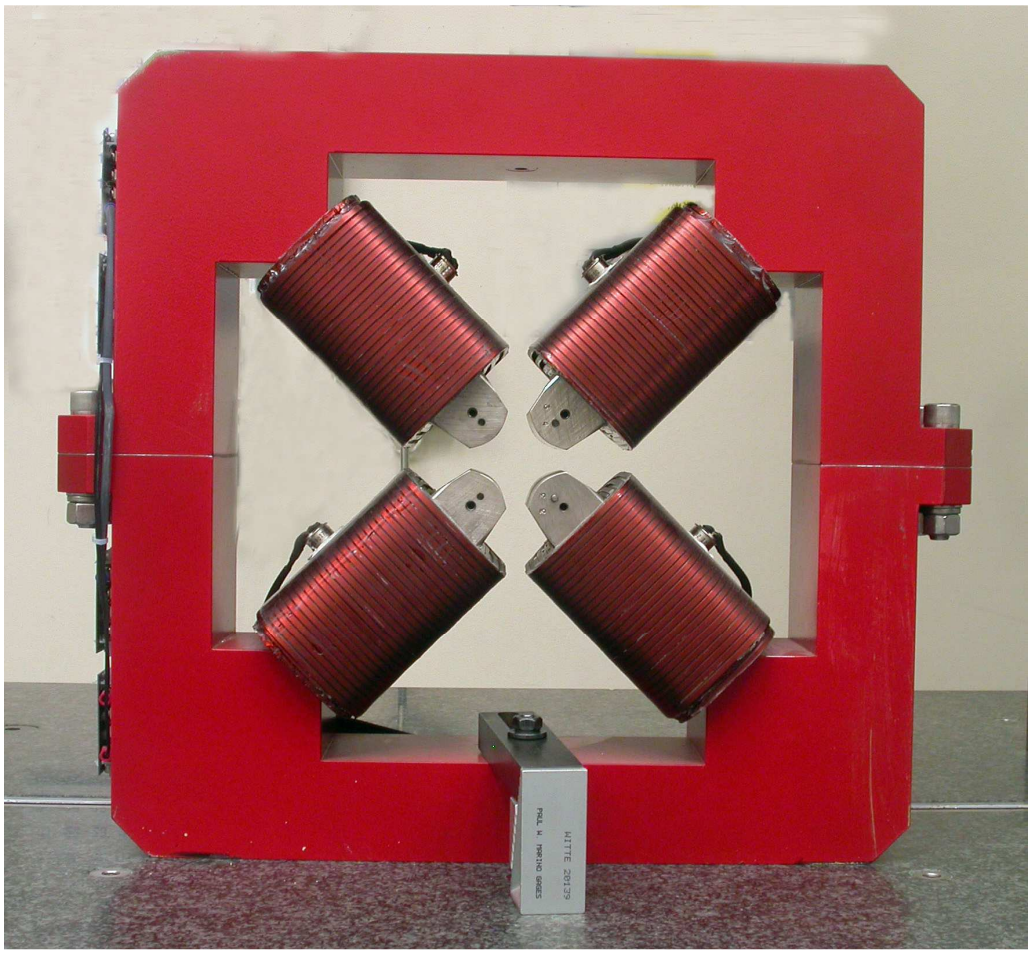
Angle of the Composite Pole Tip Best-Fit In Relation to Tooling Ball Plane



Angle in Decimal Degrees ° = 0.06373

Angle in Milliradians = 1.11237

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