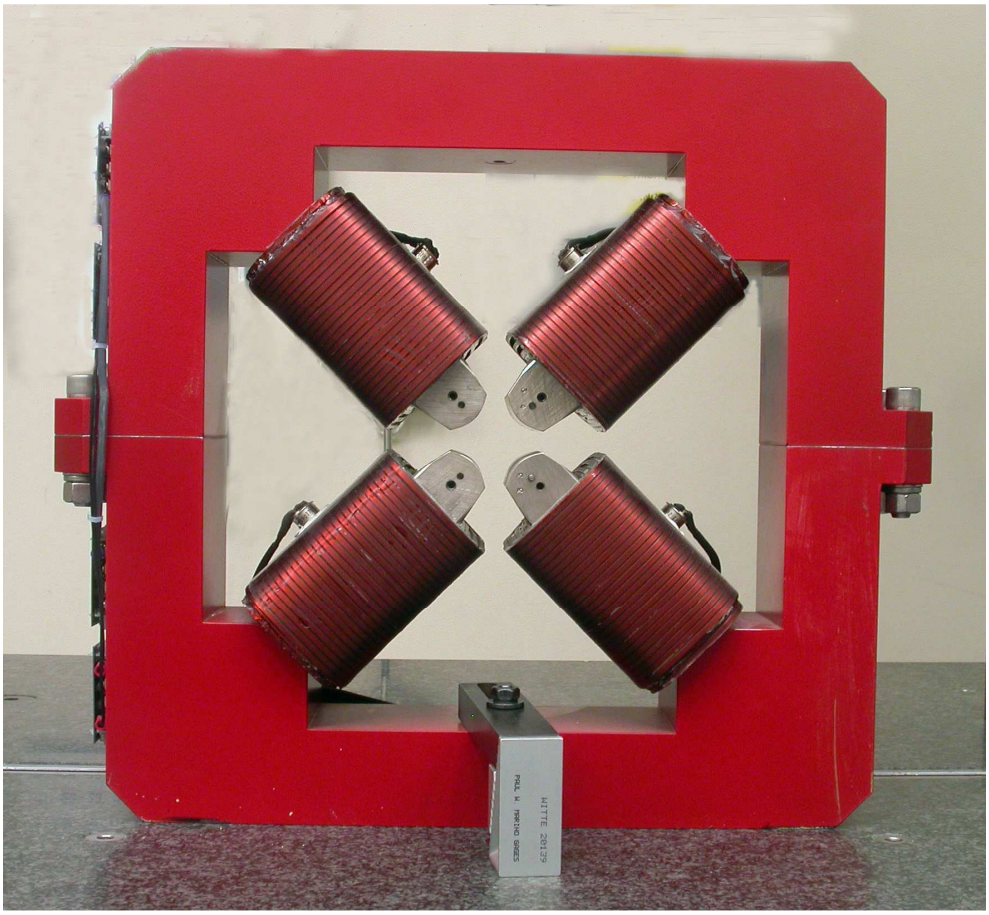
LCLS II Magnet Fiducialization Report
Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4036

Mfg. S/N : 037

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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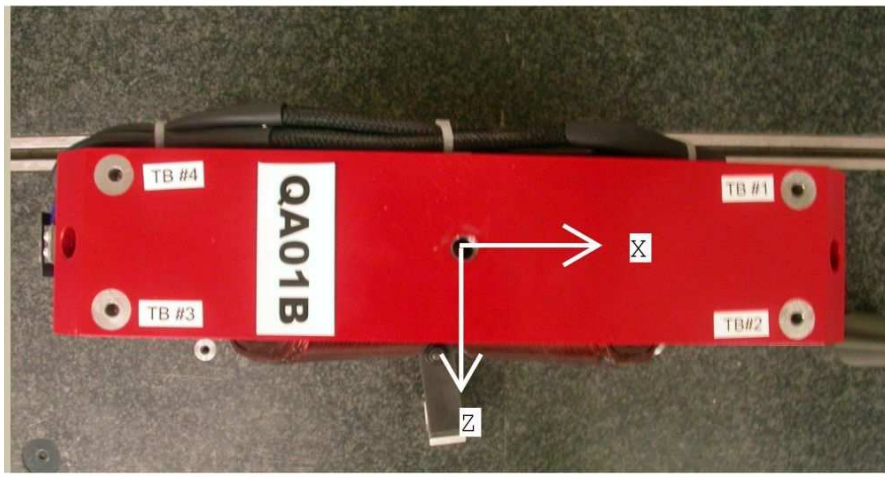
Tooling Ball Locations



Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	6.4902	8.8837	-1.2512
TB 2	6.4908	8.8832	1.2516
TB 3	-6.5087	8.8687	1.2503
TB 4	-6.5092	8.8701	-1.2483
TB A	6.4912	8.1966	-1.2512
TB B	6.4920	8.1955	1.2493
TB C	-6.5076	8.1807	1.2498
TB D	-6.5078	8.1819	-1.2500

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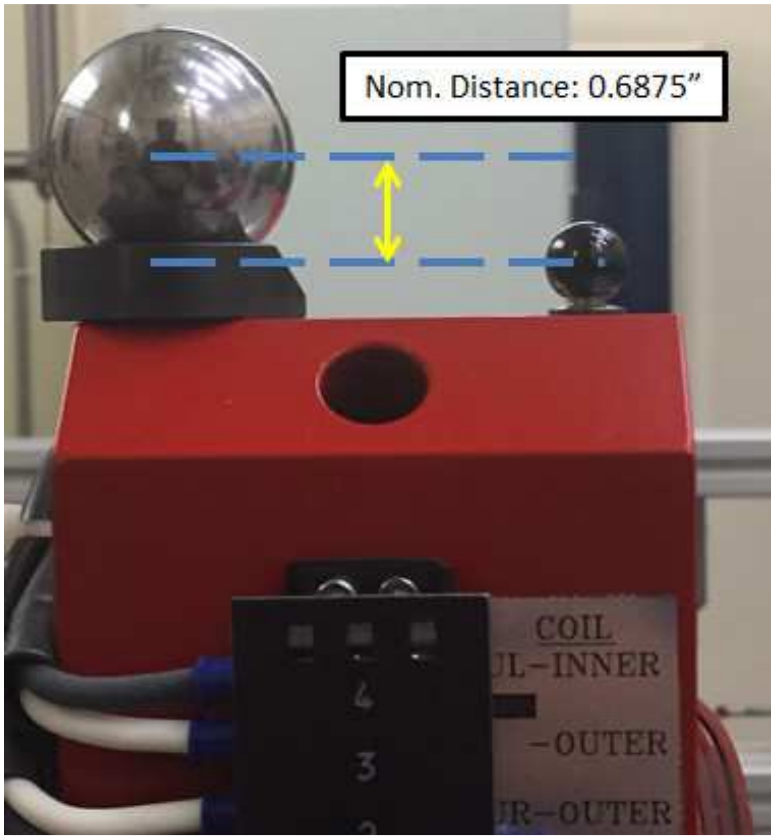
1" Tooling Ball to 5/16" Tooling Ball Difference



Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68718
TB 2	0.6875 ± 0.001	0.6877
TB 3	0.6875 ± 0.001	0.68797
TB 4	0.6875 ± 0.001	0.68819

Dimensions in Inch

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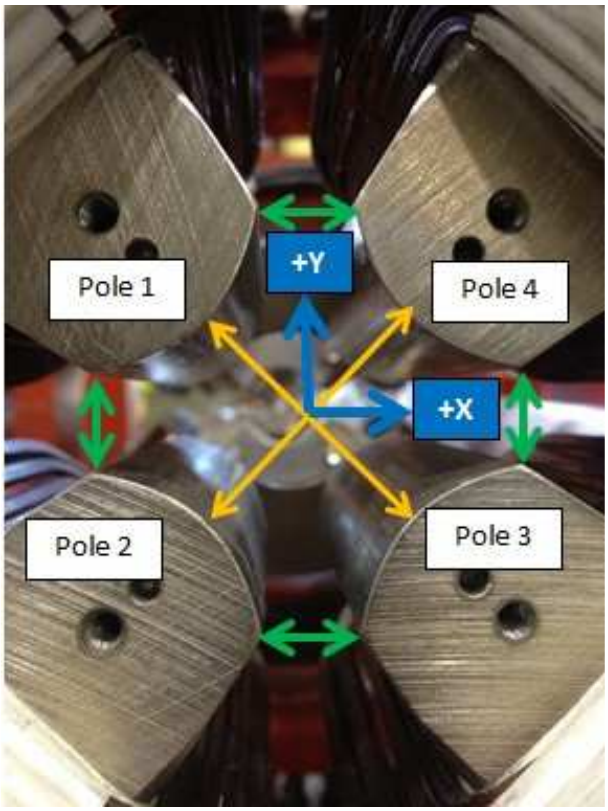
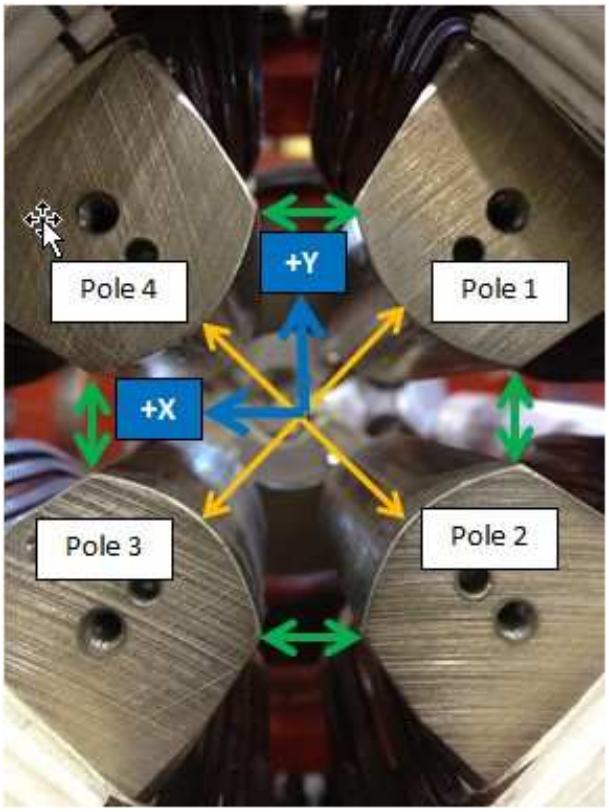
Pole Tip Gap Measurements

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	1.26127	1.26202
Pole Tip Distance 2-4	1.260	1.26045	1.25958
Gap 1-2	.422	0.42949	0.42818
Gap 2-3	.422	0.41925	0.42177
Gap 3-4	.422	0.41926	0.41961
Gap 4-1	.422	0.41777	0.41774

Dimensions in Inch

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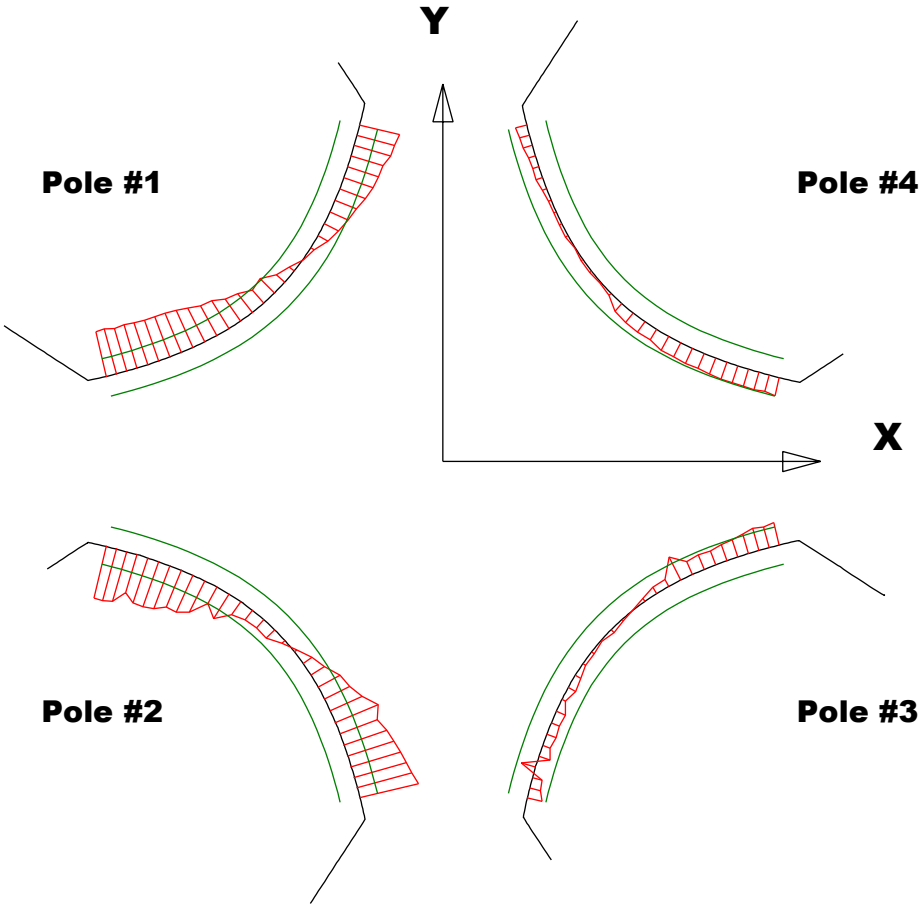
Composite Best-fit of Pole Tips, Downstream



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.	-0.00247	-0.00284	-0.0008	0.00004
Max. Dev.	0.00218	0.0032	0.00135	0.00099

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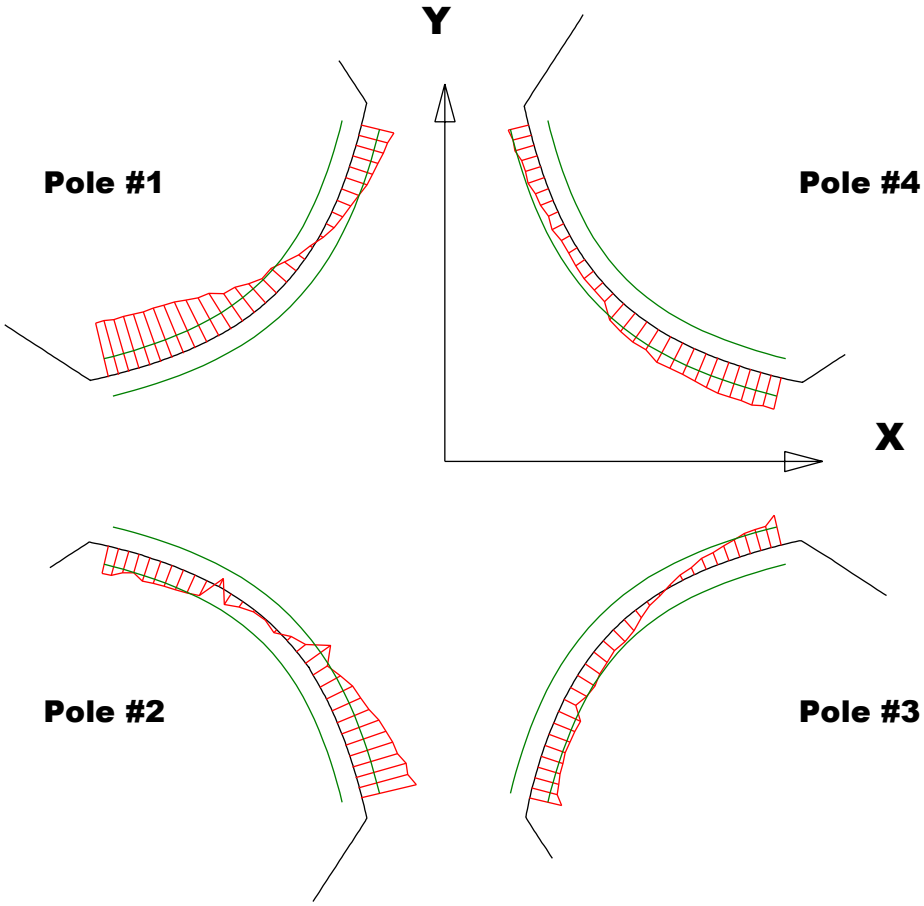
Composite Best-fit of Pole Tips, Upstream



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.	-0.00292	-0.0015	-0.00175	0.00053
Max. Dev.	0.00177	0.00297	0.00163	0.0018

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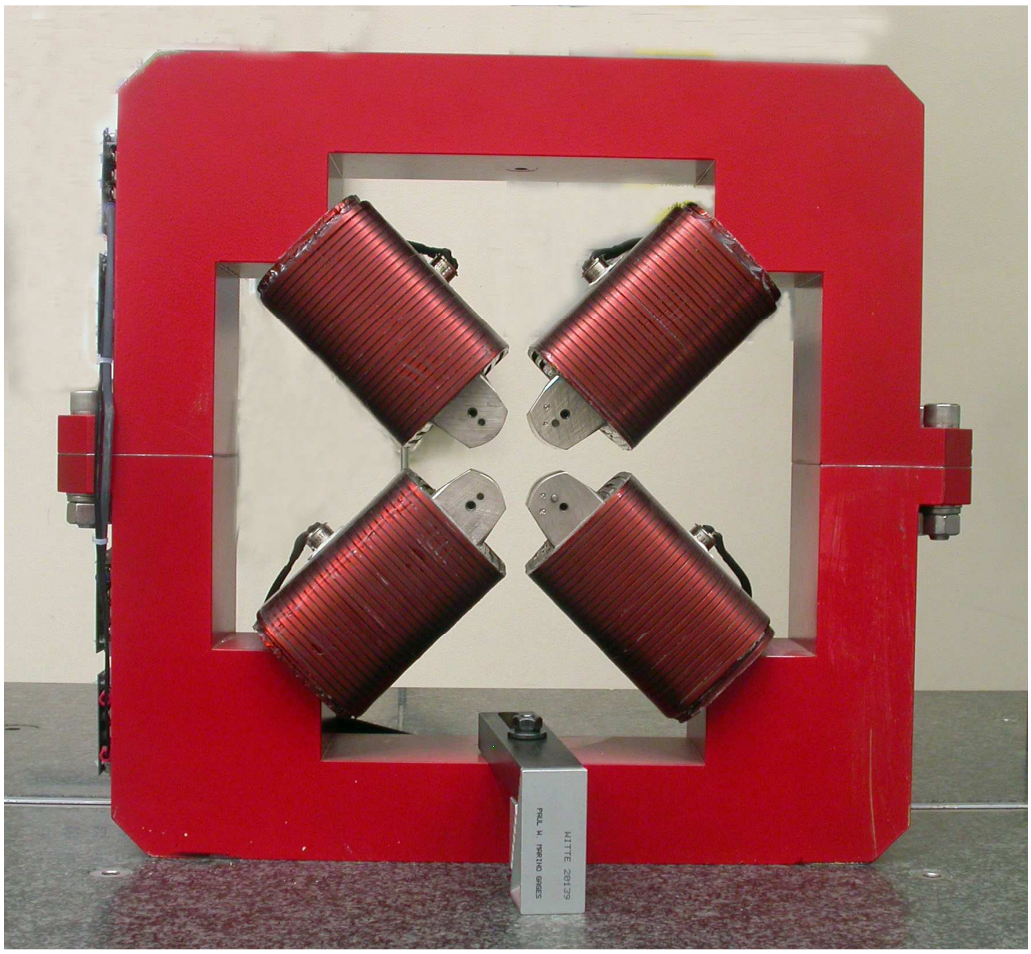
Angle of the Composite Pole Tip Best-Fit In Relation to Tooling Ball Plane



Angle in Decimal Degrees ° = -0.06523

Angle in Milliradians = -1.13844

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