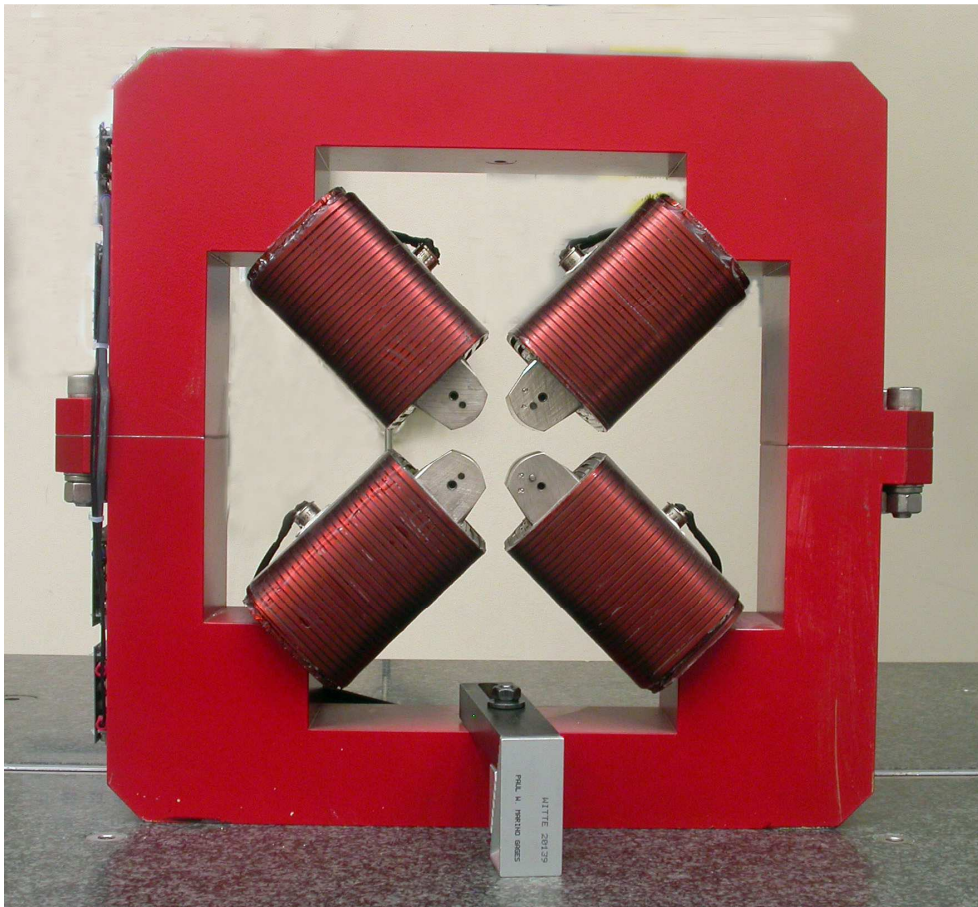


LCLS II Magnet Fiducialization Report

Injector Quadrupole 1.26Q3.5



Inspector : K. Caban

Engineer : J. Amann

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

Barcode No.: 4004

Mfg. S/N : 007

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	6.50356	8.87372	-1.25294
TB 2	6.50459	8.87457	1.24627
TB 3	-6.49630	8.87905	1.24668
TB 4	-6.49540	8.87822	-1.25342
TB A	6.50272	8.18738	-1.25203
TB B	6.50413	8.18750	1.24730
TB C	-6.49631	8.19226	1.24780
TB D	-6.49571	8.19102	-1.25241

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

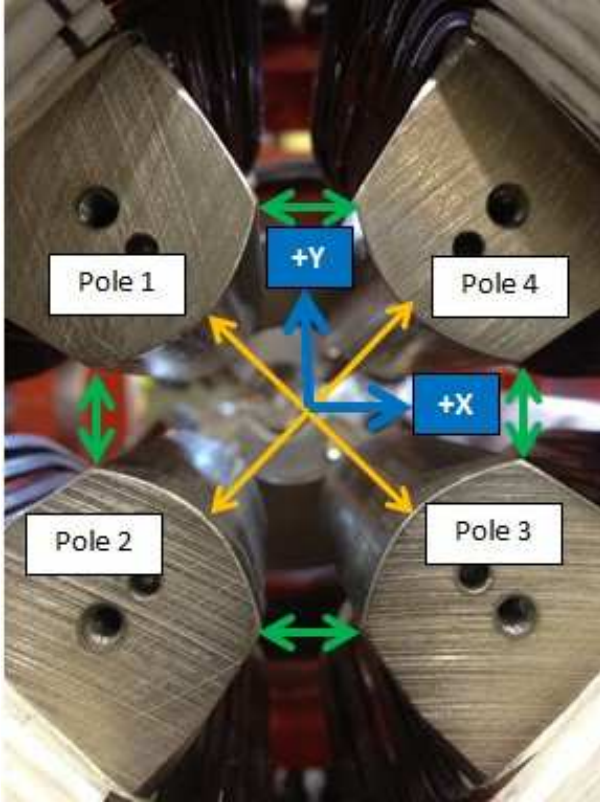
Dimensions in Inch

Barcode # : 4004

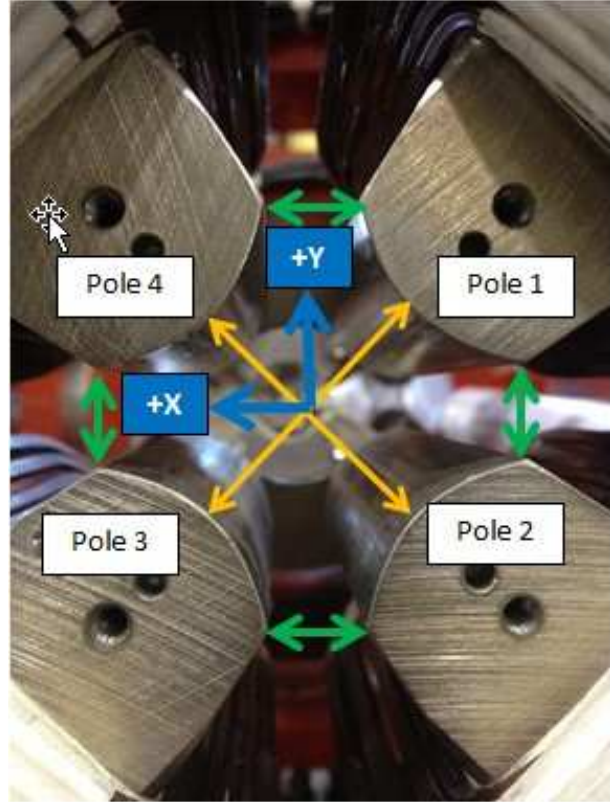
Mfg. S/N : 007

Pole Tip Gap Measurements

Pole Tips View from Downstream



Pole Tips View from Upstream



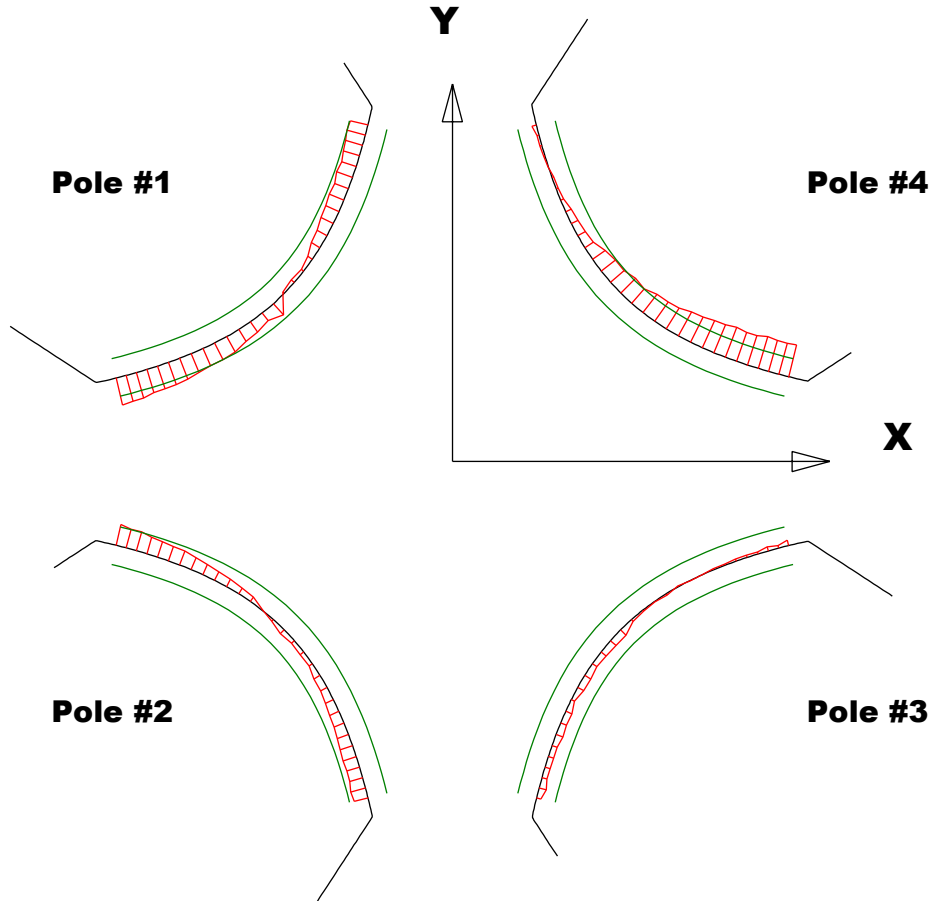
	Nominal Distance	Downstream Pole Ends	Upstream Pole Ends
Pole Tip Distance 1-3	1.260	1.26046	1.2605
Pole Tip Distance 2-4	1.260	1.26134	1.26101
Gap 1-2	.422	0.41973	0.41814
Gap 2-3	.422	0.42434	0.42428
Gap 3-4	.422	0.42427	0.42512
Gap 4-1	.422	0.42358	0.42379

Dimensions in Inch

Barcode # : 4004

Mfg. S/N : 007

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

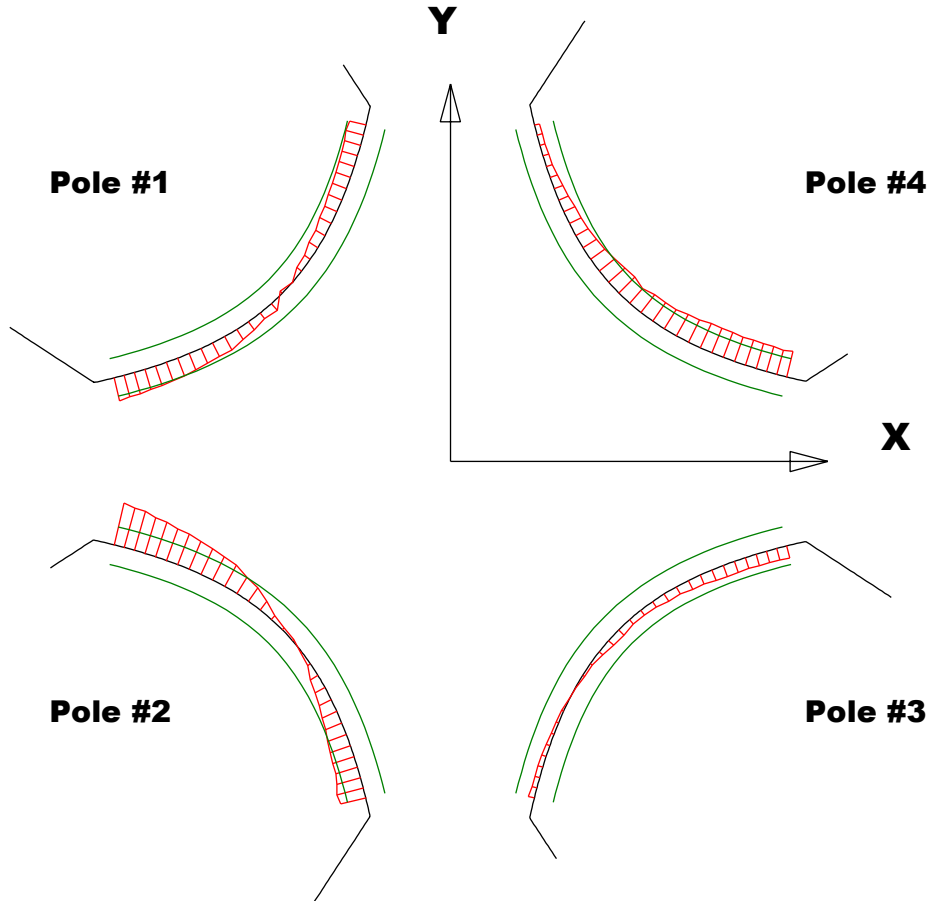
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00102	-0.00082	-0.0004	-0.00175
Max. Dev.	0.00148	0.00113	0.00029	0.00025

Barcode # : 4004

Mfg. S/N : 007

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

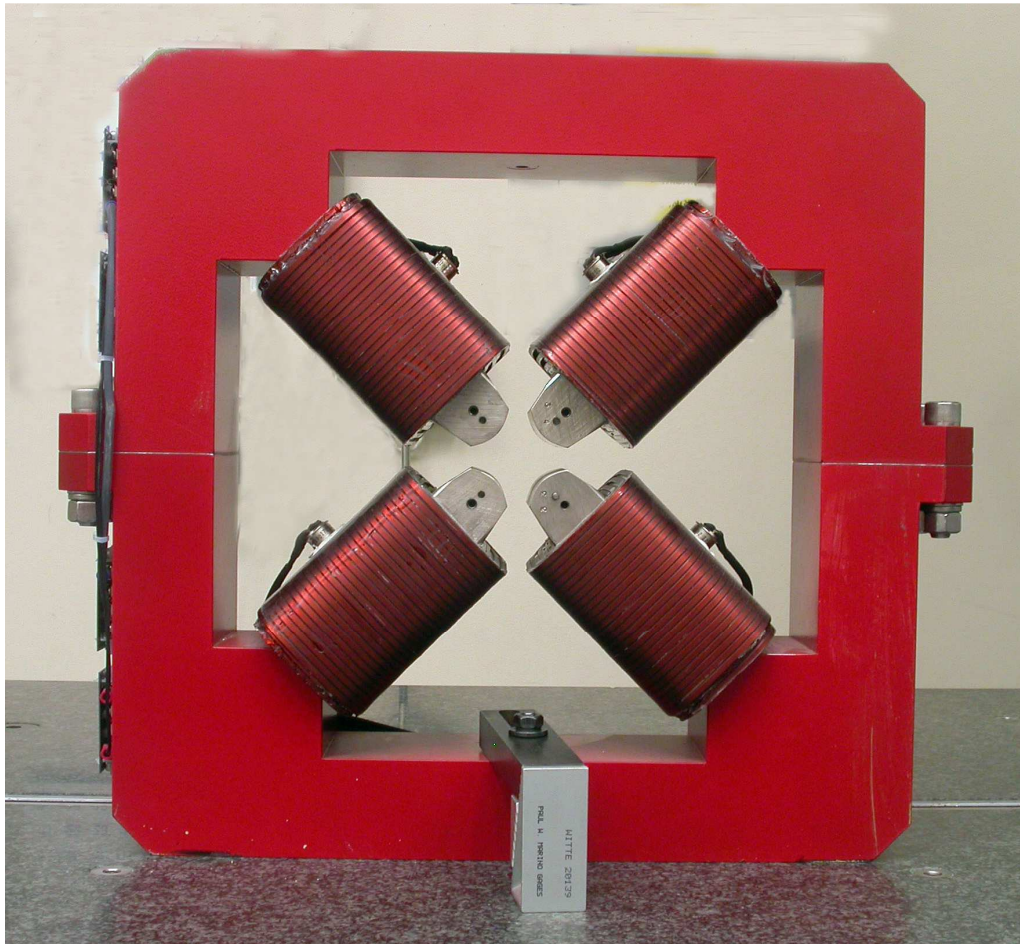
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00097	-0.00145	-0.00067	-0.00142
Max. Dev.	0.00126	0.00229	0.00033	-0.00026

Barcode # : 4004

Mfg. S/N : 007

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



Angle in Decimal Degrees $^{\circ}$ = 0.01879

Angle in Milliradians = 0.32791

Barcode # : 4004

Mfg. S/N : 007