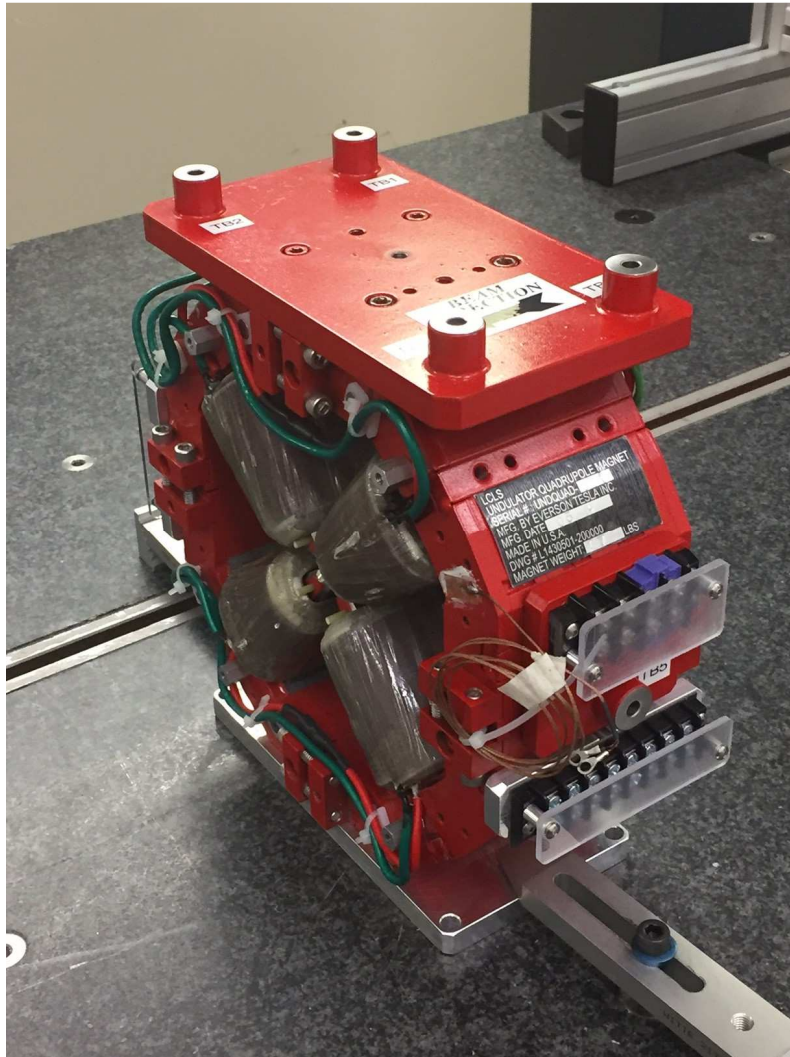


LCLS II Undulator Quadrupole Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-381-012-22
Barcode # : 4081
Mfg. S/N : 012

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.

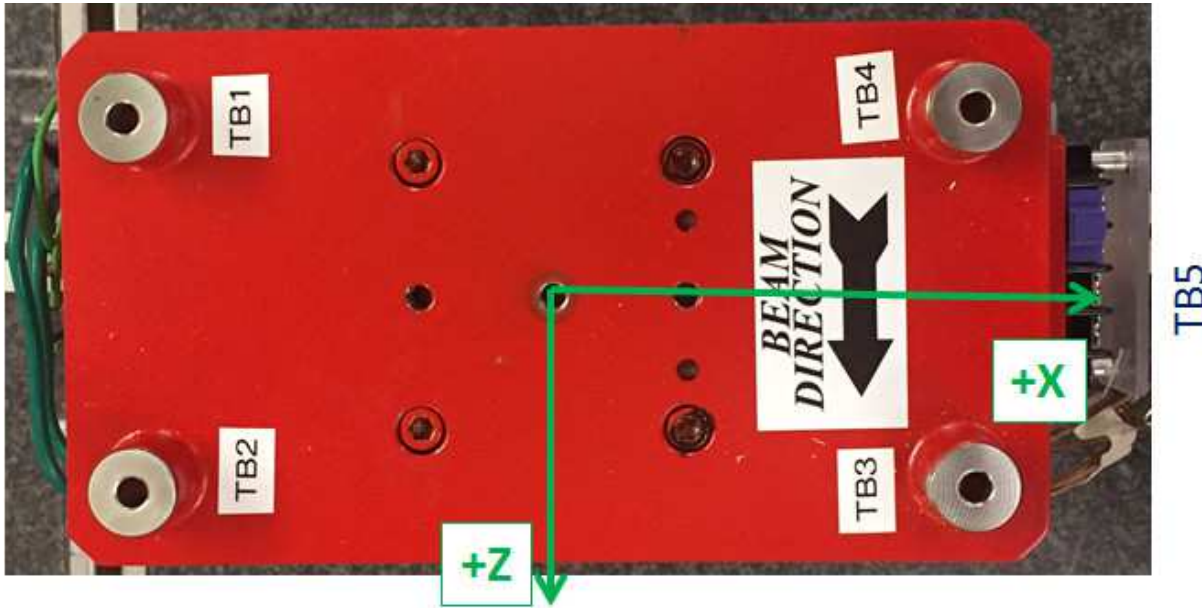
Coordinate Origins

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



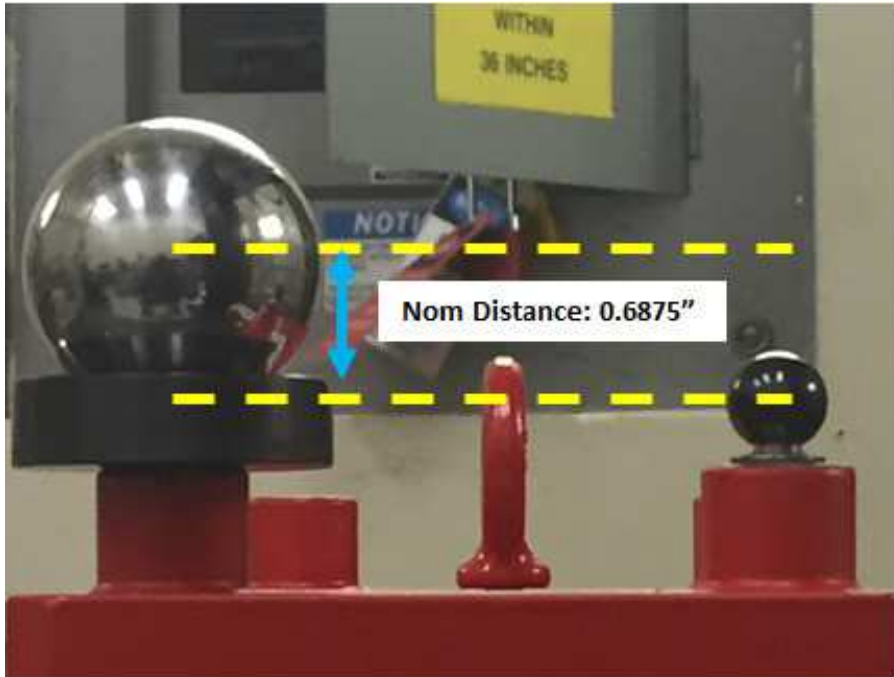
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-3.36201	6.81141	-1.49230
TB 2	-3.38549	6.80997	1.50536
TB 3	3.35539	6.81167	1.55192
TB 4	3.37560	6.81029	-1.44718
TB 5	6.58802	0.13232	0.02824
TB A	-3.36440	6.12439	-1.49420
TB B	-3.38706	6.12258	1.50481
TB C	3.35772	6.12412	1.55199
TB D	3.37859	6.12274	-1.44705
TB E	5.90059	0.13067	0.02768

Tooling Ball Locations (1-5) are 1 inch above Tooling Ball Adapter Plane
 Tooling Ball Locations (A-E) are 5/16 inch above Tooling Ball Adapter Plane
 Dimensions in Inch

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



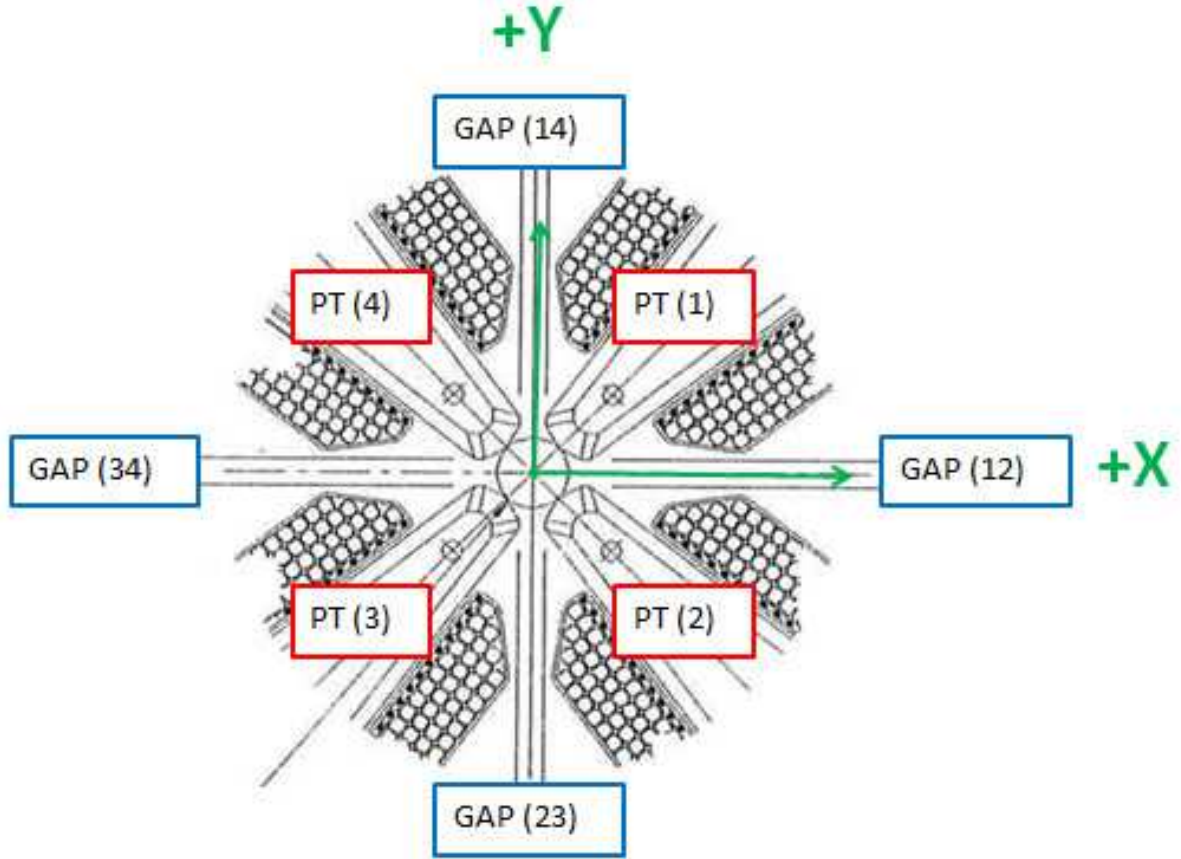
Tooling Ball	Nom Dist.	Actual Dist.
TB 1	0.6875 ± 0.001	0.68702
TB 2	0.6875 ± 0.001	0.68739
TB 3	0.6875 ± 0.001	0.68756
TB 4	0.6875 ± 0.001	0.68756
TB 5	0.6875 ± 0.001	0.68743

Dimensions in Inch

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Pole Tip Gap Measurements



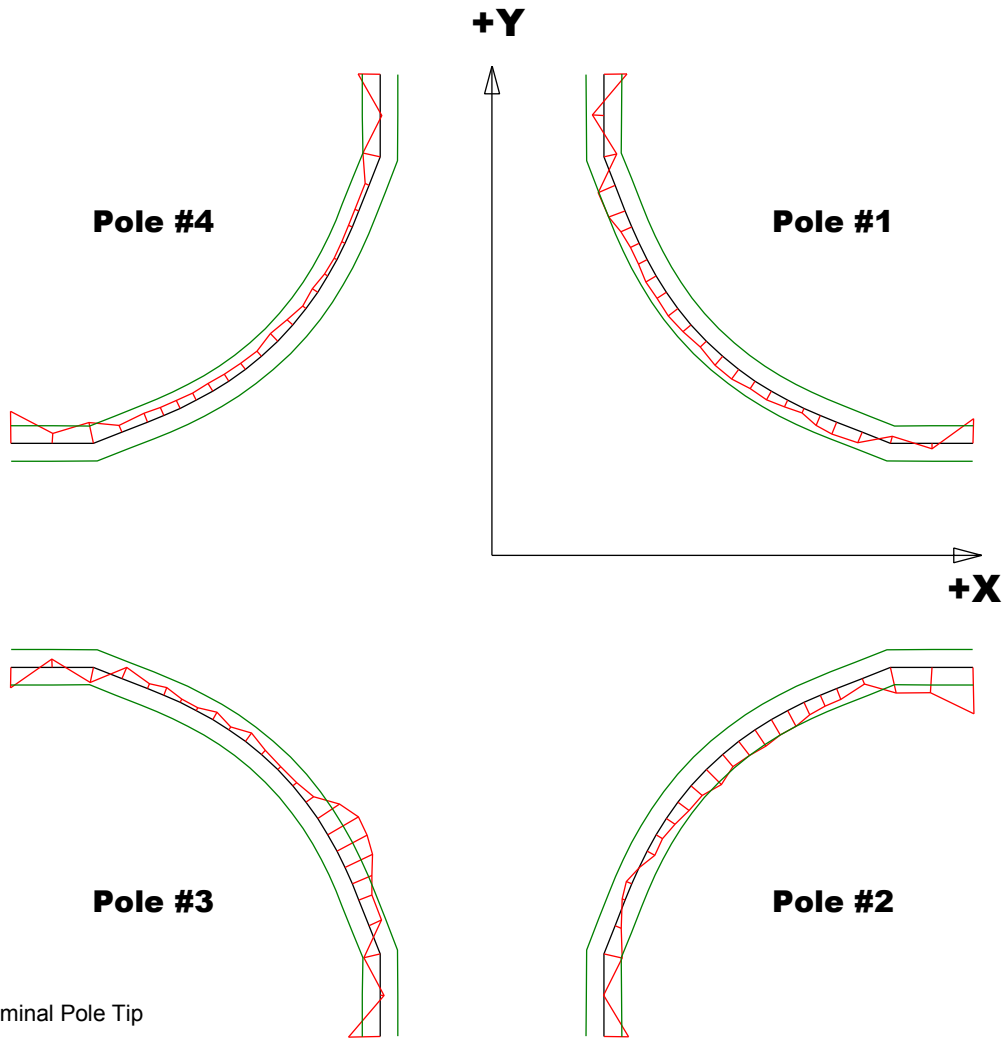
	Nominal Distance	Downstream Pole End	Upstream Pole End
Pole Tip Distance 1-3	0.433 ± .002	0.43232	0.43285
Pole Tip Distance 2-4	0.433 ± .002	0.43472	0.43335
Gap 1-2	0.159 ± .002	0.16031	0.16001
Gap 2-3	0.159 ± .002	0.15964	0.16012
Gap 3-4	0.159 ± .002	0.16006	0.15956
Gap 4-1	0.159 ± .002	0.15883	0.15997

Dimensions in Inch

Barcode # : 4081

Mfg. S/N : 012

Composite Best-fit of Pole Tips, Downstream



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

Dimensions in Inch

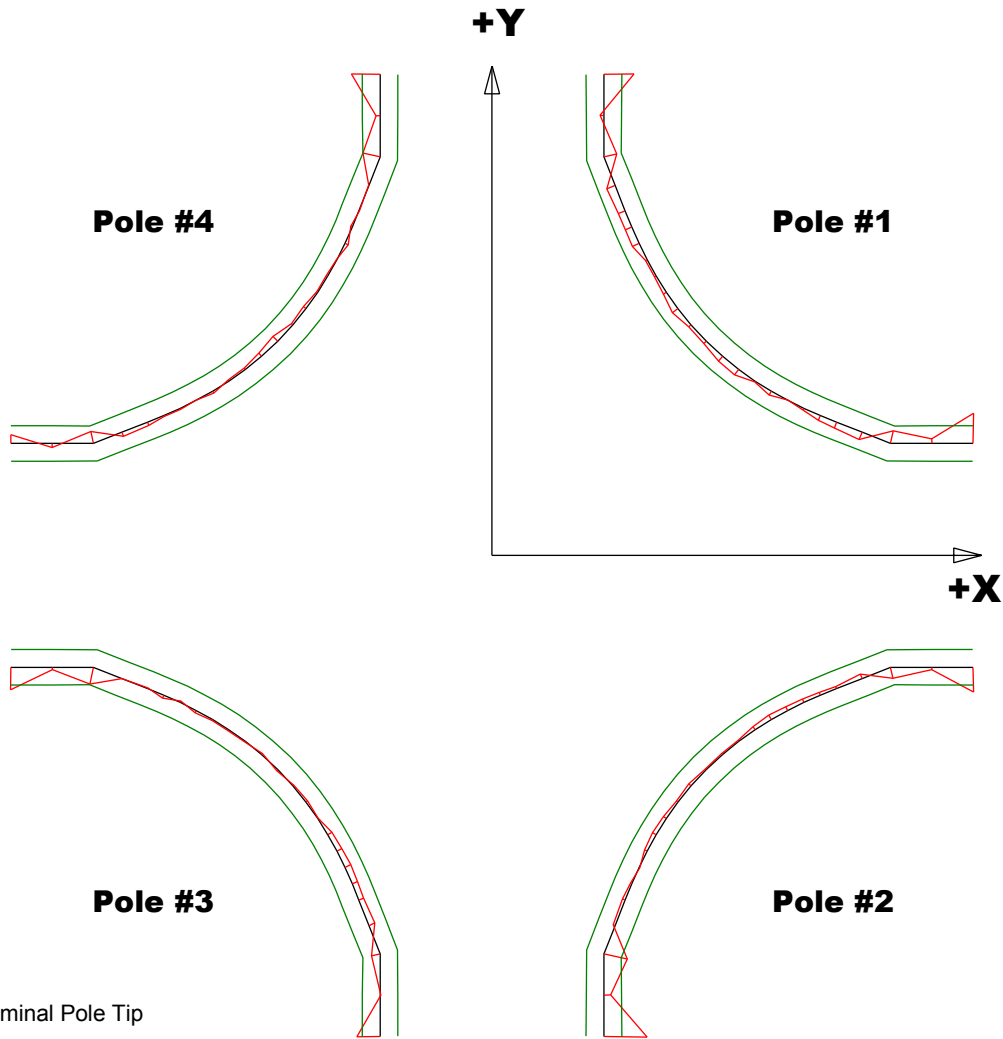
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00139	-0.00262	-0.00178	-0.00181
Max. Dev.	0.00105	0.00033	0.002	0.00009

Barcode # : 4081

Mfg. S/N : 012

Composite Best-fit of Pole Tips, Upstream



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

Dimensions in Inch

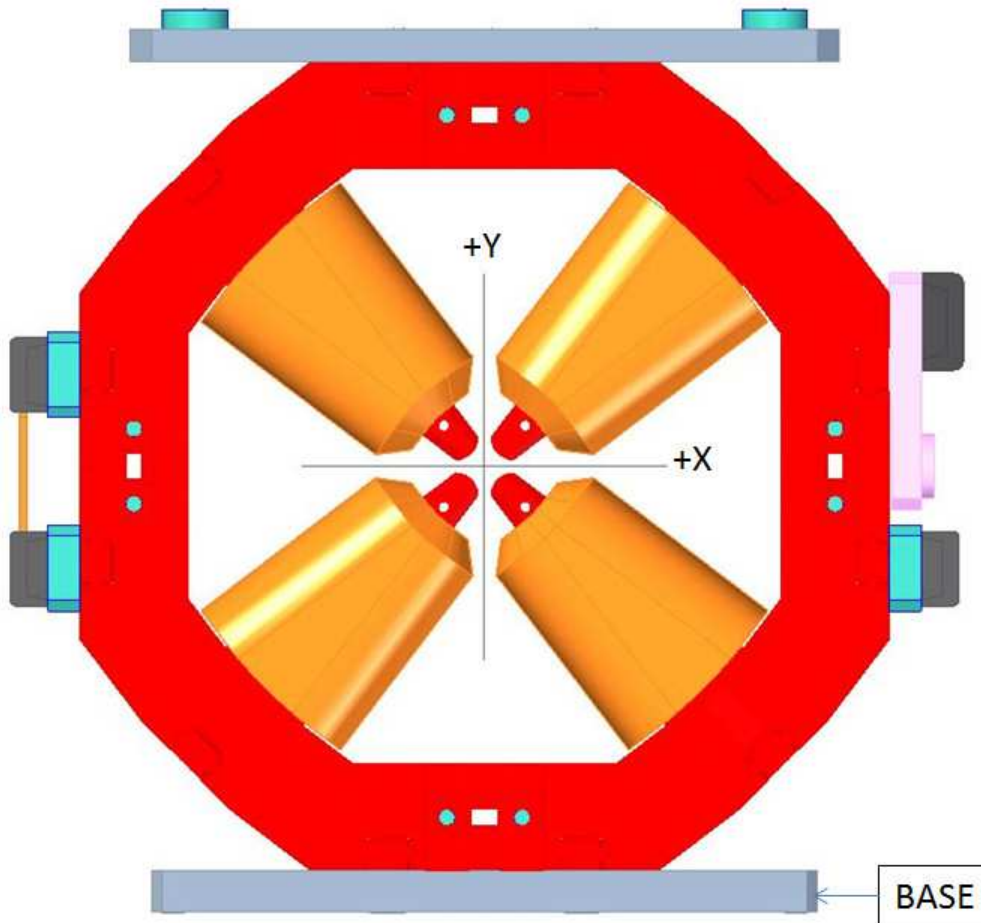
Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.0017	-0.00243	-0.00131	-0.00161
Max. Dev.	0.00052	0.0003	0.00036	0.00025

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Angle of the Composite Pole Tip Best-Fit In Relation to Base



Angle in Decimal Degrees ° :-0.06684

Angle in Milliradians :-1.16659

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