

## LCLS II 2Q10 Fiducialization Report



Inspector : K. Caban  
Engineer : J. Amann  
Drawing No. : SA-344-113-21  
Barcode # : 4181  
Mfg. S/N : #13

## 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 0.150 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.

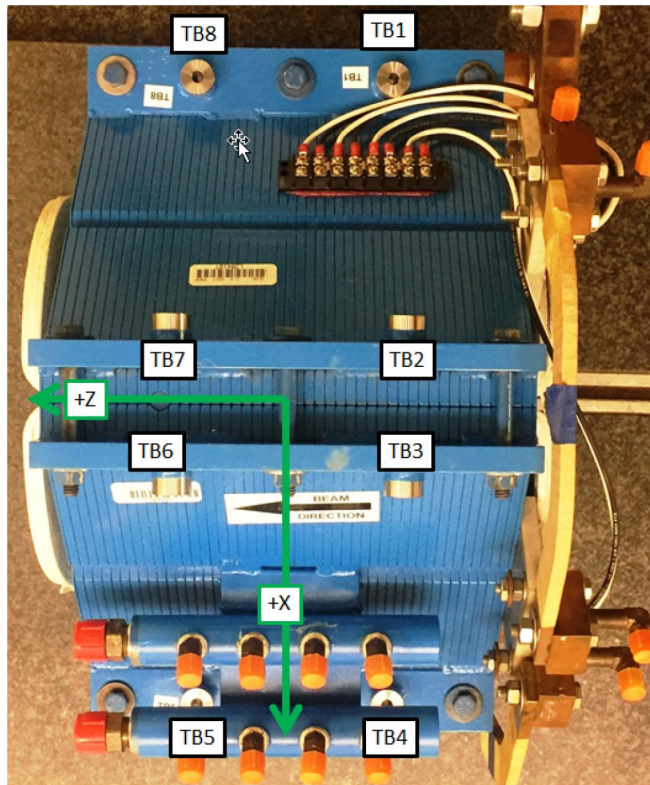
### Coordinate Origins

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.

**Barcode # : 4181**

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## Tooling Ball Locations



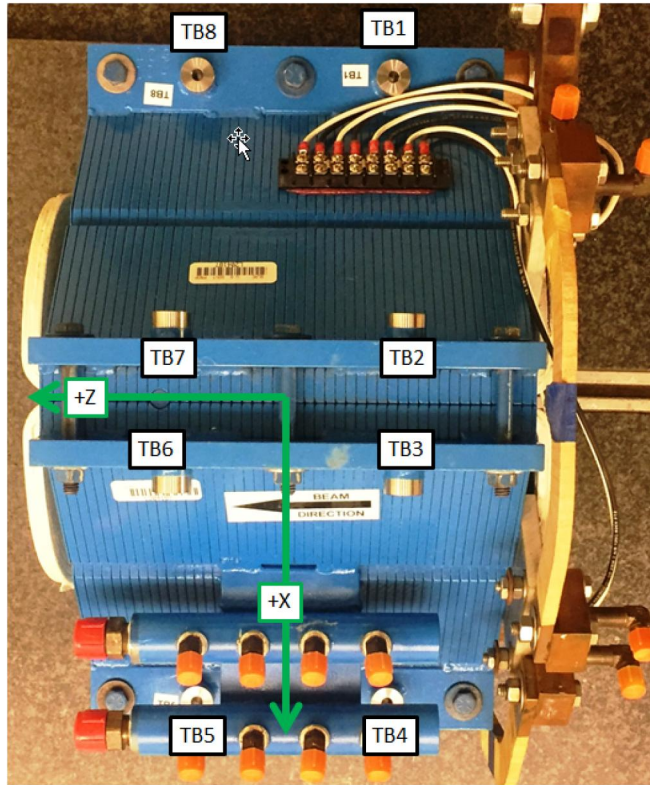
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-7.0578	2.6772	-2.1535
TB 2	-2.6732	7.0766	-2.1744
TB 3	2.6718	7.0601	-2.1662
TB 4	7.0518	2.6728	-2.1819
TB 5	7.0605	2.6774	2.1589
TB 6	2.6795	7.0523	2.1592
TB 7	-2.6693	7.0684	2.1694
TB 8	-7.0553	2.6766	2.1902

Tooling Ball Locations are 1 inch above Tooling Ball Adapter Plane  
Dimensions in Inch

**Barcode # : 4181**

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## Tooling Ball Locations



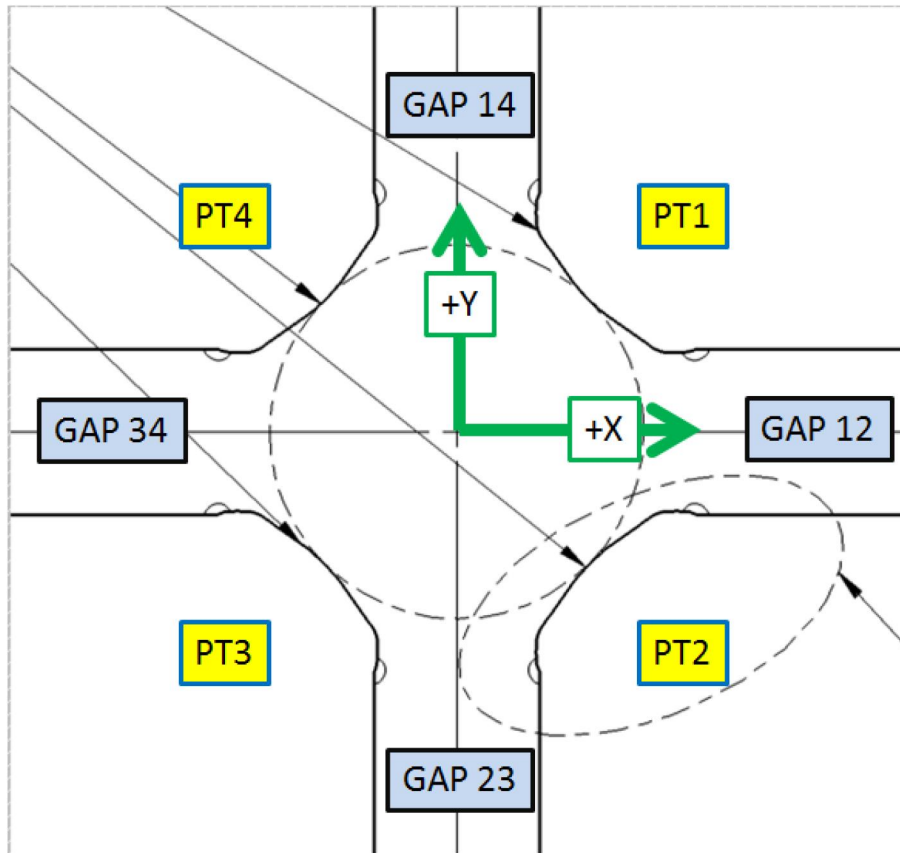
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	-7.0532	1.9883	-2.1543
TB 2	-1.9848	7.0696	-2.1751
TB 3	1.9849	7.0586	-2.1657
TB 4	7.0507	1.9855	-2.1809
TB 5	7.0622	1.9905	2.1587
TB 6	1.9926	7.0511	2.1698
TB 7	-1.9806	7.0742	2.1561
TB 8	-7.0512	1.9892	2.1906

Tooling Ball Locations are 5/16 inch above Tooling Ball Adapter Plane  
Dimensions in Inch

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## Pole Tip Gap Measurements



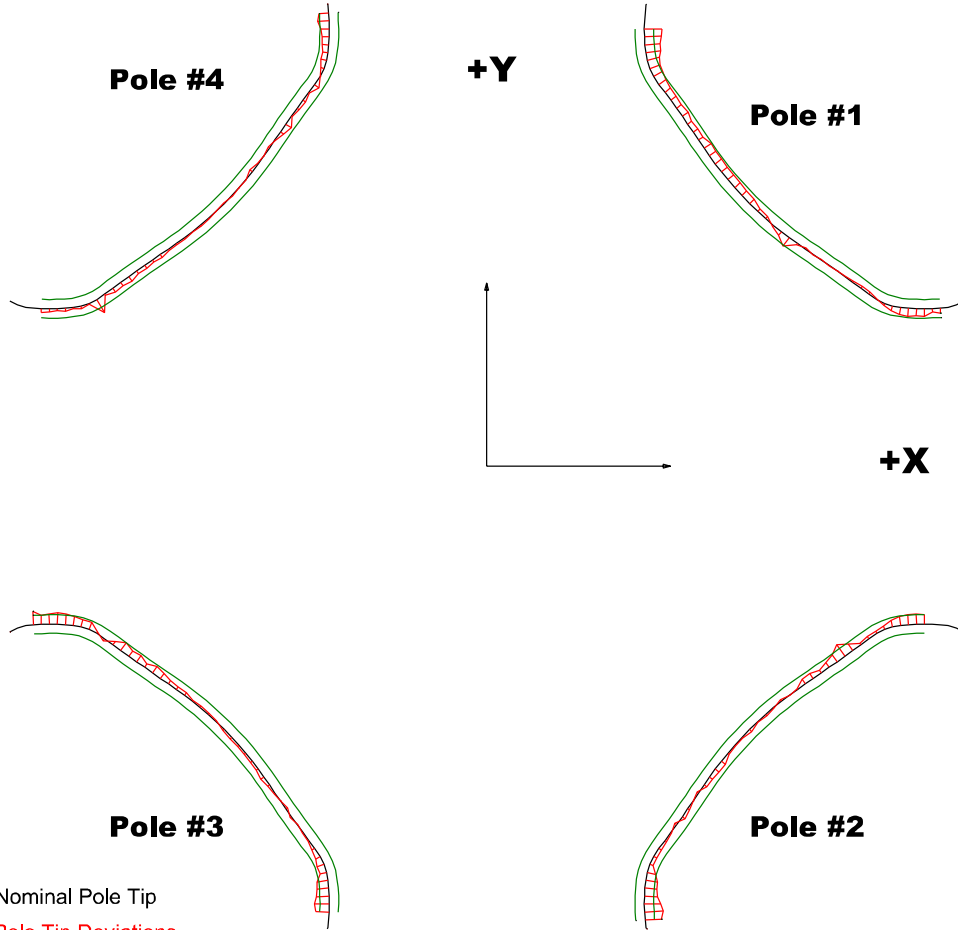
	Nominal Distance	Downstream Pole End	Upstream Pole End
PT Distance 1-3	2.026	2.02679	2.02716
PT Distance 2-4	2.026	2.02631	2.02671
Gap 1-2	0.8602	0.85718	0.85807
Gap 2-3	0.8602	0.86092	0.85961
Gap 3-4	0.8602	0.85643	0.85949
Gap 1-4	0.8602	0.86051	0.85742

Dimensions in Inch

**Barcode # : 4181**

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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

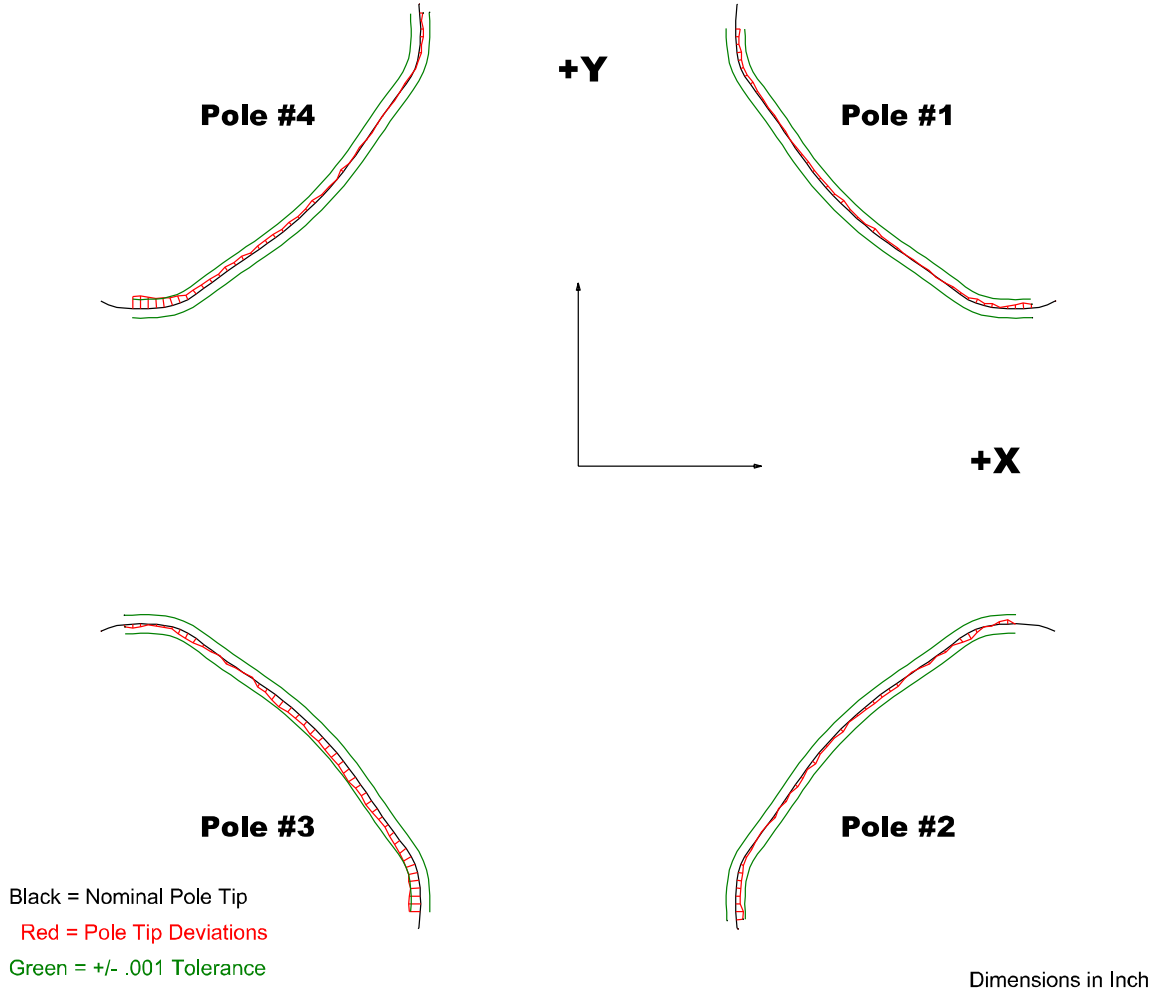
Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00192	-0.00201	-0.00158	-0.00122
Max. Dev.	0.00113	0.00155	0.0014	0.00159

**Barcode # : 4181**

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## Composite Best-fit of Pole Tips, Upstream



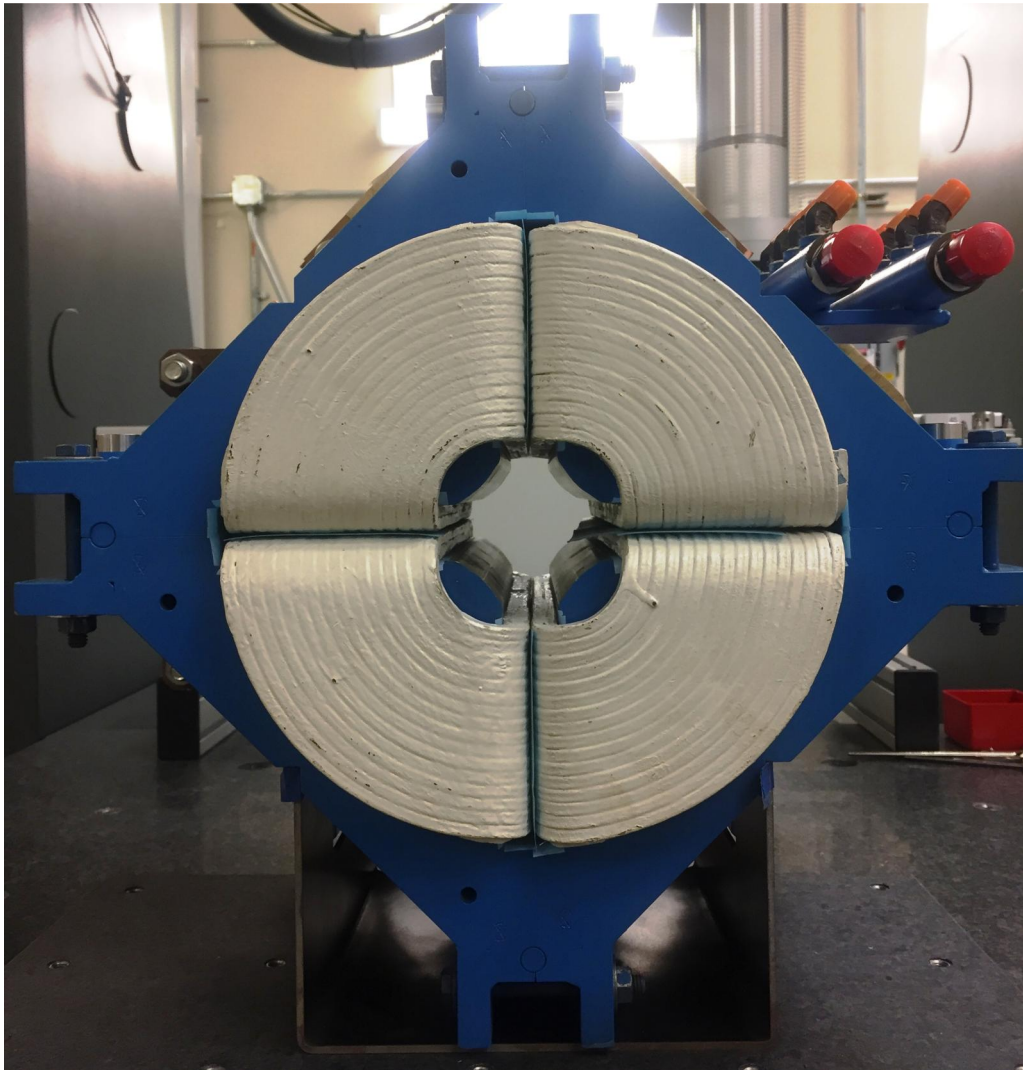
### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.00056	-0.00079	-0.00131	-0.00137
Max. Dev.	0.00006	0.00044	0.00016	0.00035

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## Angle of the Composite Pole Tip Best-Fit



in Decimal Degrees ° : -0.01289  
Angle in Milliradians : -0.22501

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