

# **LCLS II 2Q4W Fiducialization Report**

## **S30XL Refurb Quadrupole MFD FILE: 38193-2**



Inspector : K. Caban  
Engineer : A. Ibrahimov  
Drawing No. : LCL0370-10763 R00  
Barcode # : L204255  
Mfg. S/N : QA08

## 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 and +Z points towards Terminal Bus End.

### 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.

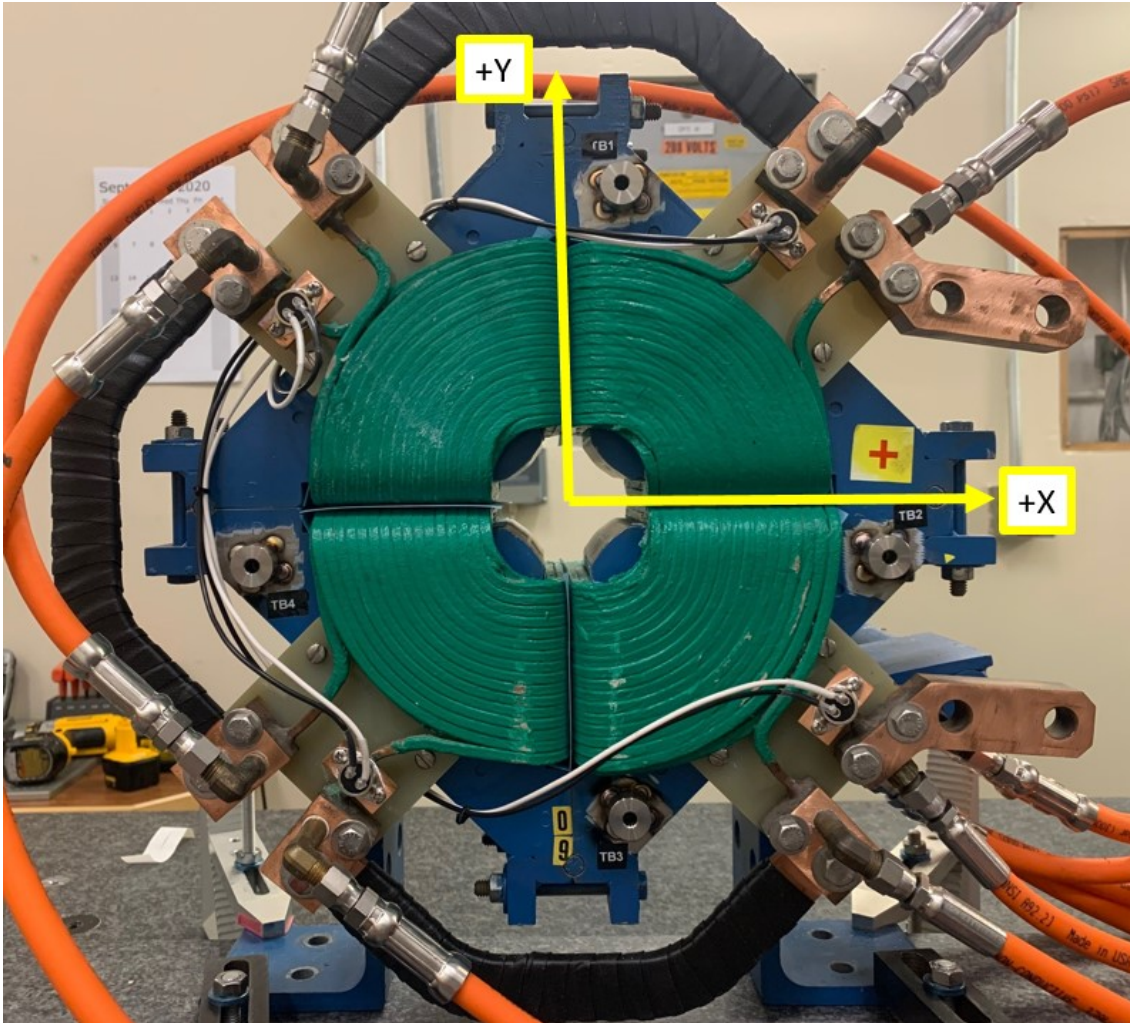
### Coordinate Origins

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. +Z points towards Terminal Bus End.

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## Tooling Ball Locations



Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	0.9929	5.4690	3.4479
TB 2	5.5229	-0.9717	3.4456
TB 3	1.0325	-5.4940	3.4445
TB 4	-5.5147	-1.0031	3.4402

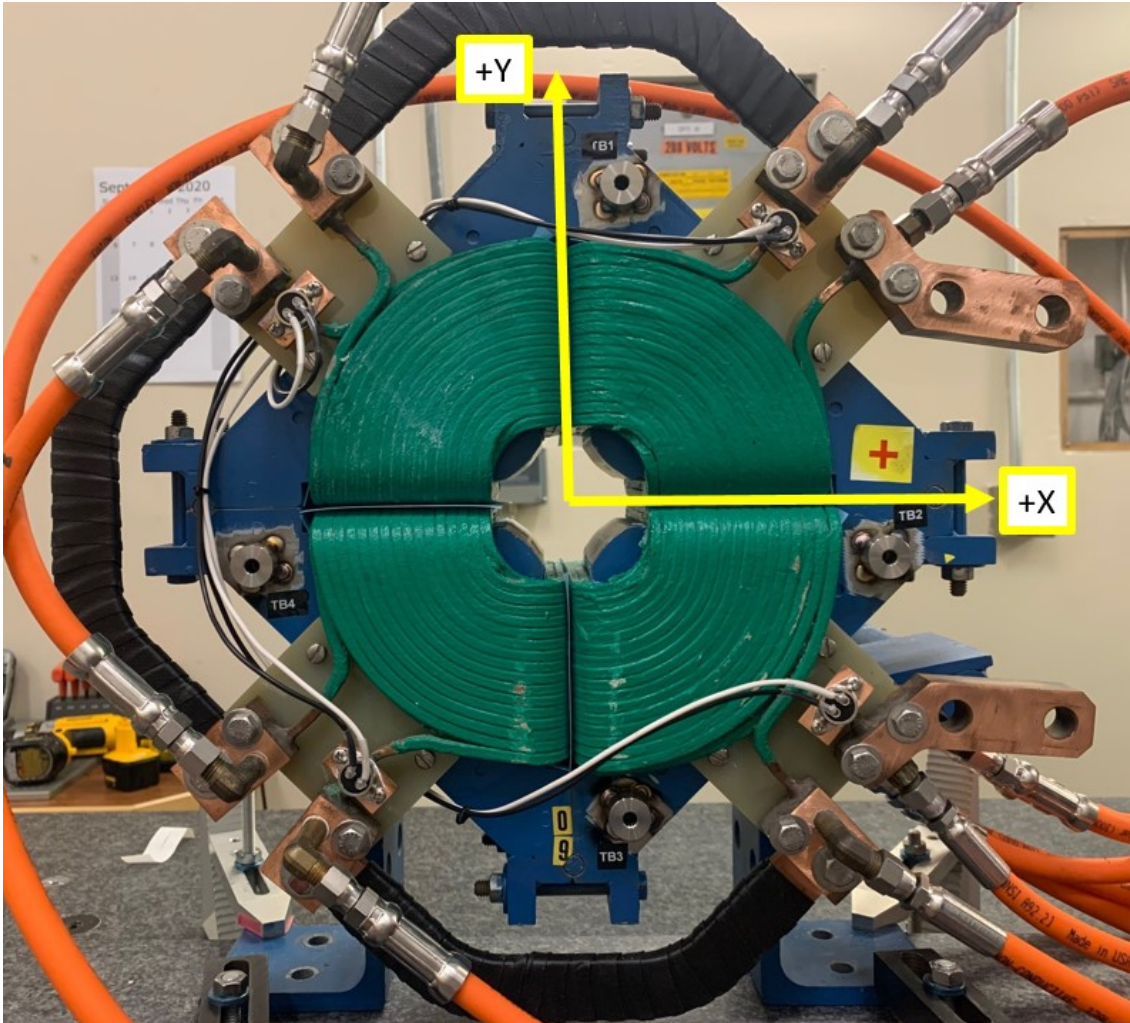
Tooling Ball Locations are 1 inch above Tooling Ball Adapter Plane  
Dimensions in Inch

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## Tooling Ball Locations



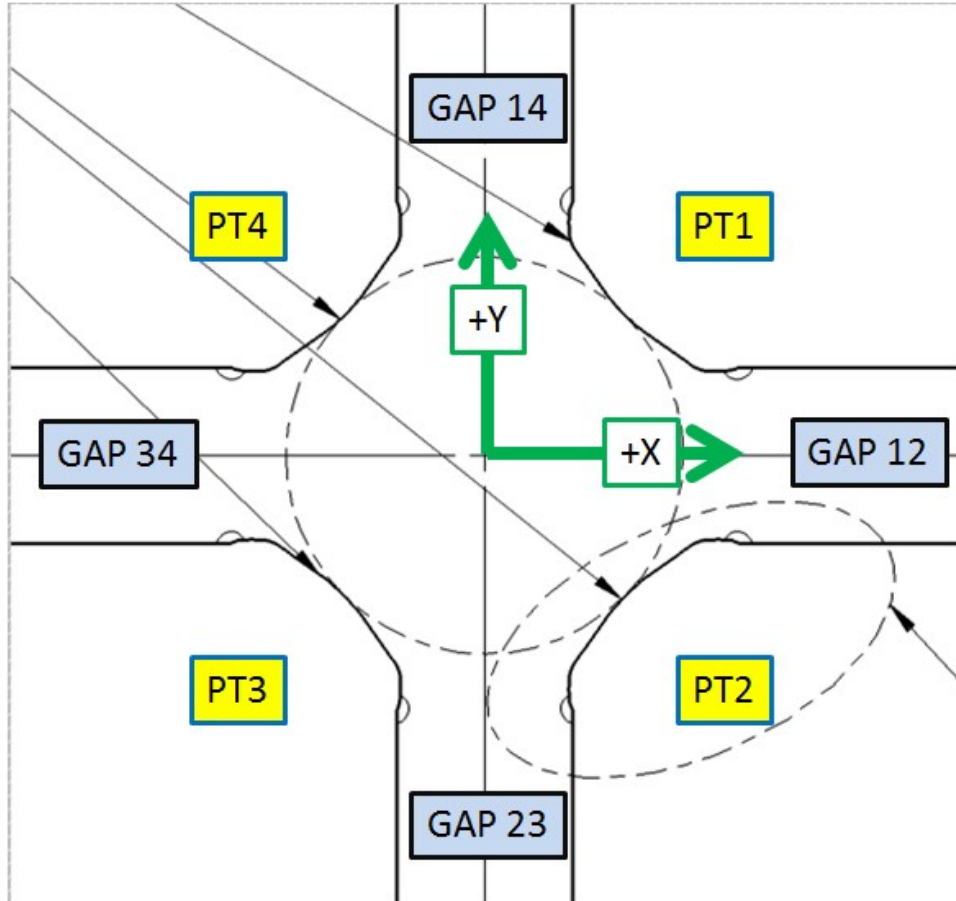
Tooling Ball	X Coord.	Y Coord.	Z Coord.
TB 1	0.9975	5.4536	2.7606
TB 2	5.5232	-0.9841	2.7583
TB 3	1.0312	-5.4906	2.7570
TB 4	-5.5109	-1.0033	2.7527

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

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## Pole Tip Gap Measurements



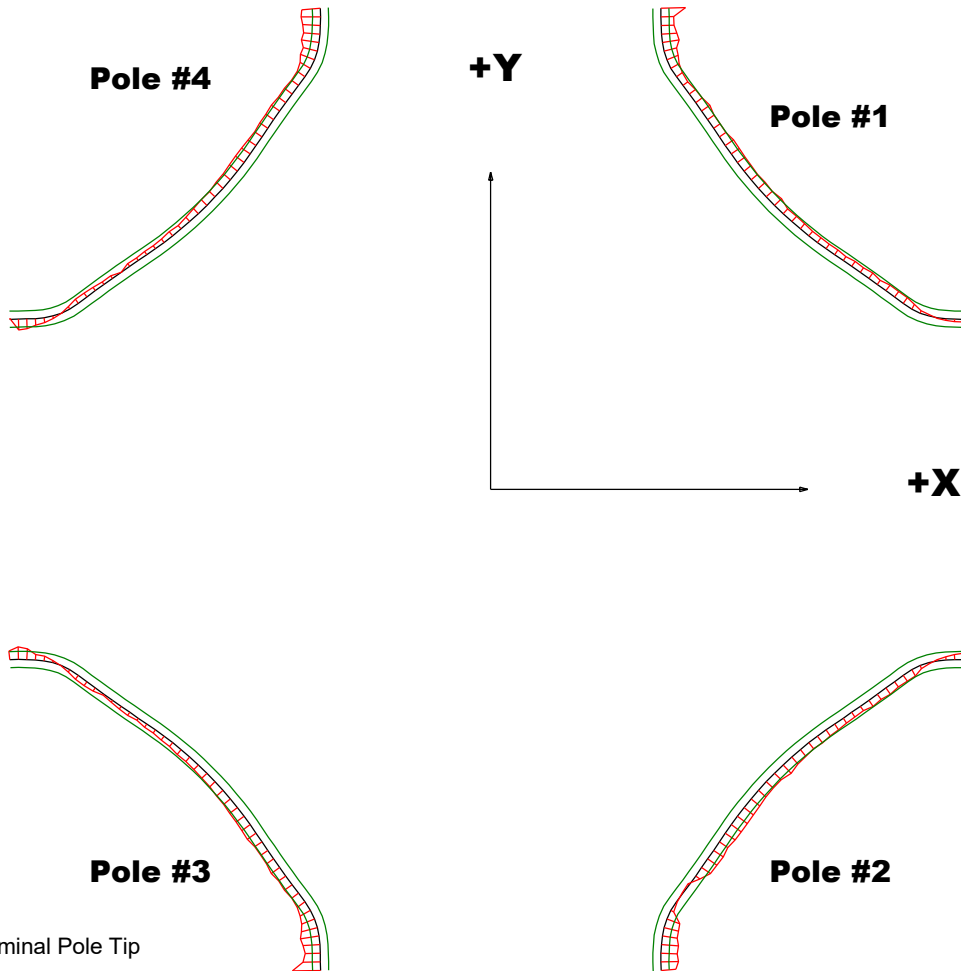
	Nominal Distance	Downstream Pole End	Upstream Pole End
PT Distance 1-3	2.026	2.0279	2.0285
PT Distance 2-4	2.026	2.0281	2.0272
Gap 1-2	0.8602	0.8574	0.8567
Gap 2-3	0.8602	0.8624	0.8622
Gap 3-4	0.8602	0.8556	0.8585
Gap 1-4	0.8602	0.8622	0.8608

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

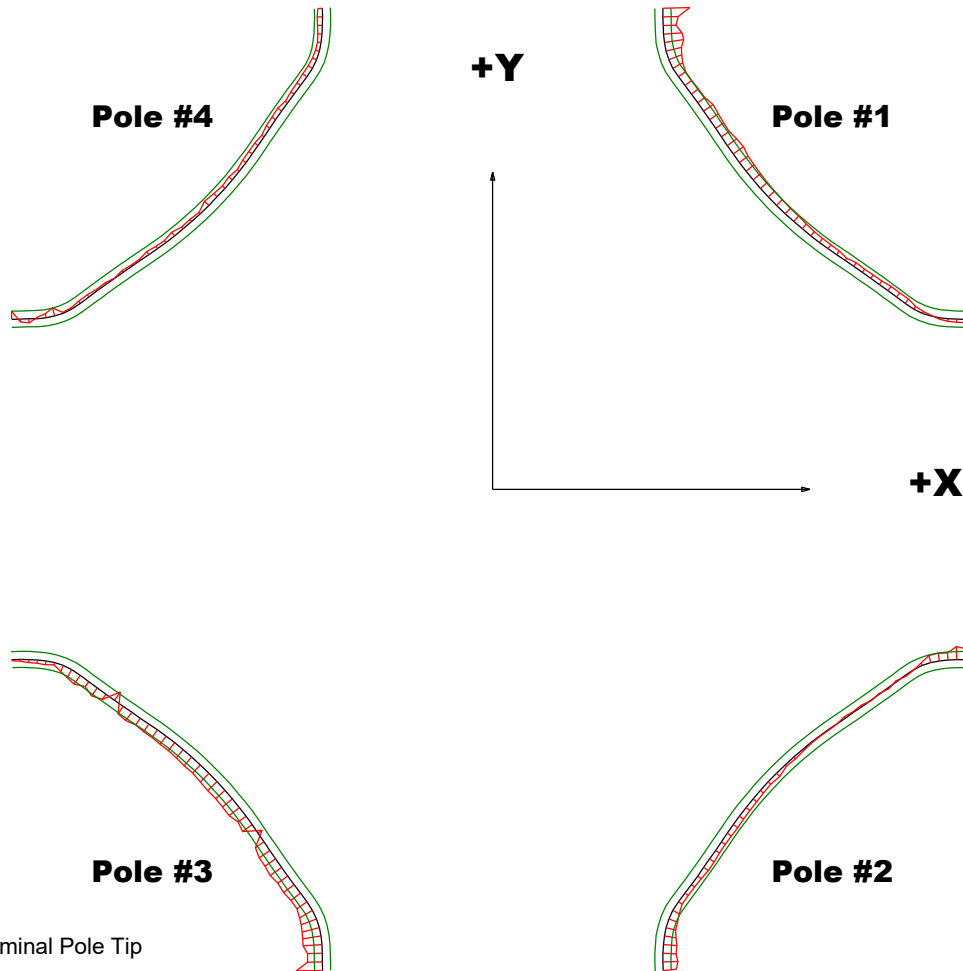
### Pole Tip Deviations

Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.0031	-0.0022	-0.0035	-0.0024
Max. Dev.	0.0005	0.0008	0.0016	0.0013

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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

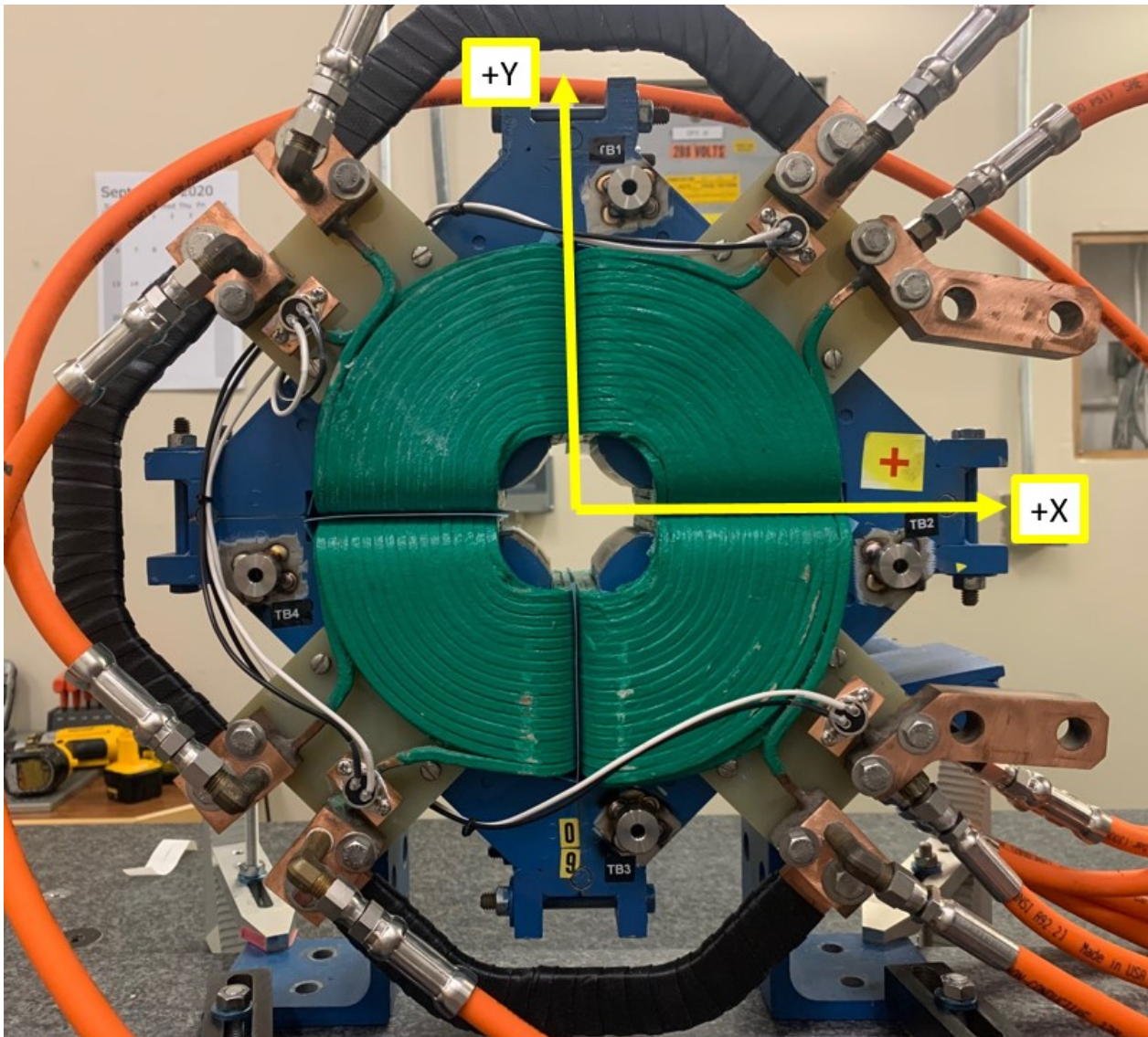
Pole Tip	#1	#2	#3	#4
Min. Dev.	-0.0034	-0.0019	-0.0033	-0.001
Max. Dev.	0.0005	0.0017	0.0012	0.0005

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## Angle of the Composite Pole Tip Best-Fit



in Decimal Degrees ° : -0.08266

Angle in Milliradians : -1.44273

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