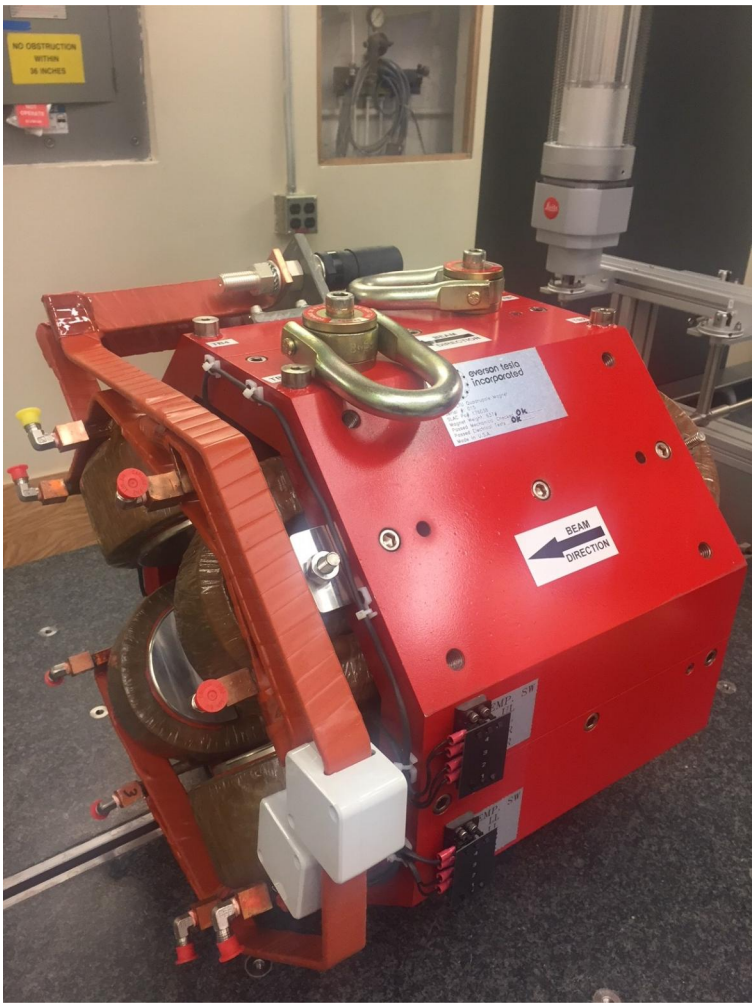
# LCLS II LTU Quad Fiducialization Report

# 1.26Q12 Quadrupole




Inspector : K. Caban

Engineer : J. Amann

Drawing No. : SA-380-327-00 R1

Barcode # : 4054

Mfg. S/N : 015

# 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 .100 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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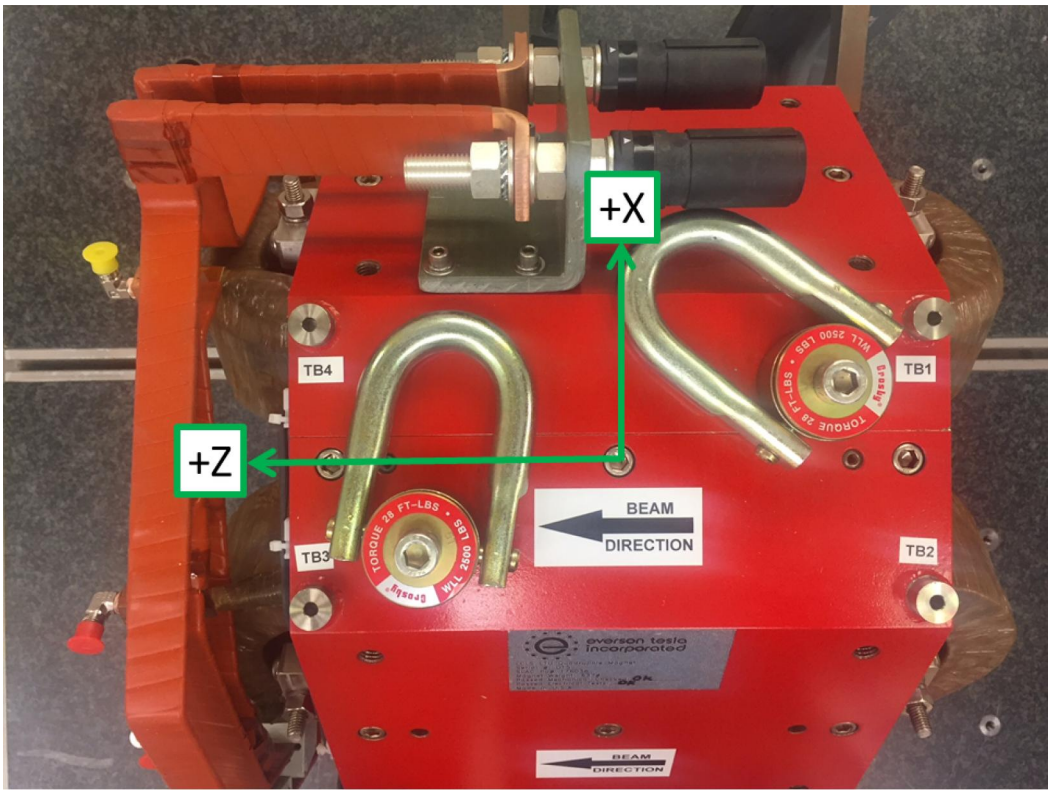
# Tooling Ball Locations




| Tooling Ball | X Coord. | Y Coord. | Z Coord. |
|---|---|---|---|
| TB 1 | -2.4864 | 10.2068 | -5.4979 |
| TB 2 | 2.4871 | 10.2040 | -5.4899 |
| TB 3 | 2.5131 | 10.2022 | 5.4883 |
| TB 4 | -2.4880 | 10.2122 | 5.4911 |
| TB 1* | -2.4869 | 9.5197 | -5.4980 |
| TB 2* | 2.4865 | 9.5158 | -5.4897 |
| TB 3* | 2.5121 | 9.5138 | 5.4894 |
| TB 4* | -2.4871 | 9.5240 | 5.4901 |

Tooling Ball (TB1-4) Locations are 1 inch above Tooling Ball Adapter Plane
Tooling Ball (TB1*-4* Locations are 5/16 inch above Tooling Ball Adapter Plane
Dimensions in Inch

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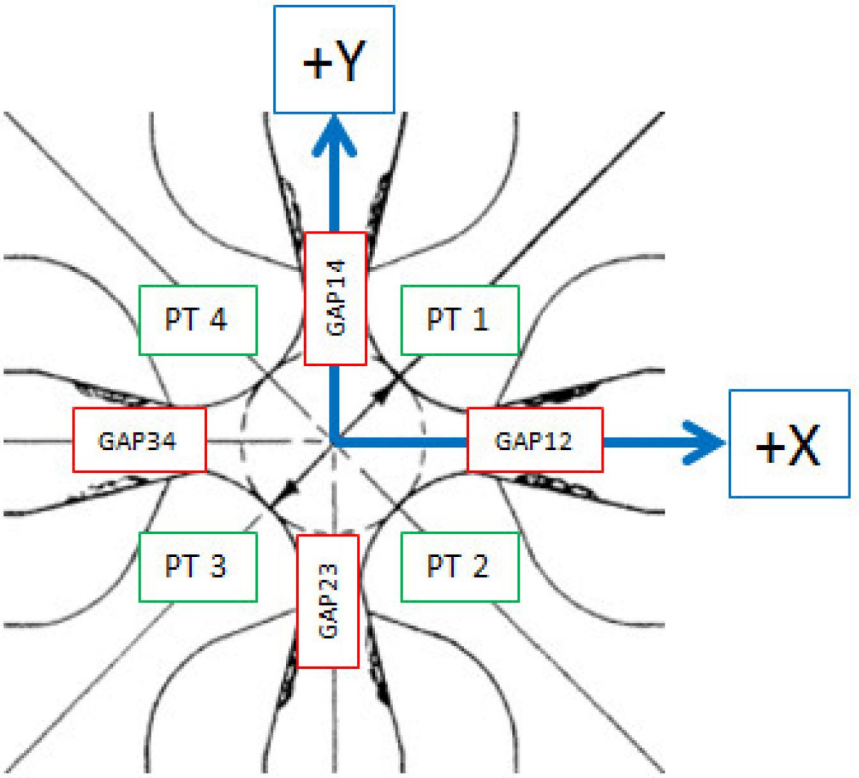
# Pole Tip Gap Measurements




| | Nominal Distance | Downstream Pole End | Upstream Pole End |
|---|---|---|---|
| Pole Tip Distance 1-3 | 1.260 | 1.2601 | 1.2600 |
| Pole Tip Distance 2-4 | 1.260 | 1.2581 | 1.2617 |
| Gap 1-2 | 0.432 | 0.4288 | 0.4292 |
| Gap 2-3 | 0.432 | 0.4315 | 0.4368 |
| Gap 3-4 | 0.432 | 0.4353 | 0.4334 |
| Gap 4-1 | 0.432 | 0.4304 | 0.4312 |

Dimensions in Inch

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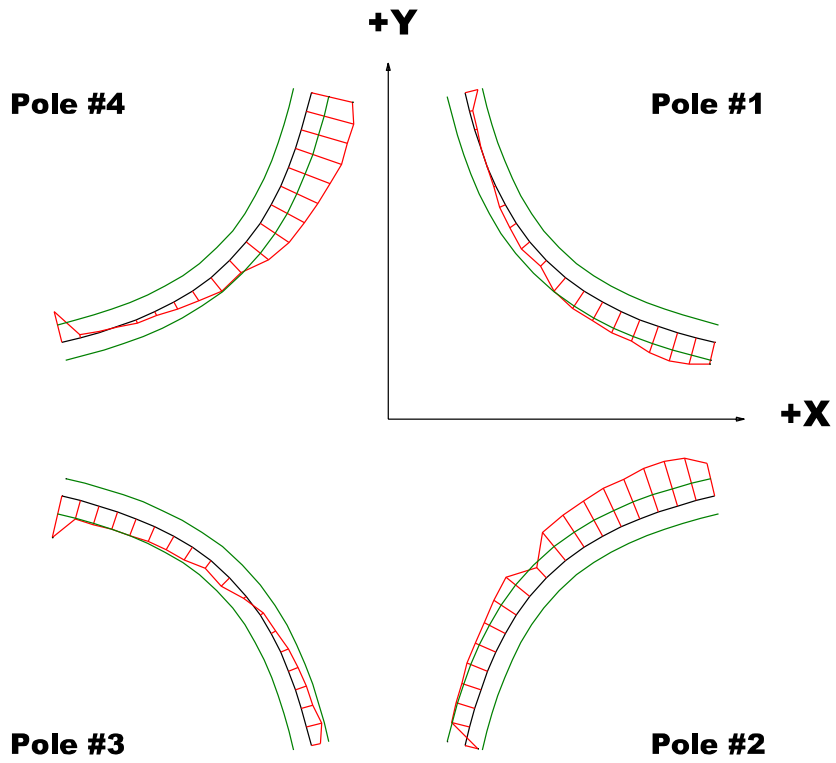
# Composite Best-fit of Pole Tips, Downstream




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. | -0.0007 | -0.0007 | -0.0024 | -0.0017 |
| Max. Dev. | 0.0016 | 0.0026 | 0.0009 | 0.0027 |

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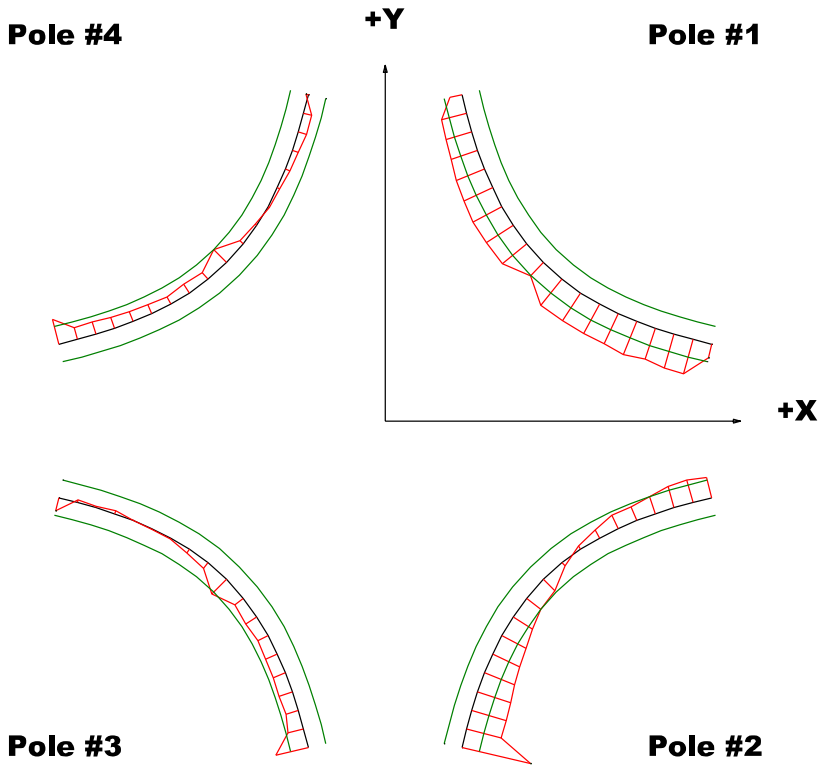
# Composite Best-fit of Pole Tips, Upstream




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. | 0.0007 | -0.0039 | -0.0018 | -0.0014 |
| Max. Dev. | 0.0020 | 0.0013 | 0.0002 | 0.0005 |

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# Angle of the Composite Pole Tip Best-Fit In Relation to Base/CMM Granite Table

Angle in Decimal Degrees ° :0.04638

Angle in Milliradians :0.80940

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