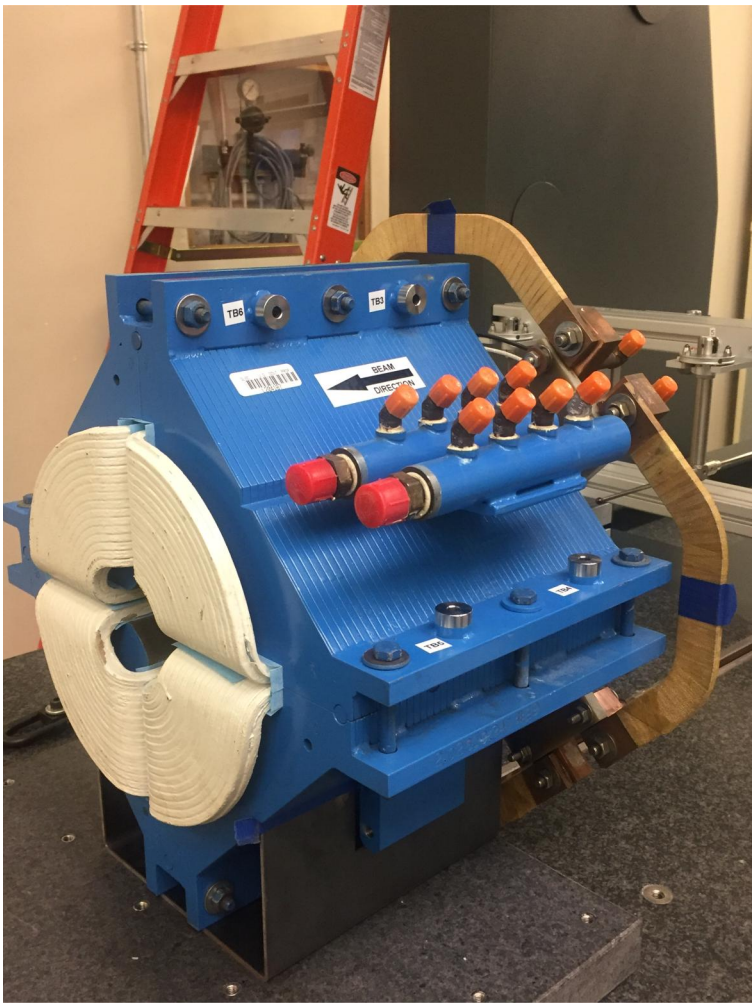
# LCLS II 2Q10 Fiducialization Report




Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-344-113-21
Barcode # : 4201
Mfg. S/N : #06

# 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.

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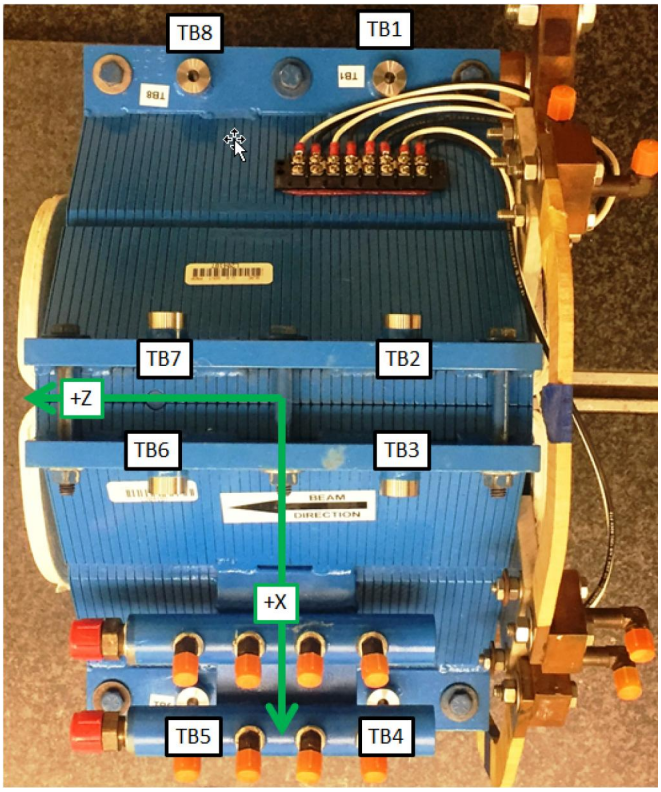
# Tooling Ball Locations




| Tooling Ball | X Coord. | Y Coord. | Z Coord. |
|---|---|---|---|
| TB 1 | -7.0645 | 2.6778 | -2.1503 |
| TB 2 | -2.6783 | 7.0617 | -2.1620 |
| TB 3 | 2.6698 | 7.0583 | -2.1753 |
| TB 4 | 7.0535 | 2.6694 | -2.1859 |
| TB 5 | 7.0389 | 2.6758 | 2.1388 |
| TB 6 | 2.6815 | 7.0598 | 2.1650 |
| TB 7 | -2.6691 | 7.0507 | 2.1627 |
| TB 8 | -7.0512 | 2.6811 | 2.1792 |

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

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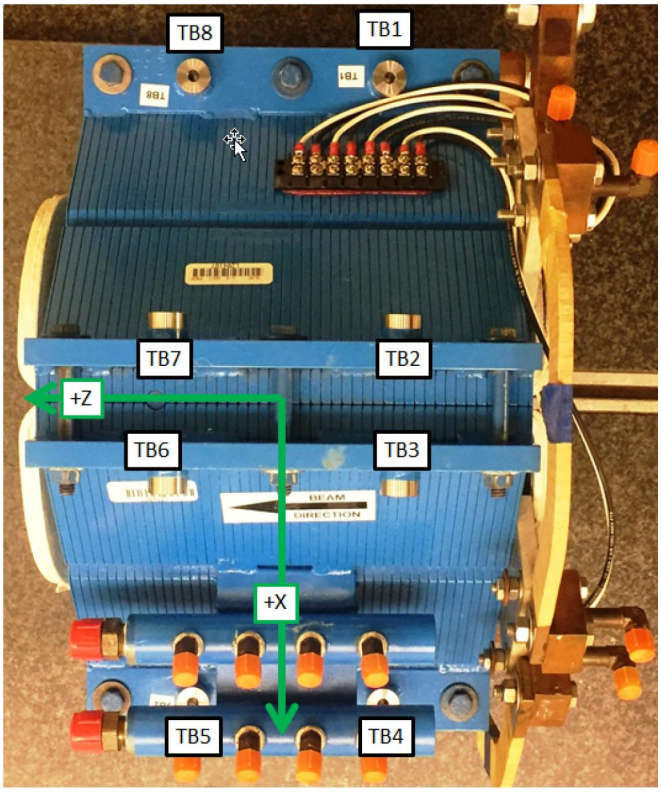
# Tooling Ball Locations




| Tooling Ball | X Coord. | Y Coord. | Z Coord. |
|---|---|---|---|
| TB 1 | -7.0642 | 1.9894 | -2.1502 |
| TB 2 | -1.9896 | 7.0580 | -2.1628 |
| TB 3 | 1.9808 | 7.0593 | -2.1726 |
| TB 4 | 7.0512 | 1.9830 | -2.1863 |
| TB 5 | 7.0391 | 2.0037 | 2.1422 |
| TB 6 | 1.9947 | 7.0594 | 2.1831 |
| TB 7 | -1.9809 | 7.0556 | 2.1423 |
| TB 8 | -7.0479 | 1.9937 | 2.1791 |

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

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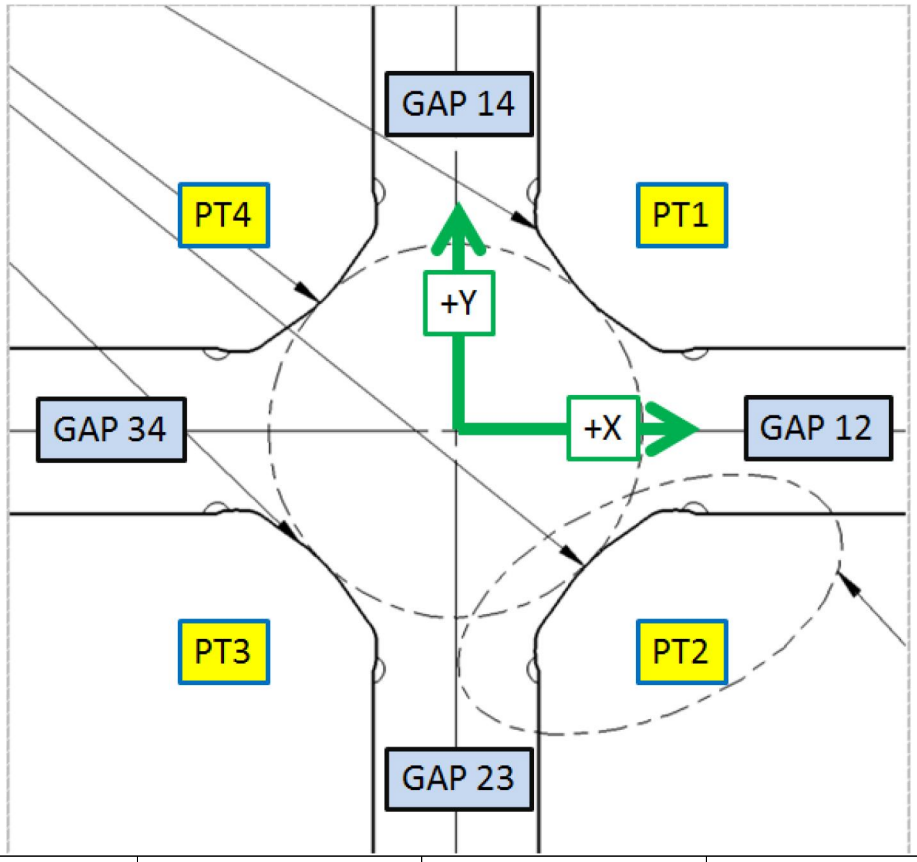
# Pole Tip Gap Measurements




| | Nominal Distance | Downstream Pole End | Upstream Pole End |
|---|---|---|---|
| PT Distance 1-3 | 2.026 | 2.02543 | 2.02605 |
| PT Distance 2-4 | 2.026 | 2.02498 | 2.02675 |
| Gap 1-2 | 0.8602 | 0.85725 | 0.85654 |
| Gap 2-3 | 0.8602 | 0.85795 | 0.86016 |
| Gap 3-4 | 0.8602 | 0.85532 | 0.85742 |
| Gap 1-4 | 0.8602 | 0.85851 | 0.85766 |

Dimensions in Inch

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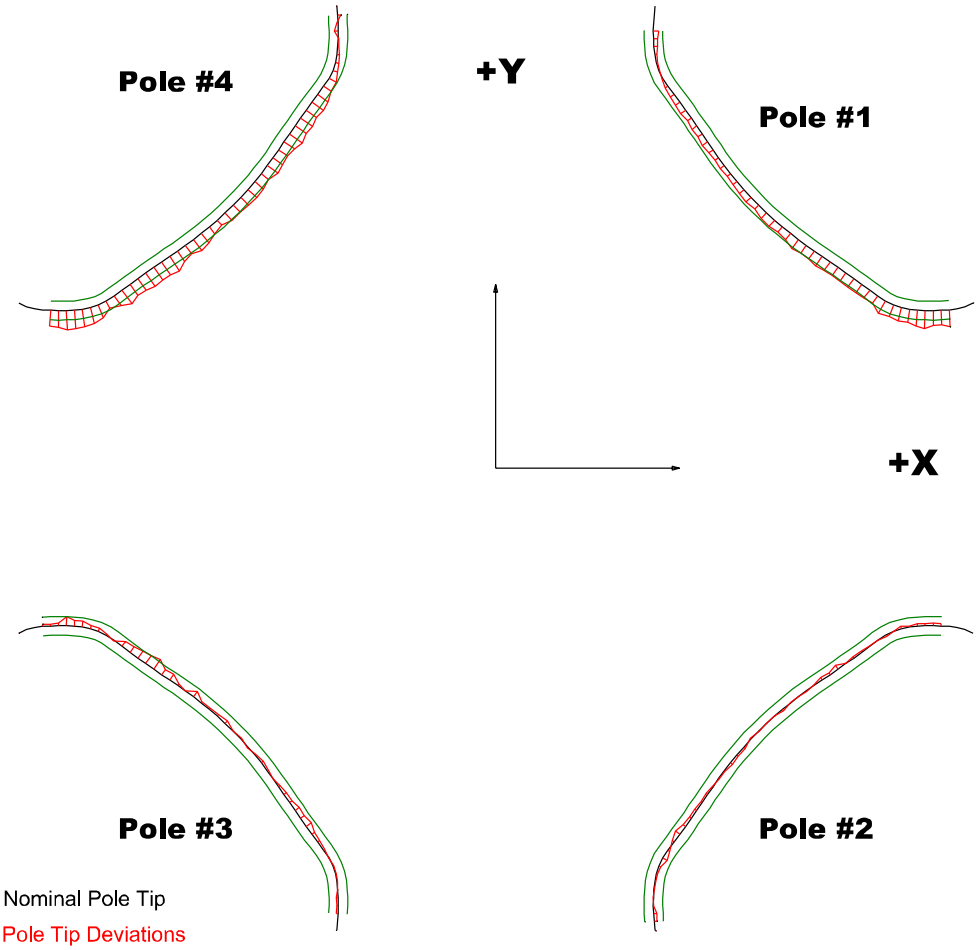
# Composite Best-fit of Pole Tips, Downstream




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. | -0.00062 | -0.00056 | -0.00021 | -0.00043 |
| Max. Dev. | 0.00196 | 0.00061 | 0.00126 | 0.00208 |

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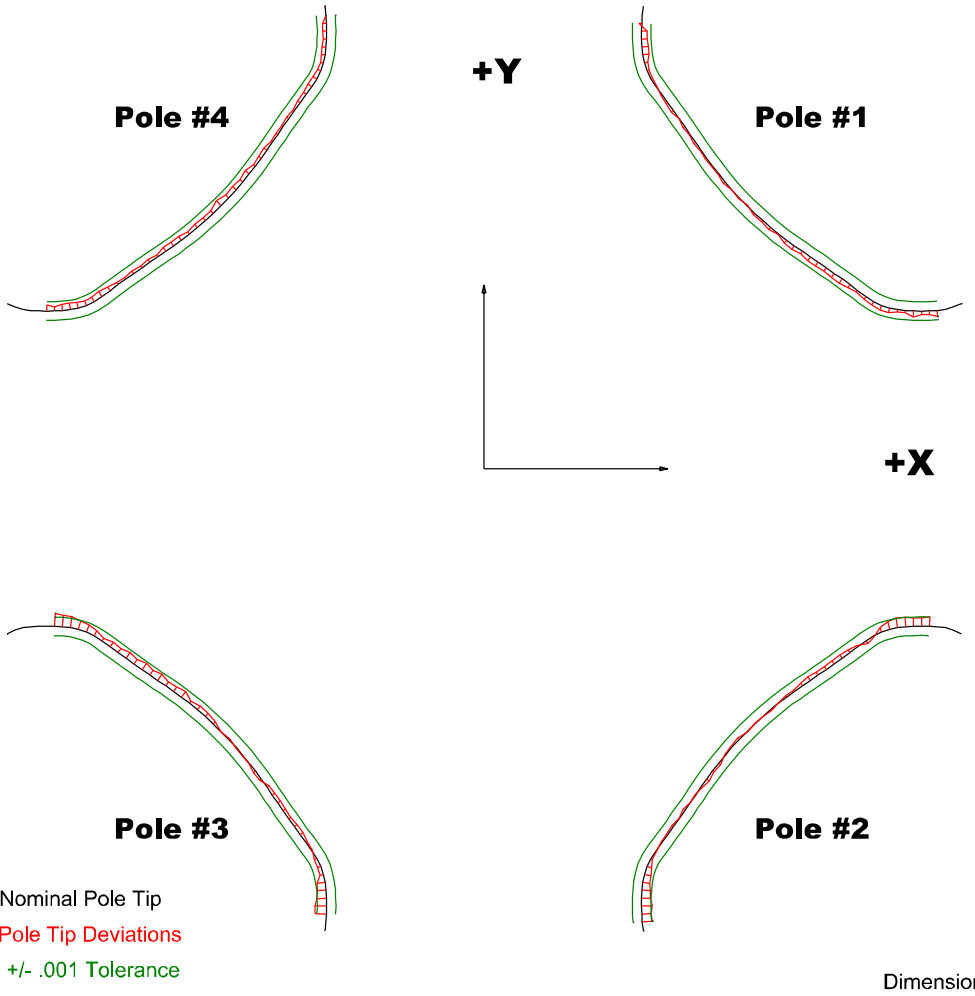
# Composite Best-fit of Pole Tips, Upstream




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. | -0.00066 | -0.00113 | -0.00126 | -0.00074 |
| Max. Dev. | 0.00066 | 0.00104 | 0.00138 | 0.00001 |

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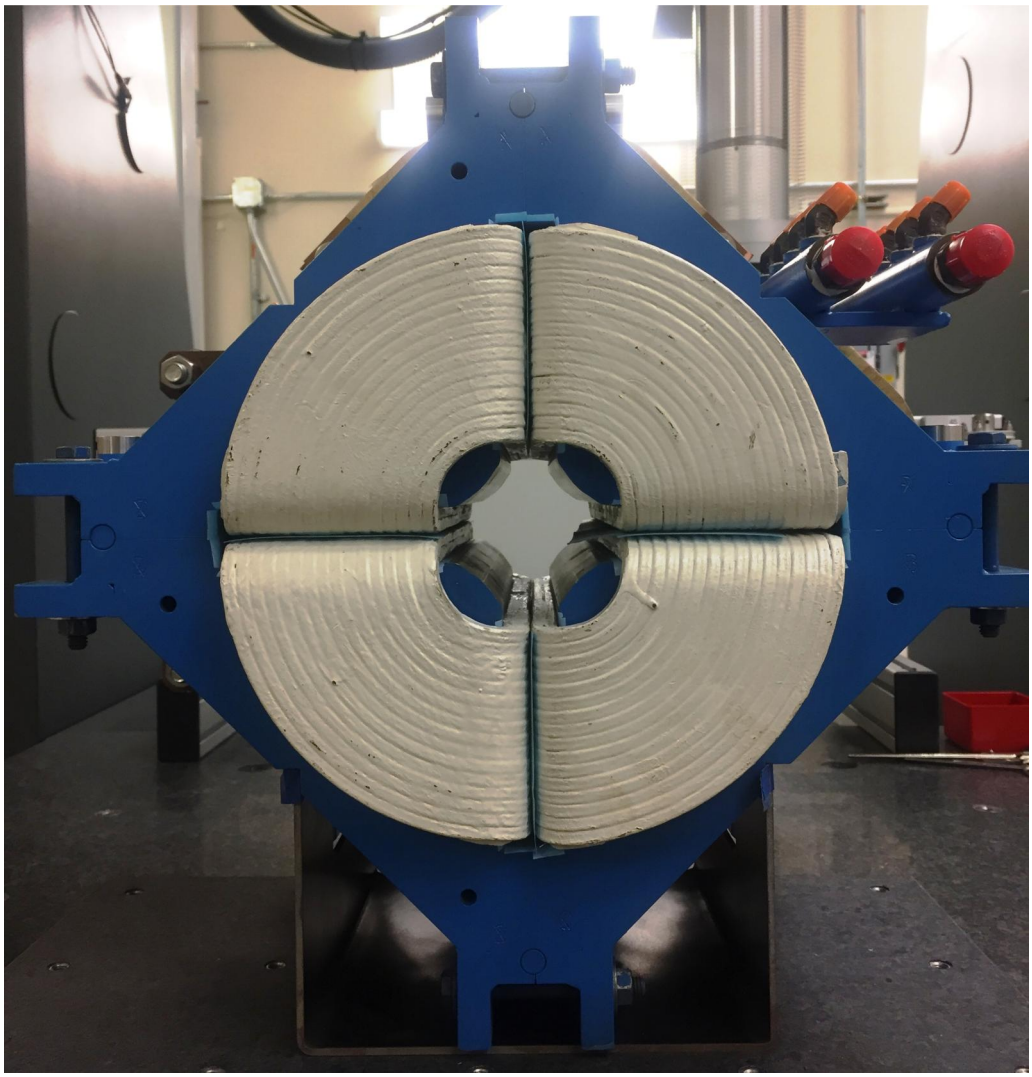
# Angle of the Composite Pole Tip Best-Fit



| | |
|---|---|
| in Decimal Degrees ° : | 0.04201 |
| Angle in Milliradians : | 0.73324 |

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