

LCLS II 2Q10 Fiducialization Report



Inspector : K. Caban
Engineer : J. Amann
Drawing No. : SA-344-113-21
Barcode # : 4187
Mfg. S/N : #29

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.

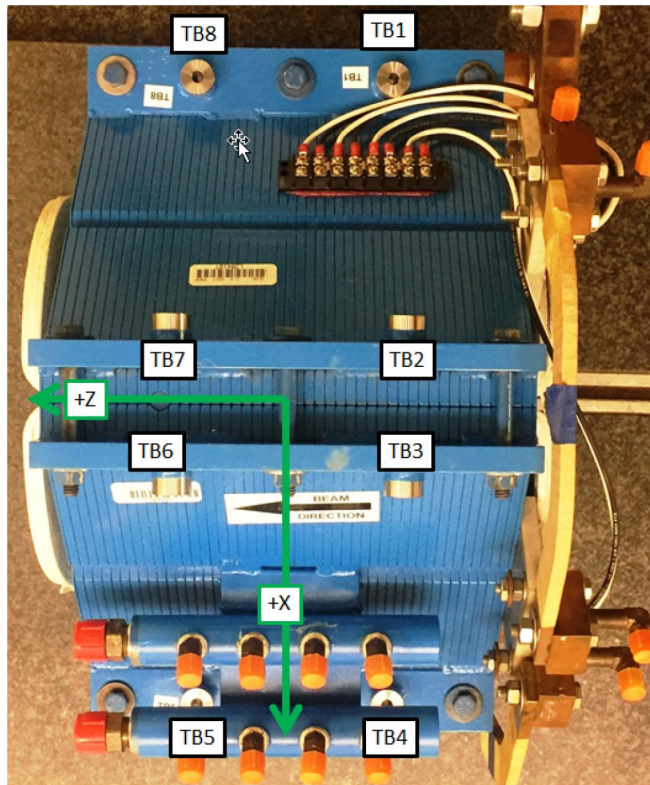
Coordinate Origins

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



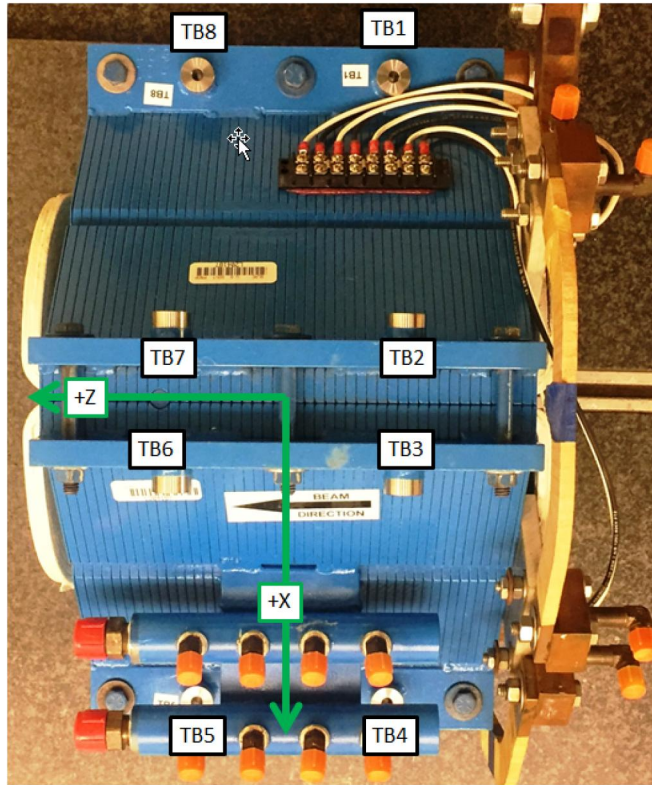
| Tooling Ball | X Coord. | Y Coord. | Z Coord. |
|--------------|----------|----------|----------|
| TB 1 | -7.0539 | 2.6856 | -2.1683 |
| TB 2 | -2.6774 | 7.0566 | -2.1829 |
| TB 3 | 2.6832 | 7.0576 | -2.1715 |
| TB 4 | 7.0607 | 2.6881 | -2.1809 |
| TB 5 | 7.0582 | 2.6797 | 2.1719 |
| TB 6 | 2.6765 | 7.0530 | 2.1691 |
| TB 7 | -2.6810 | 7.0482 | 2.1823 |
| TB 8 | -7.0563 | 2.6753 | 2.1723 |

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

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Tooling Ball Locations



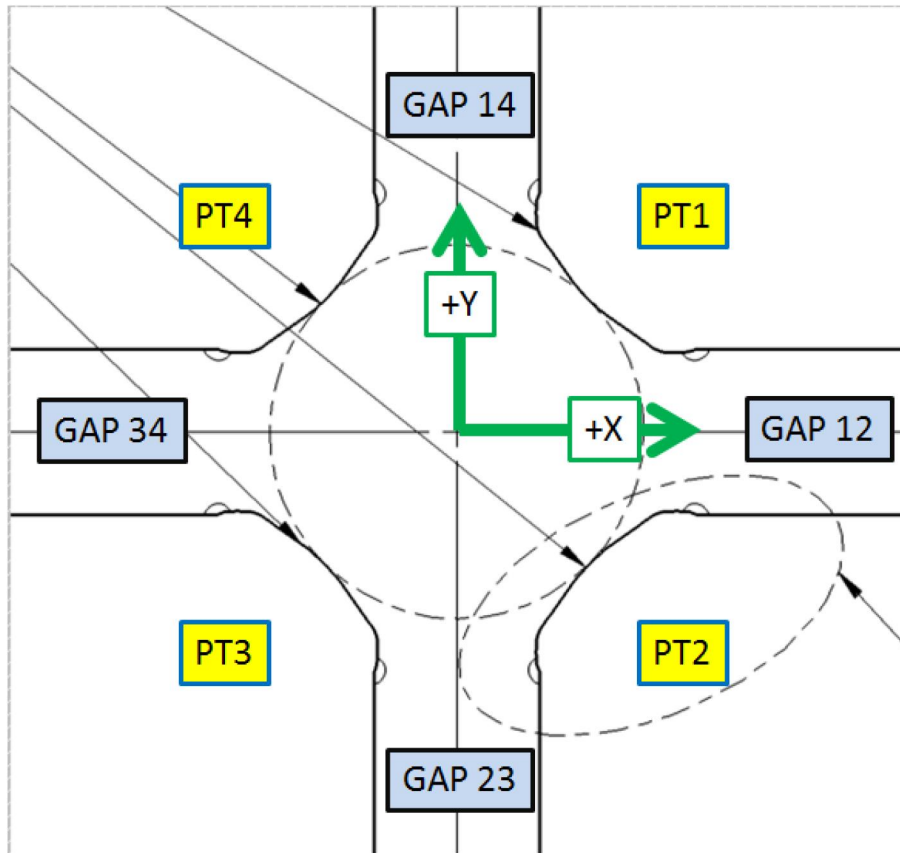
| Tooling Ball | X Coord. | Y Coord. | Z Coord. |
|--------------|----------|----------|----------|
| TB 1 | -7.0494 | 1.9981 | -2.1678 |
| TB 2 | -1.9891 | 7.0611 | -2.1812 |
| TB 3 | 1.9958 | 7.0569 | -2.1713 |
| TB 4 | 7.0600 | 2.0009 | -2.1786 |
| TB 5 | 7.0578 | 1.9931 | 2.1696 |
| TB 6 | 1.9895 | 7.0513 | 2.1680 |
| TB 7 | -1.9925 | 7.0544 | 2.1812 |
| TB 8 | -7.0518 | 1.9878 | 2.1699 |

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

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Pole Tip Gap Measurements



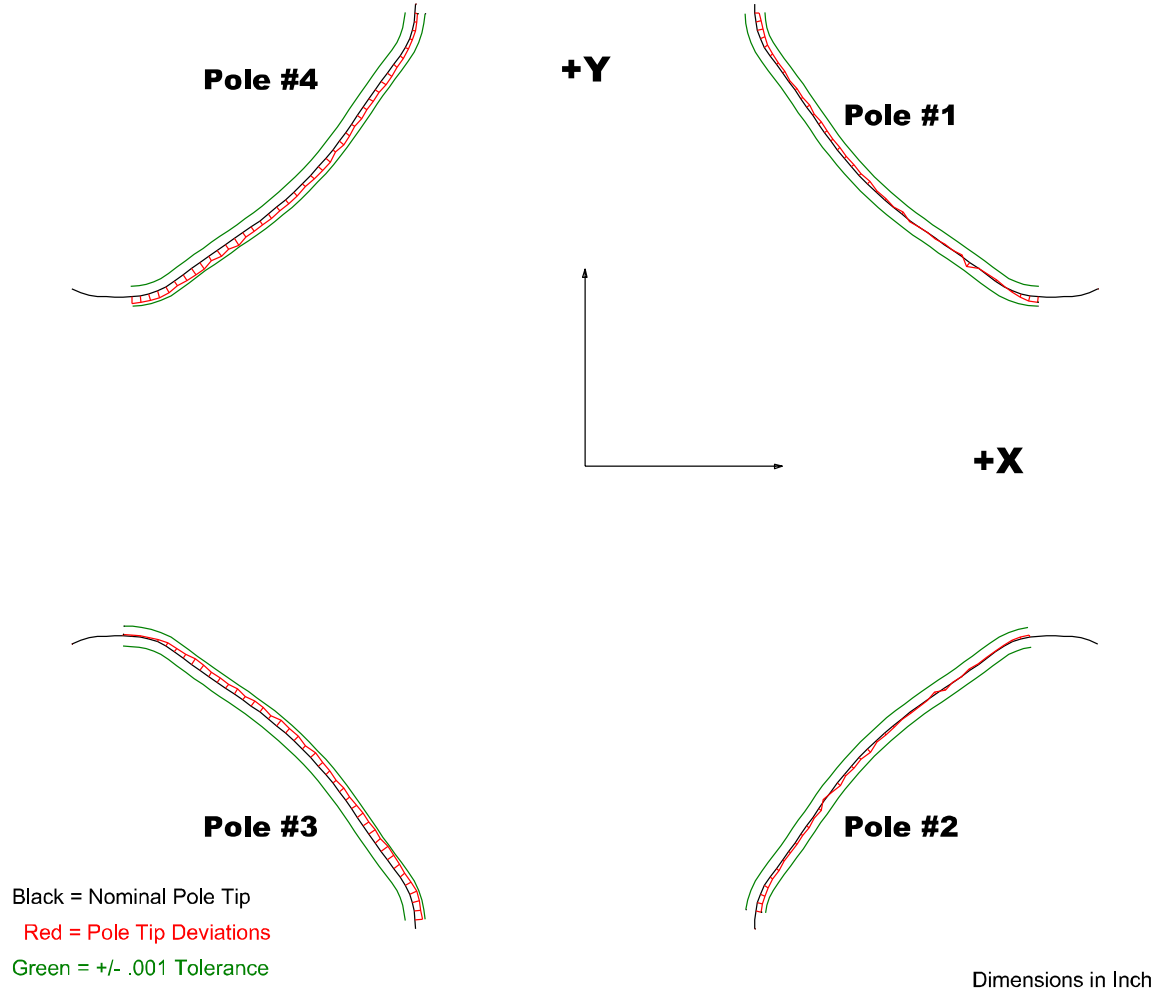
| | Nominal Distance | Downstream Pole End | Upstream Pole End |
|-----------------|------------------|---------------------|-------------------|
| PT Distance 1-3 | 2.026 | 2.02581 | 2.02568 |
| PT Distance 2-4 | 2.026 | 2.02594 | 2.0258 |
| Gap 1-2 | 0.8602 | 0.86158 | 0.85957 |
| Gap 2-3 | 0.8602 | 0.86172 | 0.85984 |
| Gap 3-4 | 0.8602 | 0.85885 | 0.85987 |
| Gap 1-4 | 0.8602 | 0.86009 | 0.85931 |

Dimensions in Inch

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Composite Best-fit of Pole Tips, Downstream



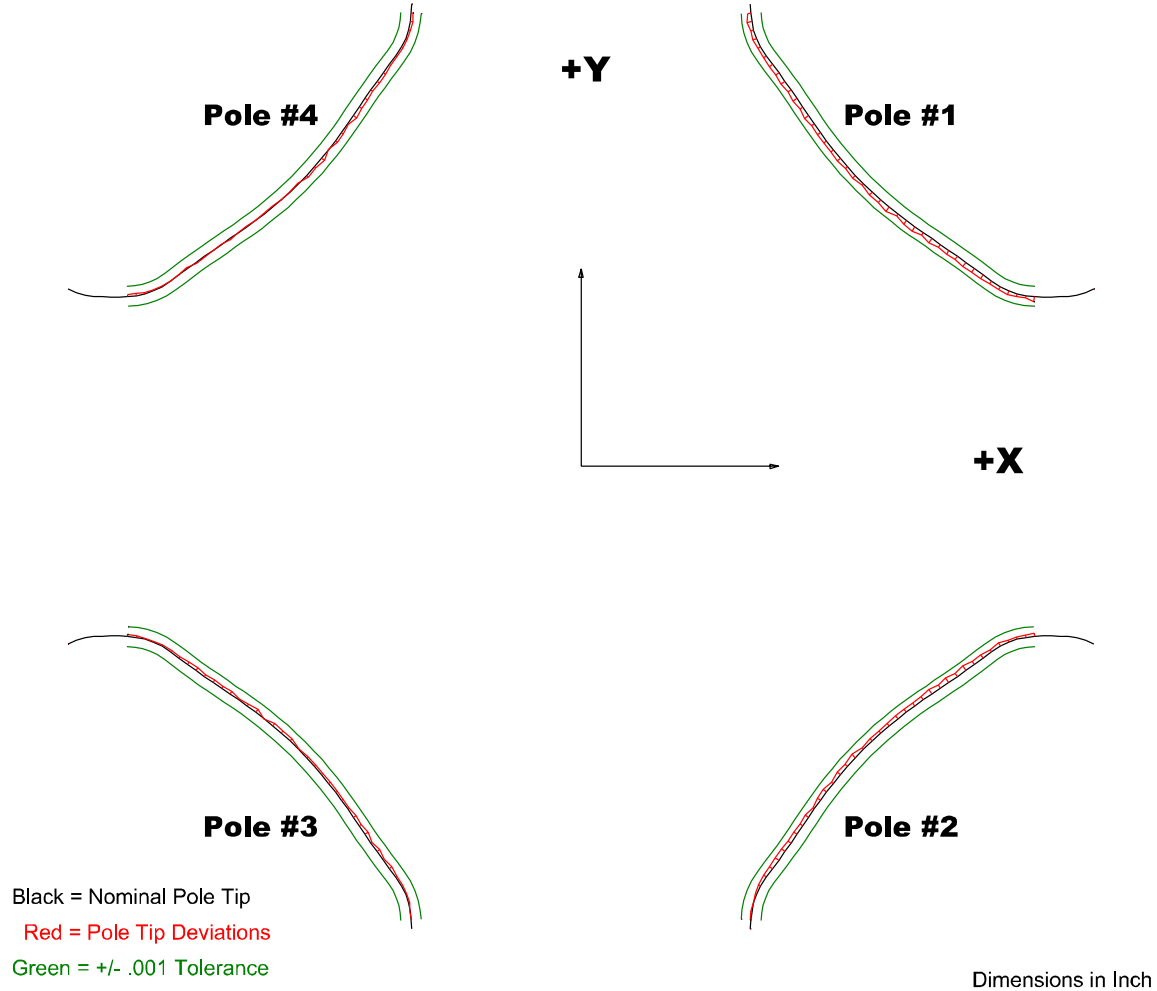
Pole Tip Deviations

| Pole Tip | #1 | #2 | #3 | #4 |
|-----------|----------|----------|---------|---------|
| Min. Dev. | -0.00055 | -0.00052 | 0.00013 | 0.00027 |
| Max. Dev. | 0.00059 | 0.00026 | 0.00084 | 0.00083 |

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Composite Best-fit of Pole Tips, Upstream



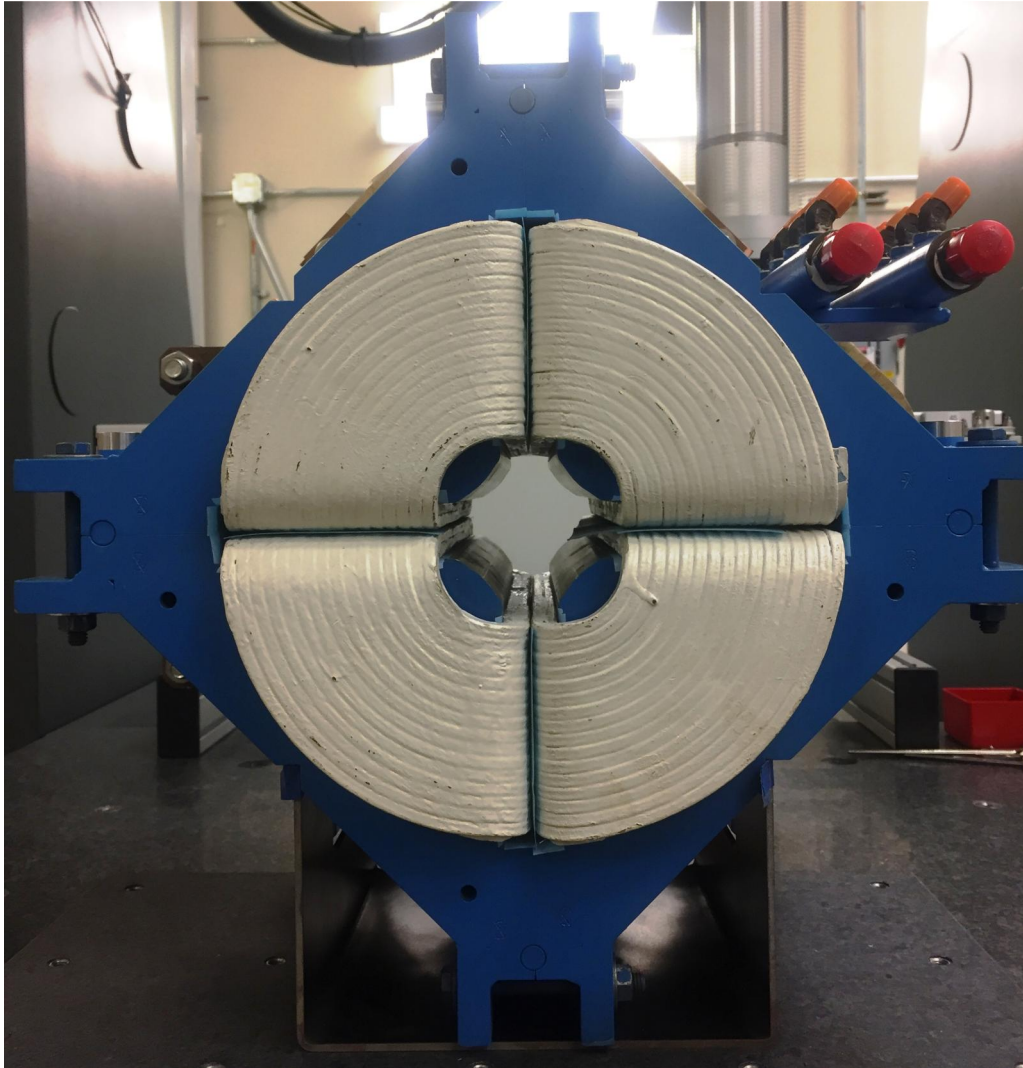
Pole Tip Deviations

| Pole Tip | #1 | #2 | #3 | #4 |
|-----------|---------|----------|----------|----------|
| Min. Dev. | 0.0002 | -0.00001 | -0.00002 | -0.00021 |
| Max. Dev. | 0.00054 | 0.00055 | 0.00039 | 0.0004 |

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Angle of the Composite Pole Tip Best-Fit



in Decimal Degrees ° : -0.02091

Angle in Milliradians : -0.36493

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