IDR
LCLS SUPPORT STAND
DESIGN DETAILS

Brian Rusthoven
01/12/2006
Chronological Design of the Fixed Support

Design changes incorporated from design reviews involving ANL and SLAC personnel.

- **Design Background**
  - **07-19**
    - Single supports for each Cam Mover
    - Stand Leveling separate from Cam Movers
    - Independent adjustability of each Cam Mover
  - **09-30**
    - Combine both Cam movers on a single stand using an interface plate
    - Provide vertical (X) adjustment independent of Y&Z adjustments with guides for the movement
  - **10-11**
    - Fix the Cam Movers to each other
    - One sided adjustment through a push-pull system
    - X movement guides finalized
  - **10-31**
    - Relocate adjustments to Interface Plate
    - Provide alignment guides on Connecting Plate
  - **11-27**
    - Relocation of Guides and Adjustments
LCLS Fixed Support – Base Pedestal Details

Stands are fabricated from ASTM A36 Steel to minimize thermal growth.

- 1½” Top Plates
- 18” Schedule 40 Pipe
- 1½” Bottom Plates
- Drill Thru Clearance holes for anchoring
- Reinforcing Gussets Located under each support point
LCLS Fixed Support – Base Pedestal Mounting

1”- 14 Base Leveling / Anchor Bolts

Non Shrinking Grout

Flange Nuts Top & Bottom

2” Minimum grouting to cover the Base Plate edges
LCLS Fixed Support – Base Pedestal Insulating

Grouted Stands are filled with Silica Sand and capped, then wrapped with 3” Fiber Wool insulation for thermal mass stability.

- Stand Cap
- Silica Sand
- 3” Fiber Wool Insulation
LCLS Fixed Support – Interface Plate

All alignment motion will be provided from this single plate. The Interface Rod clearance holes are oversized for 12.5mm (½”) of travel in all directions. The Pusher Block has a clearance of 12.5mm (½”) in all directions from the pusher frame.

Vertical adjustment Y, the most frequent adjustment when the Cam Movers have reach their end of travel will be isolated from the X & Z motion by locking the close fitting Bronze Pusher Block in place using the 4 pusher bolts.
LCLS Fixed Support – Adjustment Method

1 ½” Interface plate

Adjustment Point
Upper Lock Nut
Spherical Washer
Pusher Block
(X&Z Axis Adjustment)
(Yaw Adjustment)
½-13 Thread (0.0002/deg)

1 ½” Interface plate

Spherical Support Nut
(Pinned to Rod)
Height Motion Point
(Thraeded Plate)
Lower Lock Nut
Height Adjustment Rod
(Y Axis Movement)
(Pitch Adjustment)
(Roll Adjustment)
1½-28 Thread (0.000099/deg)
LCLS Fixed Support – Connecting Plate

The Connecting Plate is required to provide clearance between the interface plate and the Cam Movers with the current girder depth.

1 ½” Connecting Plate with Cam Mover Mounts

1”-14 Attachment Bolts

Precision machined Cam Mover Locating Pads

5/8-11 Cam Mover Attachment points
(4 per single Cam Mover)
(6 on Double Cam Mover)
LCLS Fixed Support – Assembly

Undulator
Cam Movers
 Beam Tube
Quad BPM

Fixed Supports
Girder / Cradle
Prototype fabrication quotes total $37,000 for 4 stands, making each stand cost $9,250 each. This provides all fabricated parts.

**Future Considerations**

- Eliminate the Connecting Plate and pocket the Interface Plate to accept the Cam Movers, this requires a change to the Girder to provide the necessary clearance. This change will save ~$2,000 per stand.

- Production runs from bolt manufacturers to produce the fine threading required for the tolerances to be met.
LCLS Fixed Support – Fixed Support Assembly

IDR - LCLS Fixed Support – Design Details
LCLS Fixed Support – Fixed Support Assembly
LCLS Fixed Support – Fixed Support Assembly
LCLS Fixed Support – Fixed Support Assembly

IDR - LCLS Fixed Support – Design Details
Pioneering Science and Technology

IDR - LCLS Fixed Support – Design Details
LCLS Fixed Support – Fixed Support Assembly
LCLS Fixed Support – Fixed Support Assembly
LCLS Fixed Support – Fixed Support Assembly

NOTE:
TITLE BLOCK TOLERANCES TO BE SUPERSEDED AS FOLLOWS:

DECIMALS:
XXX .01
XXX .005

SURFACE TEXTURE: 63

NOTE:
I PRIOR TO SHIPPING ALL SURFACES OF THE PART ARE TO BE THOROUGHLY CLEANED, AND FREE OF ALL OIL AND OR SOLUTIONS.
LCLS Fixed Support – Fixed Support Assembly

NOTE:
TITLE BLOCK TOLERANCES TO BE SUPERSEDED AS FOLLOWS:

DECIMALS:
  .XX  .01
  .XXX  .005

SURFACE TEXTURE: 63

NOTE:
I PRIOR TO SHIPPING ALL SURFACES OF THE PART ARE TO BE THOROUGHLY CLEANED, AND FREE OF ALL OIL AND OR SOLUTIONS.
### IDRA - LCLS Fixed Support – Design Details

**NOTE:**

1. Prior to shipping, all surfaces of the part are to be thoroughly cleaned, and free of all oil and or solutions.

---

#### Parts List / Bill of Materials

<table>
<thead>
<tr>
<th>Part Description</th>
<th>Material Spec</th>
<th>QTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interface Plate Support Nut - Top</td>
<td>18-8 SST</td>
<td>1</td>
</tr>
<tr>
<td>Interface Plate Support Nut - Bottom</td>
<td>18-8 SST</td>
<td>1</td>
</tr>
<tr>
<td>.25 x 3.00 Long Dowel Pin</td>
<td>18-8 SST</td>
<td>1</td>
</tr>
</tbody>
</table>

---

**Source or Equivalent**

McMaster Carr

P.O. Box 4355

Chicago, IL 60680-4355

(630) 833-0300

www.mcmaster.com

---

**Scale 1:1**

**Scale 1:2**

**Notes:**

- Scale 1:1
- Scale 1:2
- See parts list

---

**Revisions**

- Zone Rev. Description
- By Approved Date

**LCLS Fixed Support – Fixed Support Assembly**
LCLS Fixed Support – Fixed Support Assembly

NOTE:
TITLE BLOCK TOLERANCES TO BE SUPERSEDED AS FOLLOWS:

DECIMALS:
XX .01
XXX .005

NOTE:
SURFACE TEXTURE: 63

I PRIOR TO SHIPPING ALL SURFACES OF THE PART ARE TO BE THOROUGHLY CLEANED, AND FREE OF ALL OIL AND OR SOLUTIONS.

IDR - LCLS Fixed Support – Design Details
LCLS Fixed Support – Fixed Support Assembly

NOTE:
TITLE BLOCK TOLERANCES TO BE SUPERSEDED AS FOLLOWS:
DECIMALS: 
.01
.005
SURFACE TEXTURE: 
.63
NOTE:
1 PRIOR TO SHIPPING ALL SURFACES OF THE PART ARE TO BE THOROUGHLY CLEANED, AND FREE OF ALL OIL AND OR SOLUTIONS.
LCLS Fixed Support – Fixed Support Assembly

IDR - LCLS Fixed Support – Design Details
LCLS Fixed Support – Fixed Support Assembly

NOTE:
TITLE BLOCK TOLERANCES TO BE SUPERSEDED AS FOLLOWS:

DECIMALS:
.XX .01
.XXX .005

SURFACE TEXTURE: 63

NOTE:
1 PRIOR TO SHIPPING ALL SURFACES OF THE PART ARE TO BE THOROUGHLY CLEANED, AND FREE OF ALL OIL AND OR SOLUTIONS.
LCLS Fixed Support – Fixed Support Assembly

NOTE:
TITLE BLOCK TOLERANCES TO BE SUPERSEDED AS FOLLOWS:

DECIMALS:
  .XX  .01
  .XXX  .005

SURFACE TEXTURE: .63

NOTE:
1 PRIOR TO SHIPPING ALL SURFACES OF THE PART ARE TO BE THOROUGHLY CLEANED, AND FREE OF ALL OIL AND OR SOLUTIONS.
LCLS Fixed Support – Fixed Support Assembly
LCLS Fixed Support – Fixed Support Assembly