Government of India
Department of Atomic Energy
*BHABHA ATOMIC RESEARCH CENTRE*
Beam Technology Development Group
Mumbai-400085

BARC/BTDG/LPTD/WORKS/PR/2018/MF/92341 09.05.2018

To

**Sub: Minor Fabrication of "Opto-mechanical components and breadboards for fiber optic pumping of lasers"**

***DUE DATE: 24th May 2018***

1. Quotations are invited for the fabrication job as per the enclosed job details in Annexure: S.
2. The quotations must reach **Associate Director, Beam Technology Development Group** by above mentioned due date and must be sent in a sealed envelope ***super-scribed*** with the above reference number and due date given above.
3. The address on the envelope should read

   **(Attn. Sh. Paramjit Rana)**
   To,
   Associate Director,
   Beam Technology Development Group
   BARC, Mumbai - 400 085
4. The quotation must be submitted on printed letter head of the company and should contain **GST** numbers; else the quotation shall be rejected.
5. The on-site fabrication job will be carried out at PRAFPUL, South Site , BARC, and will be subjected to intermediate inspection by our engineer
6. The finished components, fabricated at vendors' works, shall be dispatched for installation and commissioning at site only after the approval of our engineer. Necessary inspection facilities should be provided to our engineers during fabrication at bidder's premises
7. Associate Director, Beam Technology Development Group, BARC reserves the right to accept or reject any or all quotations without assigning any reason.
8. The drawing for the quoted items should be included with quotations.
9. For any further clarification Sh. Paramjit Rana, L&PTD (022 25594358 / 6600) may be contacted.

(V.S. Rawat)

Yours faithfully,

7/5/18

Associate Director, BTDG

Encl: One (Job details as Annexure: S)

# Annexure: S
# Technical Specifications
# Fabrication of Opto–mechanical components and breadboards for fiber optic pumping of lasers

1. **Scope of Work: -**

The work includes design and manufacture of the customized opto-mechanical mounts and breadboards for fiber optic pumping of lasers as per list mentioned below. These components will be used to set up fiber testing and other lab experimental set ups. The drawing of the optical components needs to discuss thoroughly before execution of the job. The supplier must obtain approval of the design and fabrication drawings of all components before execution of the work.

Table: 1 (List of items to be fabricated)

| Sr. No. | Items | Quantity |
|---|---|---|
| 1 | Five Axis Objective Lens Mount for 1 inch optics (Type-1) | 4 Nos. |
| 2 | Five Axis Objective Lens Mount for 1 inch optics (Type-2) | 4 Nos. |
| 3 | Five Axis Objective Lens Mount for 2 inch optics | 3 Nos. |
| 4 | Five axis fiber positioner fitted with kinematic fiber positioner | 4 Nos. |
| 5 | Compact XYZ Translation stage fitted with kinematic fiber positioner | 4 Nos. |
| 6 | Kinematic mount with three adjusters and locking arrangement for 1 inch optics | 4 Nos. |
| 7 | Kinematic mount with three adjusters and locking arrangement for 2 inch optics | 4 Nos. |
| 8 | Four axis kinematic mount with four adjuster and locking arrangement for 1 inch optics | 2 Nos. |
| 9 | Four axis kinematic mount with four adjuster and locking arrangement for 2 inch optics | 2 Nos. |
| 10 | Honeycomb Breadboard Structure | 2 Nos. |
| 11 | Aluminium Breadboard (Type-1) | 3 Nos. |
| 12 | Aluminium Breadboard (Type-2) | 2 Nos. |

**Please Note: Vendor must submit list of similar orders supplied in last two years along with quotation.**

## 2. Technical Specifications: -

### 2.1 Five Axis Objective Lens Mount for 1 inch optics (Type-1), Quantity: 4 Nos. : -

This objective lens mount will be used to focus a laser beam at a well-defined focal spot location with option of variability. It consists of three stages. Total height of the center of the optics mounted inside the component should be 205 mm (-0, +1mm) from the bottom of the base of the assembly. Complete assembly should be fitted using bolts and tapped holes. It should be dis-mountable and re-assemblable at site.

#### 2.1.1 Precision multi axis translation stage:-

It should be base mountable. It should have a compact XYZ precision travel stage. The stage should be pre-loaded rolling contact ball bearing guide ways for frictionless and stick slip free positioning.

| **Parameter** | **Specifications** |
|---|---|
| Travel: X<br>Travel: Y<br>Travel: Z | 15 mm<br>15 mm<br>15 mm |
| Top plate | 65 mm X 65 mm<br>M6 tapped hole matrix on the top surface for mounting optical components. |
| Minimum Height | ~ 75 mm |
| Material of construction | Aluminium alloy |
| Finish | Black anodized |
| Mounting on the breadboard | 6.5 mm diameter slot for mounting |
| Load capacity | 3 Kg |
| Straight line accuracy | 0.010 mm |
| Drive | Precision micrometer driven (10µm) |
| Mounting holes for base | M 6 slots at the base |
| Positioning accuracy | 5 micrometre (5µm) |

#### 2.1.2 Kinematic mount for optical Lens:-

This mount should be suitable for circular mirrors, beam splitters, lenses. Optics should be mounted at the center of the mirror mount.

| **Parameter** | **Specifications** |
|---|---|
| **Kinematic mount for 1” circular optics** | |
| Optics Diameter | 25.4 mm / 1 inch or nearest standard |

| | |
|---|---|
| Optics thickness | 1 mm to 8 mm |
| Adjustable Axis | θx, θy |
| Angular Tilting range | +/- 3 degree or better |
| Sensitivity | 4 arc sec. or better |
| Mounting | Direct mounting on post or platform with M6 screws |
| Drive type | Driven by 80 TPI lead screw (dia. ≥5mm) or better |
| Mounts dimensions | 50 mm X 50 mm X ~21 mm (without adding adjustment knobs) Optics center = 25 mm from base of the mount |
| Optics Mounting | 1" Optics should be mounted at the center of the mount. Nylon screws should be provided for locking the optics in the mount. |
| Optics holder | 1" Optics holder should also be provided along with the mount |
| Adjustment knob | Lead-screws (dia. ≥15mm) with locking nut |
| Material | Aluminum alloy, black anodized |

### 2.1.3 Rigid support section:-

A rigid rectangular support structure should be provided for matching the optics center height of 205 mm from the bottom of the base plate. Lens mount fitted on the Precision multi axis translation stage should be mounted on the rigid support section. Rigid support should have a base plate at the bottom for mounting this on the breadboard. M6 tapped hole matrix should be provided on the top surface of the support section in order to mount translation stage or lens mount. Dimensions of the base plate should be 125 mm X 65 mm X 10 mm. Clearance slots should be provided on two sides for fixing it on the breadboard using M 6 bolts. It should be made of aluminium / aluminium alloy having black anodized finish.

## 2.2 Five Axis Objective Lens Mount for 1 inch optics (Type-2), Quantity: 4 Nos. : -

This objective lens mount will be used to collimate a fiber coupled laser beam with option of variability. It consists of two stages. Total height of the center of the optics mounted inside the component should be 75 mm (-0, +1mm), (50 mm of Compact translation stage + 25 mm of 1" lens mount). Complete assembly should be fitted using bolts and tapped holes. It should be dis-mountable and re-assemblable at site.

### 2.2.1 Precision multi axis compact translation stage:-

It should be base mountable. It should have a compact XYZ precision travel stage. The stage should be pre-loaded rolling contact ball bearing guide ways for frictionless and stick slip free positioning.

| **Parameter** | **Specifications** |
|---|---|
| Travel: X<br>Travel: Y<br>Travel: Z | 10 mm<br>5 mm<br>5 mm<br>Single side control / Compact |
| Top plate | 50 mm X 50 mm<br>M6 tapped hole matrix on the top surface for mounting optical components. |
| Minimum Height | ~ 50 mm |
| Material of construction | Aluminium alloy |
| Finish | Black anodized |
| Mounting on the breadboard | 6.5 mm diameter slot for mounting |
| Load capacity | 3 Kg |
| Straight line accuracy | 0.010 mm |
| Drive | Precision micrometer driven (<10µm) |
| Mounting holes for base | M 6 slots at the base |
| Positioning accuracy | 5 micrometre (5µm) |

### 2.2.2 Kinematic mount for optical Lens:-

This mount should be suitable for circular mirrors, beam splitters, lenses. Optics should be mounted at the center of the mirror mount.

| **Parameter** | **Specifications** |
|---|---|
| **Kinematic mount for 1" circular optics** | |
| Optics Diameter | 25.4mm / 1 inch or nearest standard |
| Optics thickness | 1 mm to 8 mm |
| Adjustable Axis | θx, θy |
| Angular Tilting range | +/- 3 degree or better |
| Sensitivity | 4 arc sec. or better |

| | |
|---|---|
| Mounting | Direct mounting on post or platform with M6 screws |
| Drive type | Driven by 80 TPI lead screw (dia. ≥5mm) or better |
| Mounts dimensions | 50 mm X 50 mm X ~21 mm (without adding adjustment knobs)<br>Optics center = 25 mm from base of the mount |
| Optics Mounting | 1" Optics should be mounted at the center of the mount. Nylon screws should be provided for locking the optics in the mount. |
| Optics holder | 1" Optics holder should also be provided along with the mount |
| Adjustment knob | Lead-screws (dia. ≥15mm) with locking nut |
| Material | Aluminum alloy, black anodized |

**2.3 Five Axis Objective Lens Mount for 2 inch optics (Quantity: 3 Nos.):-**

This objective lens mount will be used to focus a laser beam at a well-defined focal spot location with option of variability. It consists of three stages. Total height of the center of the optics mounted inside the component should be 205 mm (-0, +1mm) from the bottom of the base of the assembly. Complete assembly should be fitted using bolts and tapped holes. It should be dis-mountable and re-assemblable at site.

**2.3.1 Compact precision translation stage:-**

It should be base mountable. It should have a compact XYZ precision travel stage. The stage should be pre-loaded rolling contact ball bearing guide ways for frictionless and stick slip free positioning.

| **Parameter** | **Specifications** |
|---|---|
| Travel: X<br>Travel: Y<br>Travel: Z | 15 mm<br>15 mm<br>15 mm |
| Top plate | 65 mm X 65 mm<br>10.1 mm grooved top plate for fiber adaptor mouting,<br>M6 tapped hole matrix on the remaining top surface for mounting optical components. |
| Minimum Height | ~ 75 mm |
| Material of construction | Aluminium alloy |
| Finish | Black anodized |
| Mounting on the breadboard | 6.5 mm diameter slot for mounting |

| | |
|---|---|
| Load capacity | 3 Kg |
| Straight line accuracy | 0.010 mm |
| Drive | Precision micrometer driven (10µm) |
| Mounting holes for base | M 6 slots at the base |
| Positioning accuracy | 5 micrometre (5µm) |

### 2.3.2 Kinematic mount for optical Lens:-

This mount should be suitable for circular mirrors, beam splitters, lenses. Optics should be mounted at the center of the mirror mount.

| **Parameter** | **Specifications** |
|---|---|
| **Kinematic mount for 2" circular optics** | |
| Optics Diameter | 50 mm / 2 inch or nearest standard |
| Optics thickness | 2 mm to 10 mm |
| Adjustable Axis | θx, θy |
| Angular Tilting range | +/- 3 degree or better |
| Sensitivity | 4 arc sec. or better |
| Mounting | Direct mounting on post or platform with M6 screw |
| Drive type | Driven by 80 TPI lead screw (dia. ≥5mm) or better |
| Mounts dimensions | 75 mm X 75 mm X ~29 mm (without adding adjustment knobs) Optics center = 37.5 mm from base of the mount. |
| Optics Mounting | 2" circular Optics should be mounted at the center of the mount. Nylon screws should be provided for locking the optics in the mount. |
| Optics center position | 37.5 mm from the base of the mount |
| Optics holder | 2" Optics holder should also be provided along with the mount |
| Adjustment knob | Lead-screws (dia. ≥15mm) with locking nut |
| Material | Aluminum, black anodized |

### 2.3.3 Rigid support section:-

A rigid rectangular support structure should be provided for matching the optics center height of 205 mm from the bottom of the base plate. Lens mount fitted on the Precision multi axis translation stage

should be mounted on the rigid support section. Rigid support should have a base plate at the bottom for mounting this on the breadboard. M6 tapped hole matrix should be provided on the top surface of the support section in order to mount translation stage or lens mount. Dimensions of the base plate should be 125 mm X 65 mm X 10 mm. Clearance slots should be provided on two sides for fixing it on the breadboard using M 6 bolts. It should be made of aluminium / aluminium alloy having black anodized finish.

**2.4 Five axis fiber positioner fitted with kinematic fiber positioner, Quantity: 4 Nos.: -**

This fiber positioner will be used to couple a focused laser beam in to a bare optical fiber. It consists of three stages. Precise and controlled translation and angular tilting are the crucial demands from this optical component. It consists of three stages. Total height of the center of the optical fiber tip should be 205 mm (-0, +1mm) from the bottom of the base of the assembly. Complete assembly should be fitted using bolts and tapped holes. It should be dis-mountable and re-assemblable at site.

**2.4.1 Five axis positioner stage:-**

It should be base mountable. It should have a compact XYZ precision travel stage. The stage should be pre-loaded rolling contact ball bearing guide ways for frictionless and stick slip free positioning.

| **Parameter** | **Specifications** |
|---|---|
| Travel: X<br>Travel: Y<br>Travel: Z<br>Tilting range Ø1<br>Tilting range Ø1 | 5 mm<br>5 mm<br>5 mm<br>±2 degree<br>±2 degree |
| Top plate | Minimum 50 mm X 50 mm<br>10.1 mm grooved top plate for fiber adaptor mount guiding,<br>M6 tapped hole matrix on the remaining top surface for mounting optical components. |
| Minimum Height | ~ 76 mm |
| Base Dimensions | 125 mm X 50 mm |
| Material of construction | Aluminium alloy |
| Finish | Black anodized |
| Mounting on the breadboard | 6.5 mm diameter slot for mounting |
| Load capacity | 3 Kg |
| Straight line accuracy | 0.010 mm |
| Drive | Precision micrometer driven (5µm) |

| | |
|---|---|
| Mounting holes for base | M 6 slots at the base |
| Positioning accuracy | 5 micrometre (5µm) |

### 2.4.2 Kinematic fiber positioner fitted with fiber chuck and chuck holder: -

Kinematic mounts will be used for precise tilt adjustment in two different planes. Fiber clamping provision should be done through center tilting unit. This positioner should be equipped with an optical fiber chuck (6 mm diameter X 100 mm length) and chuck holder to clamp fibers up to 1 mm diameter. One pair of Rubber / magnetic fiber clamps should be provided with each of this to hold the bare fiber firmly inside the chuck.

| **Parameter** | **Specifications** |
|---|---|
| Angular tilting range | +/- 3 degrees |
| Drive | 100 TPI lead screw |
| Linear resolution | 0.25 mm (100 TPI) |
| Sensitivity | 4 arc. Sec. or better |
| Material of construction | Aluminium |
| Finish | Black anodized finish |
| Mounting | M6, Post mountable and platform mountable |
| Mounting orientation | Vertical and horizontal |
| Dimensions<br>Fiber tip height from base | 50 mm X 50 mm X 25 mm<br>25 mm |

### 2.4.3 Rigid support section: -

A rigid rectangular support structure should be provided for matching the optical fiber tip height of 205 mm from the bottom of the base plate. Kinematic fiber positioner fitted on the five axis positioner stage should be mounted on the rigid support section. Rigid support should have a base plate at the bottom for mounting this on the breadboard. M6 tapped hole matrix should be provided on the top surface of the support section in order to mount translation stage or other optical components. Dimensions of the base plate should be 125 mm X 50 mm X 10 mm. Clearance slots should be provided at least on two sides for fixing it on the breadboard using M 6 bolts. It should be made of aluminium / aluminium alloy having black anodized finish.

**2.5 Compact XYZ translation stage fitted with kinematic fiber positioner , Quantity: 4 Nos.: -**

This fiber positioner will be used to collimate a fiber coupled laser beam using a bare optical fiber. It consists of two stages. Precise and controlled translation and angular tilting are the crucial demands from this optical component. Total height of the center of the optical fiber tip should be 75 mm (-0, +1mm) from the bottom of the base of the asembly. Complete assembly should be fitted using bolts and tapped holes. It should be dis-mountable and re-assemblable at site.

**2.5.1 Compact Precision translation stage:-**

It should be base mountable. It should have a compact XYZ precision travel stage. The stage should be pre-loaded rolling contact ball bearing guide ways for frictionless and stick slip free positioning.

| **Parameter** | **Specifications** |
|---|---|
| Travel: X<br>Travel: Y<br>Travel: Z | 10 mm<br>5 mm<br>5 mm<br>Single side control / Compact |
| Top plate | 50 mm X 50 mm<br>M6 tapped hole matrix on the top surface for mounting optical components. |
| Minimum Height | ~ 50 mm |
| Material of construction | Aluminium alloy |
| Finish | Black anodized |
| Mounting on the breadboard | 6.5 mm diameter slot for mounting |
| Load capacity | 3 Kg |
| Straight line accuracy | 0.010 mm |
| Drive | Precision micrometer driven (10µm) |
| Mounting holes for base | M 6 slots at the base |
| Positioning accuracy | 5 micrometre (5µm) |

**2.5.2 Kinematic fiber positioner fitted with fiber chuck and chuck holder: -**

Kinematic mounts will be used for precise tilt adjustment in two different planes. Fiber clamping provision should be done through center tilting unit. This positioner should be equipped with an optical fiber chuck (6 mm diameter X 100 mm length) and chuck holder to clamp fibers up to 1 mm

diameter. One pair of Rubber / magnetic fiber clamps should be provided with each of this to hold the bare fiber firmly inside the chuck.

| **Parameter** | **Specifications** |
|---|---|
| Angular tilting range | +/- 3 degrees |
| Drive | 100 TPI lead screw |
| Linear resolution | 0.25 mm (100 TPI) |
| Sensitivity | 4 arc. Sec. or better |
| Material of construction | Aluminium |
| Finish | Black anodized finish |
| Mounting | M6, Post mountable and platform mountable |
| Mounting orientation | Vertical and horizontal |
| Dimensions<br>Fiber tip height from base | 50 mm X 50 mm X 25 mm<br>25 mm |

**2.6 Kinematic mount with three adjusters and locking arrangement for 1 inch optics (Quantity: 4 Nos.): -**

| **Parameter** | **Specifications** |
|---|---|
| **Kinematics mounts for 1" circular optics with three adjusters** | |
| Optics Diameter | 25.4 mm or nearest standard |
| Optics thickness | 1 mm to 6 mm |
| Adjustable Axis | θx, θy, z |
| Tilting range | +/- 3 degree or better |
| Sensitivity | 5 arc sec. or nearest standard better |
| Mounting | Direct mounting on post or platform with M6 |
| Drive type | Driven by 80 TPI lead screw (dia. ≥5mm) or better |
| Mounts dimensions | 50 mm X 50 mm X 25 mm (without knobs) |
| Mounting Orientation | Vertical & Horizontal |
| Optics Mounting | 1" Optics should be centrally mounted inside the mount |
| Optics center position | 25 mm from bottom of the base |
| Optics holder | 1" Optics holder should also be provided along with the mount |

| | |
|---|---|
| Adjustment knob | Lead-screws (dia. ≥15mm) with locking nut |
| Material | Aluminum, black anodized |

**2.7 Kinematic mount with three adjusters and locking arrangement for 2 inch optics (Quantity: 4 Nos.):-**

| **Parameter** | **Specifications** |
|---|---|
| **Kinematics mounts for 2" circular optics with three adjusters** | |
| Optics Diameter | 50mm / 2 inch or nearest standard |
| Optics thickness | 2mm to 10mm |
| Adjustable Axis | θx, θy, z |
| Tilting range | +/- 3 degree or better |
| Sensitivity | 5 arc sec. or nearest standard better |
| Mounting | Direct mounting on post or platform with M6 |
| Drive type | Driven by 80 TPI lead screw (dia. ≥5mm) or better |
| Mounts dimensions | 75 mm X 75 mm X 28.5 mm (without knobs) |
| Mounting Orientation | Vertical & Horizontal |
| Optics Mounting | 2" Optics should be centrally mounted inside the mount |
| Optics center position | 37.5 mm from bottom of the base |
| Optics holder | 2" Optics holder should also be provided along with the mount |
| Adjustment knob | Lead-screws (dia. ≥15mm) with locking nut |
| Material | Aluminum, black anodized |

**2.8 Four axis kinematic mount with four adjuster and locking arrangement for 1 inch optics (Quantity: 2 Nos.): -**

| **Parameter** | **Specifications** |
|---|---|
| **Kinematics mounts for 1" circular optics with four adjusters and locking arrangement** | |
| Optics Diameter | 25.4mm or nearest standard |

| | |
|---|---|
| Optics diameter tolerance | -0.00 / +0.20 mm |
| Optics thickness | 1mm to 6mm |
| Adjustable Axis | θx, θy, x & y |
| Tilting range (θx, θy) | +/- 3 degree or better |
| X-Y Travel Range | ≥ 5mm (±2.5 mm) |
| Sensitivity | 5 arc sec. or nearest standard better |
| Mounting | Direct mounting on post or platform with M6 |
| Drive type | Driven by 80 TPI lead screw (dia. ≥8mm) or better |
| Mounts dimensions | ~ 80 mm X 80 mm X 32 mm |
| Mounting orientation | Horizontal & Vertical |
| Optics Mounting | 1" Optics should be centrally mounted in the mount |
| Optics center position | ~ 40 mm from the bottom of the base |
| Optics holder | 1" Optics holder should also be provided along with the mount |
| Adjustment knob | Lead-screws (dia. ≥15mm) with locking nut |
| Material | Stainless Steel |

**2.9 Four axis kinematic mount with four adjuster and locking arrangement for 2 inch optics (Quantity: 2 Nos.): -**

| **Parameter** | **Specifications** |
|---|---|
| **Kinematics mounts for 1" circular optics with four adjusters and locking arrangement** | |
| Optics Diameter | 50 mm / 2 inch or nearest standard |
| Optics diameter tolerance | -0.00 / +0.20 mm |
| Optics thickness | 2mm to 10mm |
| Adjustable Axis | θx, θy, x & y |
| Tilting range (θx, θy) | +/- 3 degree or better |
| X-Y Travel Range | ≥ 10 mm (±5 mm) |

| | |
|---|---|
| Sensitivity | 5 arc sec. or nearest standard better |
| Mounting | Direct mounting on post or platform with M6 |
| Drive type | Driven by 80 TPI lead screw (dia. ≥8mm) or better |
| Mounts dimensions | ~ 100 mm X 100 mm X 42 mm |
| Mounting orientation | Horizontal & Vertical |
| Optics Mounting | 2” Optics should be centrally mounted in the mount |
| Optics center position | ~ 55 mm from the bottom of the base |
| Optics holder | 2” Optics holder should also be provided along with the mount |
| Adjustment knob | Lead-screws (dia. ≥15mm) with locking nut |
| Material | Stainless Steel |

### 2.10 Honeycomb Breadboard Structure (Quantity: 2 Nos.): -

It is required to make a breadboard table top of the existing table. It should have following specifications.

| **Parameter** | **Specifications** |
|---|---|
| Size | 1100 mm x 1000 mm x 90 mm |
| Height of breadboard | 90 mm |
| Top plate thickness | 2-3 mm |
| Top plate material of construction | Stainless Steel |
| Bottom Plate thickness | 2 – 3 mm thick |
| Honey comb Core | Aluminium |
| Honeycomb core size | 6 $cm^2$ |
| Flatness of top plate | ± 100 µm |
| Tapped Hole | M6 |
| Tapped hole grid | 25 mm grid |
| Bonding | Semi solid Epoxy |
| Side wall Finish | Black non reflecting |
| Fixing of bottom plate | with M10 Bolts |
| ➢ The breadboard should dissipate induced energy in the amplitude and duration. | |

- The deflection in between the two components fixed on the breadboard should be minimum.
- Location of fixing holes will be finalized in the drawing.

### 2.11 Aluminium Breadboards (Type-1), Quantity: 3 Nos.: -

| **Parameter** | **Specifications** |
|---|---|
| Size | 500 mm x 500 mm x 10 mm |
| Height of breadboard | 10 mm |
| Dimensional tolerance | ± 0.1 mm |
| Material of construction | Aluminium alloy |
| Breadboard edges | 10 X45$^0$ |
| Tapped Hole | M6 |
| Tapped hole grid | 25 mm grid |
| Tapped hole depth | >15 mm |
| Fixing holes | M 6 CBR |
| Fixing hole numbers | 8 Nos. |
| Finish | Black anodized, matt finish |

### 2.12 Aluminium Breadboards (Type-2), Quantity: 2 Nos.): -

| **Parameter** | **Specifications** |
|---|---|
| Size | 400 mm x 400 mm x 10 mm |
| Height of breadboard | 10 mm |
| Dimensional tolerance | ± 0.1 mm |
| Material of construction | Aluminium alloy |
| Breadboard edges | 10 X45$^0$ |
| Tapped Hole | M6 |
| Tapped hole grid | 25 mm grid |
| Tapped hole depth | >15 mm |
| Fixing holes | M 6 CBR |
| Fixing hole numbers | 8 Nos. |
| Finish | Black anodized, matt finish |

## 3. General Specifications: -

**3.1** Flatness of the breadboard top: ± 0.1 mm over 300 mm x 300 mm area (non-cumulative error). The tolerance for thickness must be ± 0.1 mm for each base plate. Mounting holes: M6 tapped holes on top of the base plates. The base plate must have Black mat finish or Zinc black platting.

**3.2** The manufacturer should provide the frequency spectrum of the vibration isolated platform.

**3.3** The fixing of the base shall be firm. The base and all components shall be made of suitable material such that they should not be dented/ compressed or excessively strained during tightening.

**3.4** The threading both on the hole or the screw shall be hard surfaced and so chosen that there is no stick-slip movement during adjustment. The shaft and sliding member shall have minimum clearance (H7 or above).

**3.5** The components shall be burr free and should not have sharp edges at corners.

**3.6** All the surfaces shall be made for clean room application. Crevices, holes and inaccessible locations where dust can accumulate shall be avoided.

**3.7** The conceptual layout of the beam routing will be provided to the supplier if required..

## 4. Inspection and Acceptance Criteria

4.1 The manufacturer should provide the test report for material of construction.

4.2 All fabricated components shall be inspected by the manufacturer and the test reports shall be submitted. These reports must be submitted before pre-dispatch inspection by the Purchaser.

4.3 Manufacturer should arrange a stage wise inspection and dimensional inspection with respect to tolerances and repeatability of the opto mechanical components. The opto-mechanical mounts shall be anodized black with matt finish, non reflecting surfaces. The main laser beam or reflected laser beam shall not bounce off the surface of the OM mounts even accidently.

4.4 The finish of the opto-mechanical mounts shall be smooth and without any burrs with a surface flatness of 5 microns. The natural frequency of the mounts and any other component shall be high and away from the dominant natural frequency of the support so as not to resonate with it.

4.5 The items after fabrication will be delivered to BARC for installation only after final inspection. The complete order has to be supplied within 60 days of the issue of the purchase order. The material is to be supplied at UCUF building South Site, BARC Trombay. Shorter delivery period will be preferred.

4.6 The shop drawings of the assembly by parts must be submitted for the approval of the indentor before execution of the job.

4.7 The bidder should submit the drawing of the job along their respective quotation.

4.8 The delivery shall be in good quality packing materials to avoid any type of damage during transit.

4.9 The material shall cover the guarantee/warrantee of minimum one year against any form of defect and quality degradation after installation on site.

4.10 The workman ship should be of good quality.

4.11 The vender will supply all the fabricated items at the site and will provide all the material required for this fabrication job.

4.12 No free issue material will be given to the party.

4.13 The fabricator shall arrange for the inspection by the I/O or representative for the quality assurance (QA) at the fabrication site.