

Government of India
Bhabha Atomic Research Centre
Beam Technology Development Group

Trombay
Mumbai - 400 085.
September 16, 2021
17

Ref: BTDG/ATLAF/WORKS/PR/MF/2021/296 / 1121559

To,

To whom it may concern

Sub: Fabrication and supply of opto-mechanical components for fiber optic delivery of laser beams - 1 Set.

Invitation of Quotations

DUE DATE: 1st October, 2021

Dear Sirs,

1. Quotations are invited for the fabrication job as per the enclosed job details.
2. The quotations must reach. **Director, Beam Technology Development Group** by **1st October, 2021** and must be sent in a sealed envelope **superscribed** with the above reference number, subject and due date given above.
3. The address on the envelope should read
(Attn. Dr . Paramjit Rana)
To,
Director,
Beam Technology Development Group
BARC, Trombay, Mumbai - 400 085.
4. The bidder may contact on Telephone Nos. **+91-22-25594358** or by email at **paramjit@barc.gov.in** for any clarifications in the enquiry.
5. Sealed Quotations should be submitted only through **Registered post/speed post** through Indian Postal Service. Offers sent by telegram, telex, courier, fax or e-mail will not be considered
6. Director, Beam Technology Development Group BARC reserves the right to accept or reject any or all quotations without assigning any reason.

Yours faithfully,


17-9-2021
Director

Beam Technology Development Group

Encl: One (Job details)
C.C.: AAO, (WORKS) CC, BARC

डॉ. (श्रीमती) अर्चना शर्मा / ARCHANA SHARMA
निदेशक / Director
किरणपुंज प्रौद्योगिकी विकास वर्ग
Beam Technology Development Group
भारत सरकार / Government of India,
भा.प.अ. केंद्र / B. A. R.C.
टॉम्बो, मुंबई / Trombay, Mumbai - 400 085.

Annexure: S

Technical Specifications

Fabrication and Supply of Opto-mechanical components for fiber optic delivery of laser beams (Qty: 1 set)

1. Scope of Work: -

The work includes manufacture and supply of the customized opto-mechanical mounts for fiber optic pumping of lasers as per list mentioned below. These components will be used to set up fiber optic beam delivery testing and other related experiments. 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)

Sr. No.	Items	Quantity
OPTO-MECHANICAL MOUNTS FOR FIBER OPTIC PUMPING		
1	Five Axis Objective Lens Mount for 1 inch optics (Type-1)	6 Nos.
2	Five axis fiber positioner fitted with kinematic fiber positioner	6 Nos.
3	Compact XYZ Translation stage fitted with kinematic fiber positioner	6 Nos.
4	Kinematic mount with three adjusters and locking arrangement for 1 inch optics	6 Nos.
5	Four axis kinematic mount with four adjuster and locking arrangement for 1 inch optics	6 Nos.
6	Compact Precision translation stage	6 Nos.

**DRAWINGS MUST BE SUBMITTED FOR APPROVAL BEFORE COMENCEMENT
OF THE WORK**

2. Technical Specifications: -

2.1 Five Axis Objective Lens Mount for 1 inch optics, Quantity: 6 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 208 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. It should be assembled in following sequence from bottom: Multiaxis translation

stage at the bottom, rigid support structure on top of the multi-axis stage and kinematic mount at the top of rigid stage. specifications of the sub-components are as follows:

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	15 mm
Travel: Y	15 mm
Travel: Z	15 mm
Top plate	65 mm X 65 mm 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 (10 μ m)
Mounting holes for base	M 6 slots at the base
Positioning accuracy	5 micrometre (5 μ m)

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	θ_x, θ_y
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. ≥ 5 mm) 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. ≥ 15 mm) 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 208 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 65 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 fiber positioner fitted with kinematic fiber positioner, Quantity: 6 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 208 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.

It should be assembled in following sequence from bottom: Rigid support structure at the bottom, then five axis positioner stage will be fitted on this rigid support and kinematic fiber positioner with fiber chuck at the top of five axis positioner stage. specifications of the sub-components are as follows:

2.2.1 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	5 mm
Travel: Y	5 mm
Travel: Z	5 mm
Tilting range Ø1	±2 degree
Tilting range Ø1	±2 degree
Top plate	Minimum 50 mm X 50 mm 10.1 mm grooved top plate for fiber adaptor mount guiding, 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)

2.2.2 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 metallic / magnetic fiber clamps should be provided with each of the kinematic fiber positioner 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	50 mm X 50 mm X 25 mm
Fiber tip height from base	25 mm

2.2.3 Rigid support section: -

A rigid rectangular support structure should be provided for matching the optical fiber tip height of 208 mm from the bottom of the base plate. Kinematic fiber positioner fitted on the five axis positioner stage should be mounted on this 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 90 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.

2.3 Compact XYZ translation stage fitted with kinematic fiber positioner , Quantity: 6 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 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 Travel: Y Travel: Z	10 mm 5 mm 5 mm Single side control / Compact
Top plate	50 mm X 50 mm 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 (10 μ m)
Mounting holes for base	M 6 slots at the base
Positioning accuracy	5 micrometre (5 μ m)

2.3.2 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 metallic / 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	50 mm X 50 mm X 25 mm
Fiber tip height from base	25 mm

2.4 Kinematic mount with three adjusters and locking arrangement for 1 inch optics (Quantity: 6 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 8 mm
Adjustable Axis	θ_x, θ_y, 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. ≥ 5 mm) 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. ≥ 15 mm) with locking nut
Material	Aluminum, black anodized

2.5 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	25.4 mm or nearest standard
Optics diameter tolerance	-0.00 / +0.20 mm
Optics thickness	1mm to 8 mm

Adjustable Axis	θ_x, θ_y, x & y
Tilting range (θ_x, θ_y)	+/- 3 degree or better
X-Y Travel Range	≥ 5 mm (± 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. ≥ 8 mm) 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. ≥ 15 mm) with locking nut
Material	Stainless Steel

2.6 Compact Precision translation stage , (Quantity: 6 Nos.) :-

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 Travel: Y Travel: Z	10 mm 5 mm 5 mm Single side control / Compact
Top plate	50 mm X 50 mm 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)

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 plating.
- 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 accidentally.
- 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 indenter 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/warranty of minimum one year against any form of defect and quality degradation after installation on site.
- 4.10 The workmanship should be of good quality.
- 4.11 The vendor 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.

General specifications, terms and conditions

- a. Dimensional Tolerances:** As specified in the drawings or Diameter: $\pm 2\%$ (but not less than $\pm 0.1\text{mm}$), Height: $\pm 1\%$, Linearity: Maximum deviation 0.5% of total length if not specified in the drawing.
- b. Quotation details:** The quotation should be in the printed letter head /quotation format which should consist of the PAN No., GST No. of the firm. Quotation shall be signed by proprietor or authorized person and affix company seal. Computer generated/scanned and printed quotation will not be accepted. Failing to mention the details in their quotation will become liable to be rejected. All taxes, other charges should be mentioned clearly.
- c. Note to Contractor:** All the persons involved in the erection and commissioning job, if any, shall possess valid Police Verification Certificate (PVC) to enter into BARC premises. In addition to that, vendor has to submit a certificate (Annexure I) that the contractors or their employees have not been involved in any corrupt or criminal activity and no police has been registered against any of them. The contractor shall observe all safe working practices and shall provide safety gears to his worker wherever necessary. For any work inside BARC, the contractor has to strictly abide by rules and regulations set by Security Section of BARC.
- d. GSTIN of BARC related details:** Suppliers, please note that BARC is the final consumer of the goods/services procured and does not intend to make any outward supply. BARC will not avail the benefits of Input Tax Credit and hence, the goods can be supplied without quoting the GSTIN of BARC, Mumbai on the invoice. The invoices taxed under GST, as per rates applicable under the GST Schedule of Rates, shall be admitted for payment. An undertaking shall be submitted by the supplier that the GST has been promptly

deposited with the authorities (Annexure II). GST shall be paid only in the case of supplier clearly indicating their GSTN on the invoice.

- e. **Compliance for Section 206AB & 206CCA of Income Tax Act, 1961:** Vendor has to submit a declaration in the attached proforma (Annexure III) along with necessary acknowledgements in support of the declaration along with the quotation (Two previous financial years IT return information). In case the aforesaid declaration is not submitted, Accounts section shall be deducting the TDS at the higher rates as instructed under the provisions of the Income Tax Act.
- f. **GST exemption Certificate:** Since the goods are to be supplied against the work order meant for research purpose of a research organization under DAE, the necessary GST will be exempted to the party. Interstate transaction for R&D will attract IGST only @ 5% as per notification No. 47/17-Integrated Tax (Rate) dated 14.11.2017. Transaction within the state will attract Central Goods and Service Tax (CGST) @ 2.5% as per notification no. 45/2017-Central Tax (Rate) dated 14.11.2017 and State Goods Service Tax (SGST) @2.5% as per notification no. 45/2017-State Tax (Rate) dated. 14.11.2017 of the State of Maharashtra. No claim for reimbursement of GST above the stipulated rate as per notification would be entertained later.
- g. **Material test certificates:** The material testing certificates for all raw materials shall be provided along with the items. A laboratory test certificate of the measured properties of raw material used to make the items, finished component testing shall also be furnished before the items are dispatched to BARC, Mumbai, India.
- h. **Quality surveillance, inspection and inspection report**
 - i. All work covered by the specification shall be subject to quality surveillance by the purchaser or his authorized representative for which purpose the fabricator shall allow access at all reasonable time to: the premises in which the work is being carried out the drawing and/or tooling involved, and Gauges, instruments, etc. required for inspecting the work. Inspection and tests shall be carried out by the fabricator as per the requirements detailed in the drawings and the specifications.
 - ii. The purchaser reserves the right to inspect any material or equipment furnished or used by Supplier under the contract and to reject any, which is found defective in workmanship, design, or otherwise unsuitable for the purpose intended.
 - iii. Components found unsatisfactory as to workmanship or material shall be removed by fabricator and replaced by components, which are satisfactory. In the events of Purchaser's inspection revealing poor quality of goods, Purchaser shall be at liberty to specify additional procedures if required to ascertain supplier's compliance with the component specifications.
 - iv. Even though Purchaser or his representative carries out inspection, such inspection shall not however relieve Supplier from his responsibilities for furnishing the components conforming to the requirement of the contract. The Supplier shall maintain proper inspection records and make it available to Purchaser's representative whenever required. The fabricator shall submit three copies of inspection report to the purchaser for approval.
- i. **Free issue material:** There is no free issue of material. All material required for the job is to be supplied by the bidder.

- j. **Workmanship:** The surface should be free from impurities, splits, fractures and indentations, having an impact on a common processing or application of the product. Components with manufacturing defects viz. Cracks, burns, flakes, voids, inclusions, oxide scales, scratches, dirt and ingot patterns will not be accepted.
- k. **Dispatch:** The finished components shall not be dispatched prior to approval by our engineer at bidder's works.
- l. **Packing and shipment:** All components shall be packed properly to avoid damage during shipment.
- m. **Delivery schedule:** Supplier shall deliver the completed components/equipment in 45 days from the date of release of order.
- n. **Warranty:** Guarantee of the items shall be furnished for one year from the date of delivery.
- o. **Confidentiality clause:** No party shall disclose any information to any third party concerning the matters under this contract generally. In particular, any information identified as "Proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party and shall not be disclosed to any third party without the prior written consent of the original disclosing party.

Any contravention of the above-mentioned provisions by any contractor, sub-contractor, consultant, adviser or the employees of a contractor will invite penal consequences under the aforesaid legislation.

The contractor or sub-contractor, consultant, adviser or the employees engaged by the contractor shall not use BARCs name for any publicity purpose through any public media like Press, Radio, TV or Internet without the prior written approval of BARC
- p. **Payment terms:** No advance payment will be made. Full payment will be made by NEFT/ECS on satisfactory completion of the works. Party should submit the bill along with advance stamped receipt. Income Tax @2% and GST TDS @2% will be deducted at source from the bill.
- q. **Pre-dispatch inspection:** If the bidder is not of Indian origin inspection prior to dispatch from works is not necessary as this is a standard manufacturer. The finished products shall be subject to the inspection and testing after received by the user for transit damages. The manufacturers shall provide all the factory test certificates of all the stages of manufacture in duplicate.