

ANNEXURE A

**TECHNICAL SPECIFICATION FOR MACHINING OF TMT P3
PROTOTYPE EDGE SENSOR BLOCK FOR TMT PROJECT**

REQUEST FOR PROPOSAL (RFP)

FOR

**MACHINING OF TMT P3 PROTOTYPE
EDGE SENSOR BLOCKS**

TENDER ENQUIRY NO.RFT/IND/340/21-22 DATED 15TH MARCH 2022

THIRTY METER TELESCOPE PROJECT

15th March 2022

**INDIAN INSTITUTE OF ASTROPHYSICS
INDIA TMT CO-ORDINATION CENTRE
KORAMANGALA, BENGALURU - 560 034.**

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List of Abbreviations

| | |
|--------------|--|
| AD | Applicable Document |
| ARIES | Aryabhata Research Institute of Observational Sciences |
| ASME | American Society of Mechanical Engineers |
| EIDP | End Item Data Package |
| IIA | Indian Institute of Astrophysics |
| ITCC | India-TMT Coordination Centre |
| IUCAA | Inter-University Centre for Astronomy and Astrophysics |
| M1 | Primary Mirror |
| M1CS | Primary Mirror Control System |
| NCR | Non-Conformance Report |
| RFP | Request For Proposal |
| RD | Reference Document |
| Rev | Revision |
| SOW | Statement of Work |
| SSA | Segment Support Assembly |
| STEP | Standard for the exchange of Product model data |
| TIO | TMT International Observatory |
| TMT | Thirty Meter Telescope |
| TMTPO | Thirty Meter Telescope Project Office |
| TPI | Third Party Inspection |
| QA | Quality Assurance |

1. INTRODUCTION AND BACKGROUND

The Thirty Meter Telescope (TMT) International Observatory (TIO) is a joint venture of scientific institutions in Canada, China, India, Japan, and the US to build a 30-meter diameter optical infra-red telescope. As a part of India's contribution to TIO, the India-TMT Coordination Centre (IIA/ITCC) intends to develop various sub-systems needed for the telescope to be delivered to the observatory.

The India-TMT group is led by the Indian Institute of Astrophysics (IIA), Bangalore, the Inter-University Centre for Astronomy and Astrophysics (IUCAA), Pune and the Aryabhata Research Institute of Observational Sciences (ARIES), Nainital. The activities of India-TMT are coordinated by IIA/ITCC that is hosted at IIA, Bengaluru.

The primary mirror ('M1') of the TMT is comprised of 492 hexagonal mirror segments. Each segment is 1.44 meters measured across vertices. These segments need to be maintained at the required surface accuracy and stability, against structural deformations caused by temperature, gravity, wind, and seismic vibrations. For this, each segment is actively controlled by three Warping Harnesses and supported by its Segment Support Assembly (SSA). In order to achieve very high spatial resolution as well as sensitivity, all the 492 hexagonal mirror segments of TMT must be precisely positioned with respect to each other to form a 30-meter hyperboloid primary mirror.

The M1 control system (M1CS) performs this task with the help of the Warping Harness system that is used to correct the mirror figures of the individual segments, the M1CS actuators are responsible for positioning the segments in tip/tilt and piston, and the segment Edge Sensors are responsible for sensing the overall mirror position from measurements made at the edges of each segment. The gap, height and dihedral angle in nanometre resolution, between two M1 mirror segments, will be sensed by two capacitive edge sensors at each side of the segments. Each TMT edge sensor is a pair of drive and sense blocks, mounted on adjacent mirror segments. A total of 6668 Edge Sensor blocks (3334 pairs) are required for the Project.

The TMT Project Office in USA is responsible for the design of the Edge Sensor and will support ITCC in managing the Edge Sensor build contracts in India.

2. SUBMISSION OF BIDS

Bids are invited from Indian industries with proven technical expertise, track record and experience in precision machining of Clearceram ZH-S glass blocks. The companies willing to submit bids are invited to submit a proposal per the procedure given below.

Submission of the offer in two parts:

- 1) Technical Bid, including commercial terms and conditions,
- 2) Price Bid.

The guidelines for submission of online bids, including the details of documents required, are provided in Section 6.

2.1 PLANNED SCHEDULE

| | |
|--|-----------------------------------|
| Date of this RFP | T ₀ |
| Pre-bid meetings | T ₀ + 14 to 21 days |
| Last date for receiving Online Bids through CPP Portal | T ₀ + 30 days |
| Opening of Technical Bids on CPP Portal | T ₀ + 31 days |
| Opening of Price Bids on CPP Portal | T ₀ + 45 days |
| Award of PO | T ₀ +60 days (approx.) |

2.2 CONTACTS

A. TECHNICAL CLARIFICATIONS

Requests for additional information, technical clarification etc. shall be addressed to:

Dr. Prasanna Deshmukh

Work Package Manager (M1CS Edge Sensor)

Indian Institute of Astrophysics / ITCC

Koramangala, Bengaluru-560 034

(prasanna@iiap.res.in)

Smt.Vaishaly Nigam

Project Engineer-I (Electronics)

Indian Institute of Astrophysics / ITCC

Koramangala, Bengaluru-560 034

(vaishaly.itcc@iiap.res.in)

B. ADMINISTRATIVE CLARIFICATIONS

Requests for additional information and clarification regarding administrative matters etc. shall be addressed to either of the following contacts:

Shri K. P. Vishnu Vardhan

Stores and Purchase Officer
Indian Institute of Astrophysics
Koramangala, Bengaluru-560 034
(vishnu.vardhan@iiap.res.in)

Shri C. H. Basavaraju

Consultant, Administration,
ITCC, Indian Institute of Astrophysics,
Koramangala, Bengaluru, India-560 034
(basavaraju@iiap.res.in)

3. CONTRACTOR EVALUATION

If, after being awarded a contract for P3 Edge Sensor machining, a Contractor at any stage fails to meet the quality and schedule requirements (see Exhibit - A), that Contractor will be disqualified by ITCC from further manufacturing or bidding for the PQP (Production Qualification Program) plus Production rounds.

It is to be noted that very few Request for Waivers (RfW) / Request for Deviation (RfD) (if any) will be considered, and only for minor variations in extremely unavoidable cases. Such requests (if any) will be reviewed by TIOPO only upon recommendation from ITCC. Final decision on accepting or rejecting an RfW/RfD request from Contractor will be with TIOPO. Also, any RfW/RfD request will have impact on the Contractor performance evaluation as described in Exhibit – A.

ITCC may engage multiple contractors for the machining of these P3 prototype Edge Sensors. Contractors who will successfully built prototype Edge Sensors with the required quality, performance, and on schedule will be invited to bid on the contract for the PQP (Production Qualification Program) plus Production rounds of Edge Sensor machining, subject to continued funding by the Government of India.

4. STATEMENT OF WORK

4.1 OVERVIEW

This Statement of Work (SOW) is for the procurement of raw material, machining, inspection, packing, shipping and delivery of **75 Nos.** of machined Edge Sensor blocks per the drawing provided.

4.2 SUMMARY OF WORK TO BE PERFORMED

Contractor shall perform the following as “the Work” after placement of Purchase order:

4.2.1 The Contractor shall review all Applicable Documents, and communicate in writing to ITCC any questions, concerns, or comments, including recommended edits to improve accuracy/clarity.

4.2.2 Upon receipt of ITCC's written Authorization to Proceed after the Pre-build meeting, Contractor shall proceed with the P3 prototype phase and procurement of raw material, machining, inspection, packing, shipping and delivery of the 5 Nos. of Edge Sensor blocks, along with participation in progress meetings and reviews.

Upon receipt of ITCC's written Authorization to Proceed after ITCC's review of the initial 5 blocks, Contractor shall proceed with the P3 prototype phase and procurement of raw material, machining, inspection, packing, shipping and delivery of the remaining 70 Nos. of Edge Sensor blocks, along with participation in progress meetings and reviews.

4.3 APPLICABLE AND REFERENCE DOCUMENTS

4.3.1 Applicable Documents

Applicable Documents are those that apply directly to the work being performed. Following Applicable documents can be accessed and downloaded from this link: [LINK](#).

[AD1. TMT P3 Edge Sensor Drawings and CAD Models:](#)

- a) [PDF Drawings](#)
- b) [STEP Drawings](#)
- c) [3D PDF](#)
- d) [Drawing Changes \(if any\)](#)

[AD2. M1CS Sensor Block Qualification Plan \(TMT.CTR.SPE.18.005.REL02\)](#)

[AD3. TMT Quality Assurance Plan \(TMT.PMO.MGT.10.008.CCR10\)](#)

[AD4. Request for Waiver or Deviation \(TMT.PMO.ECR.15.001.REL02\)](#)

[AD5 Guidelines for Supplier Quality Requirements \(TMT.PMO.MGT.10.009.CCR04\)](#)

[AD6. Environmental, Safety & Health \(ES&H\) Plan \(TMT.PMO.MGT.10.002.CCR11\)](#)

[AD7. TMT Material Review Board Process \(TMT.PMO.MGT.15.021.CCR07\)](#)

[AD8. TMT Part Marking Requirements \(TMT.SEN.SPE.13.002.REL01\)](#)

[AD9 TMT Project Configuration Management and Control Plan \(TMT.SEN.SPE.05.004.CCR22\)](#)

[AD10. ITCC Inspection Report Format \(Balloon drawings and FAI format\)](#)

4.3.2 Reference Documents

[RD1. Bi-weekly progress report Formats](#)

4.4 RAW MATERIAL

4.4.1 Contractor shall procure all the required material as per the specifications provided in drawings and other Applicable Documents.

4.4.2 Supplier shall store the procured raw material in the temperature- and humidity-controlled clean environment as instructed by the original preparer of the raw material.

4.5 MANUFACTURING/FABRICATION

4.5.1 Contractor shall ensure the availability of all necessary tools, Jigs and Fixtures required for the machining of Edge Sensor blocks, to avoid delays due to their non-availability when required.

4.5.2 Contractor shall machine/manufacture sensor blocks per the drawings provided [AD1]. Contractor shall strictly follow all the manufacturing/machining guidelines as required by the drawings and applicable documents.

4.5.3 Contractor shall engrave part numbers as per requirement given in the drawing. See also [AD8].

Supplier shall store the fabricated parts in a temperature- and humidity-controlled clean environment.

4.6 QUALITY ASSURANCE

4.6.1 Contractor Quality Assurance activities shall comply with [AD3].

4.6.2 Contractor shall submit a generic Quality Assurance Plan which describes Contractor's underlying QA approach for all of its technical activities.

4.6.3 Contractor shall submit an Edge Sensor-specific Quality Assurance Plan to IIA/ITCC. Contractor's Quality Assurance Plan shall be in conformance with TMT's Quality Assurance Plan. Particular attention shall be paid by the Contractor to minimize non-conformances and the approach for processing of non-conformances, along with the adequate preparation of a full End-item Data Package.

4.6.4 ITCC shall review Edge Sensor-specific Quality Assurance Plan to determine whether that Plan meets the requirements as specified by TMT in [AD3] and [AD5].

4.7 INSPECTION

4.7.1 Contractor shall submit an Inspection Plan to IIA/ITCC. The Inspection Plan:

- a) Shall use the bubble drawings provided by IIA/ITCC [AD10].
- b) Shall indicate the applicable measuring instruments to be used to inspect the parts. ITCC prefers the Contractor to conduct the inspection in-house. Outsourcing of Inspection shall ONLY be done with the prior written approval from IIA/ITCC
- c) Shall include recommended Work Instructions/Standard Operating Procedures (SOPs) with an intention of controlling the measurement uncertainty of the Measurement System to within 10% of the applicable working tolerance of the feature. This may require Gage R&R trials (R&R) trials.

- d) Shall require valid NABL accredited calibration certificates/equipment manufacturer's calibration certificates to be made available for all QA measurement instruments.

4.7.2 Contractor shall perform incoming, in-process and final inspection, as applicable, for the raw material and the final machined parts, as per the Contractor's Inspection Plan. Contractor shall carry out following minimum inspection at various stages:

| Stage | Inspected Item(s) |
|---|--|
| Primary | Raw material, including certificates |
| Intermediate (if required per the drawing, or for Contractor's Process Control) | In Process machining |
| Final | Machined Edge Sensor Blocks (100% inspection of all features) |
| Pre-Shipment | Packaged Edge Sensor Blocks, inside boxes and Shipping Container |

4.7.3 IIA/ITCC reserves the right to witness all inspections, both in-process and end-item, and to use a third-party inspection company to inspect and verify Contractor's inspected Edge sensor blocks and inspection results, either partially or in full.

4.7.4 IIA/ITCC reserves the right to include TIOPO staff in the witnessing of inspection activities.

4.7.5 Contractor shall submit inspection reports per ITCC Inspection Report Format [AD10].

4.7.6 Upon IIA/ ITCC's request for any given inspection during the course of work, Contractor shall conduct applicable Gage R&R trials to provide sufficient evidence of controlled measurement uncertainty as per Point 5.7.1 c) above. In case the results of Gage R&R are not satisfactory (in the written opinion of IIA/ ITCC), Contractor shall repeat and report on any relevant inspection done before the Gage R&R. Contractor shall take, maintain, and provide photographs of all the blocks to ITCC from different stages of this inspection programme.

4.7.7 IIA/ITCC shall undertake TPI at its discretion for all or identified blocks/features. Only contractor inspected and accepted blocks shall be taken for TPI.

4.7.8 Contractor shall support any Third Party Inspection (TPI) at Contractor's facility: Contractor shall provide all required entry permissions, infrastructure, measuring instruments, programmes, tools and support for the inspection, and shall include the TPI activity time in the total schedule.

4.7.9 If IIA/ITCC decides to perform TPI at Third Party Facility, Contractor shall be responsible for packing and transportation of identified parts to be inspected. IIA/ITCC shall reimburse shipping, transportation, and transit insurance cost at actuals (original bills to be submitted). Contractor shall request prior approval from IIA/ITCC in this case.

4.7.10 Direct interaction with TPI provider shall only be done by IIA/ITCC. Any communication with TPI desired by Contractor shall only be allowed with prior permission

from IIA/ITCC, and such discussion shall take place only in the presence of an IIA/ITCC representative.

4.7.11 IIA/ITCC will direct the Third-Party Inspector to maintain high-resolution photographs of all parts, with each part rotated, positioned and illuminated in a consistent manner.

4.8 PACKING AND SHIPMENT

4.8.1 ITCC will provide the shipping containers for this round of P3 Prototype Edge Sensor Machining.

4.8.2 Contractor shall be responsible for safe packing and shipment of Edge Sensor blocks to the delivery address provided in Section 5.18.

4.9 NON-CONFORMANCES

4.9.1 Contractor shall avoid non-conformances with respect to any of the requirements in the drawings.

4.9.2 Contractor shall identify and segregate non-conforming components immediately on detection.

4.9.3 Contractor shall generate and maintain sufficiently detailed non-conformance reports ("NCR") on all non-conforming components.

4.9.4 Contractor shall maintain a list of all the non-conformances along with root cause, corrective action and disposition (irrespective of such non-conformances gets reworked, rejected or accepted as it is). Contractor shall provide ITCC with access to this non-conformance list.

4.9.5 If non-conforming components can be reworked, re-made or purchased to comply with the drawing and/or specifications required under this contract with no delay on the delivery date, then IIA/ITCC need not to be notified within 48 hours. But Contractor shall document this in the Contractor's list of non-conformance.

4.9.6 If the non-conforming components are reworked or remade to comply with the drawing and/or specifications, but the process will adversely affect the delivery date, then IIA/ITCC shall be notified within 48 hours of the Contractor's identification of the non-conformance.

4.9.7 Contractor shall re-inspect all reworked parts.

4.9.8 If the discrepancy is raised by TPI, and where disposition is for the rework of the part, Contractor shall rework the part and arrange via IIA/ITCC for the partre-inspected by the same third party inspector, at Contractor's own cost including packing, transport and insurance (if applicable).

4.9.9 A root cause analysis shall be performed by the Contractor for all non-conformances for which IIA/ITCC is notified.

4.9.10 IIA/ ITCC shall monitor implementation of the corrective action for any NCR.

4.9.11 Contractor shall communicate any doubts or clarifications regarding corrective action immediately to IIA/ITCC for clearance.

4.9.12 Finished Components shall meet cosmetic quality standards, and be free of scratches, dents, and gouges.

4.9.13 Unacceptable number of non-conformances, non-conformance of critical requirements, repeated failures to meet the specifications during rework or remake, persistent cosmetic quality defects etc. will lead to negative assessment of Contractor's performance, and may lead to cancellation of the order and/or disqualification of Contractor from participating in further stages of production, at risk and cost of Contractor (see Exhibit - A).

4.10 REQUEST FOR WAIVER OR DEVIATION

4.10.1 Contractor shall use the TMT form "Request for Waiver or Deviation" [AD4] to request a waiver/deviation of any kind.

4.10.2 Contractor shall attach pertinent NCRs to the applicable "Request for Waiver or Deviation" form(s) for that non-conforming component.

4.10.3 Contractor shall email the completed Request for Waiver or Deviation form(s) to jayakuma.itcc@iiap.res.in, with copy to prasanna@iiap.res.in.

4.10.4 The root cause analysis shall be provided along with appropriate corrective action along with "Request for Waiver or Deviation".

4.10.5 IIA/ ITCC shall monitor implementation of the corrective action for any RfW/RfD.

4.10.6 Contractor shall communicate any doubts or clarifications regarding corrective action immediately to IIA/ITCC for clearance.

4.10.7 IIA/ITCC shall convene a Material Review Board (see [AD7]) to disposition RfW/RfD. The decision by the Material Review Board shall be final and binding.

4.11 SUB-CONTRACTORS

4.11.1 Sub-contracting of any work shall be allowed only upon review of Sub-Contractor and prior written approval from IIA/ITCC.

4.11.2 Contractor shall define the scope of work it plans to offload to the sub-Contractors. Contractor shall ensure, in its plan, that sub-Contractor has necessary infrastructure and manufacturing capability to carry out the work as per TMT's Quality requirement.

4.11.3 Contractor shall maintain a qualification plan for each sub-Contractor. Contractor shall formally qualify sub-Contractor for the Work they will be assigned, before submitting information on the sub-Contractor for IIA/ITCC review. IIA/ITCC and possibly a TIOPO representative may visit the sub-Contract or premises and personnel as part of an on-site review.

4.11.4 Contractor alone shall remain fully liable and responsible to IIA/ITCC for the satisfactory and timely completion of the Work.

4.12 PROVISION OF END ITEM DATA PACKAGE

4.12.1 Contractor shall prepare and submit to IIA/ITCC an End Item Data Package (EIDP) that contains all critical data pertinent to each prototype Edge Sensor.

4.12.2 Each EIDP shall comply, at a minimum, with the following quality assurance requirements (as per [AD5]):

- a. Formal acceptance document signed by Contractor's Quality Assurance Officer.
- b. A set of released fabrication drawings and specifications for the delivered subsystem.
- c. Material Certificates.
- d. Traceability data.
- e. Contractor's Inspection and Process Sheet/Plan.
- f. Contractor's Quality Assurance Plan specific for the prototype Edge sensors.
- g. Contractor's Quality Assurance inspection reports for each Edge sensor.
- h. Valid calibration certificates for all measurement instruments used for inspection of deliverables. The calibration is to be performed and certified either by the Equipment Manufacturer (certified for relevant calibration) or an NABL accredited laboratory (accredited/ certified for relevant calibration).
- i. Non-Conformance Reports (NCRs) (if any).
- j. Approved Requests for Waiver or Deviation (if any).
- k. Contractor inspection qualification report (if applicable).

4.12.3 Contractor shall ensure that the End Item Data Packages are made available to IIA/ITCC at least 4 weeks prior to the associated Pre-ship Review.

4.12.4 ITCC may request an EIDP document at any stage, as and when the document is available or generated: Contractor shall keep up-to-date EIDP documentation during the entire work duration.

4.12.5 Contractor shall provide any additional documentary information requested by ITCC during the warranty period after completion of work.

4.13 MEETINGS

The Contractor shall participate in the following meetings with ITCC/IIA and TMT project representative. The meetings may be via telephone, video, or in person. IIA/ITCC reserves the right to meet at the Contractor's facility.

a) A "Kick-off Meeting"

The Kick-off meeting shall be held in order for:

- i. Contractor to introduce its team and team structure which will be working on the Edge Sensor project.
- ii. Contractor to identify single technical point of contact.
- iii. Contractor to identify single contractual point of contact.
- iv. IIA/ITCC to introduce its team.
- v. IIA/ITCC to identify single technical point of contact.
- vi. IIA/ITCC to identify single contractual point of contact.
- vii. IIA/ITCC shall make available to Contractor the final drawing set for the Edge Sensor.
- viii. IIA/ITCC to highlight areas where utmost care has to be taken by Contractor.
- ix. IIA/ITCC to discuss raw material requirement & specifications as per the drawings.
- x. IIA/ITCC to discuss in detail what is expected in terms of QA from Contractor.

- xi. Contractor to provide comments/ request clarifications on drawings, required processes etc.
- xii. Contractor to list machinery for the Work.
- xiii. Risk register and mitigation plans.
- xiv. IIA/ITCC and Contractor to discuss activities planned to be outsourced by Contractor.
- xv. IIA/ITCC and Contractor to discuss schedule activities, duration, dependencies, and credibility.

b) A “Pre-Build meeting”

The Pre-Build meeting shall be held in order for:

- i. IIA/ITCC and Contractor to discuss action items from the Kick-off meeting.
- ii. IIA/ITCC to communicate to Contract or any final changes to the drawings.
- iii. IIA/ITCC to finalise decision on acceptability to IIA/ITCC of any Sub-contractor(s).
- iv. IIA/ITCC and Contractor to discuss Contractor’s proposed detailed schedule, and agree on any modifications that shall be made by Contractor.
- v. IIA/ITCC and Contractor to discuss Contractor’s Edge Sensor-specific Quality Assurance Plan, agree on any modifications that shall be made by Contractor, and the date of final release.
- vi. IIA/ITCC and Contractor to discuss Contractor’s Inspection Plan, agree on any modifications that shall be made by Contractor, and the date of final release.
- vii. IIA/ITCC and Contractor to discuss Contractor’s Process Plan, agree on any modifications that shall be made by Contractor, and the date of final release.
- viii. IIA/ITCC and Contractor to discuss Contractor assessment of, and (where necessary), the necessary mitigation steps for, the top 5 potential risks that ITCC has identified at the Kick-off meeting.
- ix. IIA/ITCC and Contractor to discuss availability of all necessary tools, Jigs and Fixtures required for the machining of Edge Sensor blocks.

c) Progress meetings

Progress meetings shall be held bi-weekly(every two weeks) during the term of this work. The bi-weekly meetings shall review status, progress reports and address any outstanding concerns or issues regarding the Work.

Contractor shall maintain, in ITCC format (see [RD1]), an action item list with due dates and priorities.

Contractor shall convene the meeting every two weeks, propose the Agenda, share the schedule, record the minutes and Action Items.

4.14 PROGRESS REPORTS

Contractor shall submit every two weeks a written "progress report" in ITCC format (see [RD1]) by email to IIA/ITCC, describing all work carried out and the corresponding schedule status. Contractor shall provide a process update, detailing the status relative to schedule. The progress report shall include all questions to IIA/ITCC, and Contractor areas of concern, regarding the Work. All written communication by Contractor to IIA/ITCC shall have prasanna@iiap.res.in and vaishaly.itcc@iiap.res.in in distribution. The "progress report" shall be made available to IIA/ITCC two days prior to the "Bi-Weekly Progress Meetings".

4.15 REVIEWS

The Contractor shall participate in the following reviews with ITCC/IIA and TIOPO representative. The reviews may be conducted via telephone, video, or in person. IIA/ITCC reserves the right to meet at the Contractor's facility or remotely.

a) "Pre-ship Review Meeting"

A pre-ship review meeting shall be held to review whether:

- i. all EIDPs are complete and received by IIA/ITCC.
- ii. TPI is complete and the inspection reports are accepted by IIA/ITCC.
- iii. all shipping preparations have been adequately made,
- iv. any lessons learned that might be relevant to the Edge Sensor Production Phase.

Subject to a successful conclusion to this meeting and approval from IIA/ITCC, Contractor shall ship the machined Edge Sensors to the location specified in Section 5.18

b) "Acceptance Review Meeting"

An acceptance review meeting shall be held between IIA/ITCC and Contractor to review whether:

- i. The incoming inspection report from IIA/ITCC is available.
- ii. All the hardware received is in compliance with the drawing specifications.
- iii. All EIDPs are accepted by IIA/ITCC.

IIA/ITCC shall communicate to Contractor which of the machined Edge Sensors are formally accepted by IIA/ITCC.

Note: There may be two rounds of Acceptance reviews: one after the first batch of machining of 5 blocks of prototype Edge Sensors, and the second after the completion of all 70 blocks of prototype Edge Sensors.

IIA/ITCC reserves the right to convene any other meetings with the Contractor as required, to complete the machining & inspection of prototype Edge Sensors in accordance with the Purchase Order.

4.16 HARDWARE DELIVERABLES FROM CONTRACTOR

75 blocks of machined and inspected Edge Sensor Blocks.

4.17 DOCUMENTATION DELIVERABLES FROM CONTRACTOR

- a) Contractor's Inspection Plan;
- b) List of potential sub-contractor(s) and their company profile(s) (if applicable).
- c) Generic Quality Assurance Plan
- d) Quality Assurance Plan specific for the Edge Sensor Blocks build
- e) Contractor's Sample Control Plan.
- f) Process Sheets and Plan. The Process plan shall include process sequences, tools specifications, fixtureing plan, material removal rate, illustrations/drawings, etc.
- g) Inspection Plan
- h) Assessment of, and (where necessary), the necessary mitigation steps, for the top 5 potential risks that ITCC has identified at the Kick-off meeting.
- i) Checklist demonstrating that all necessary tools, Jigs and Fixtures required for the machining of Edge Sensor blocks are available.
- j) Detailed Schedule in . mpp format, showing all key activities, durations, and internal and external schedule dependencies.
- k) Progress reports
- l) Agenda, minutes and Action Items from Progress Meetings.
- m) End Item Data Package for each Edge Sensor Block.

4.18 DELIVERY LOCATION

Hardware Delivery locations:

India-TMT Coordination Centre (ITCC),
Indian Institute of Astrophysics,
2nd Block, Koramangala,
Bengaluru 560034, India.

Documentation Softcopies: by electronic delivery to
prasanna@iiap.res.in
vaishaly.itcc@iiap.res.in

4.19 PLANNED SCHEDULE

Meetings and deliverables shall be per the following Work schedule. All dates are from the Effective Date of the Purchase Order (T_1). This schedule may be modified during contract negotiations or at the Pre-Build meeting.

| Phase | Description | Completion Date, from T_1 |
|--------------|--|--|
| 1 | Kick-Off Meeting | Week 2 |
| 2 | Submission of Contractor's QA Plan | Week 4 |
| 3 | Submission of Detailed Work Schedule | Week 4 |
| 4 | Submission of Contractor's Edge Sensor Specific Quality Assurance Plan | Week 4 |
| 5 | Submission of Contractor's Process Sheet/Plan | Week 4 |
| 6 | Pre-Build Meeting | Week 6 |
| 7 | Bi-weekly Status Report | Two days prior to the Bi-weekly Progress Meeting |
| 8 | Bi-weekly Progress Meeting | Bi-weekly |
| 9 | Submission of EIDPs & As-built documents | Week 30 |
| 10 | Pre-ship Review Meeting | Week 31 |
| 11 | Shipment of Edge Sensors, along with documentation. | Week 32 |
| 12 | Incoming Inspection at ITCC. | Week 33 |
| 13 | Acceptance Review Meeting | Week 34 Contractor shall participate in the Acceptance Review of all Edge Sensors 2 weeks after the Edge Sensors are received by IIA/ITCC at the delivery location. |

4.20 VARIATION IN THE WORK

There may be some changes in the drawings between those that are provided by IIA/ITCC as part of this RFP, and the drawings released by IIA/ITCC with the Purchase Order for the Work. All such changes will be recorded and provided in "Drawing Changes"[AD1 d]. Changes, if any, will be relatively minor and ITCC's expectation is that they will not incur any change in cost. If desired by a Contractor, these changes can be more fully described at the pre-bid meeting.

Contractor shall not modify any drawing.

IIA/ITCC may vary the Work scope, location, or duration of this Work from time to time. In that event, IIA/ITCC shall notify Contractor of IIA/ITCC's requirements to negotiate a Variation of the Work, if necessary.

On receipt of such a notification, Contractor shall respond within seven (7) working days, and submit in writing to IIA/ITCC a Variation Proposal, which sets out:

1. the impact of the proposed Variation on the Work.
2. the price, if any, that would be payable to Contractor for the proposed variation.
3. change in delivery date, if any, due to the variation.

Contractor shall make efforts to accommodate minor changes to the Work without any additional cost implications. All proposed major changes with respect to work and corresponding increase in price shall need to be pre-approved by a committee which consists of IIA/ITCC, Contractor personnel and TIOPO representative.

Within seven (7) working days of receipt by IIA/ITCC of a variation proposal, IIA/ITCC shall consult with Contractor to review and negotiate the variation. Any agreed Variation shall be in the form of an amendment to the purchase order.

5. METHODOLOGY OF SUBMISSION OF BIDS

Bids in two part bid system, enclosing documents listed below and any other documents as appropriate is hereby invited:

5.1 SUBMISSION OF TECHNICAL AND PRICE BIDS – GENERAL TERMS

- a) IIA/ITCC will use Govt e-procurement System of NIC (GePNIC) for procurement.
- b) All Tender Documents may be downloaded from Central Public Procurement Portal <https://eprocure.gov.in/eprocure/app>.
- c) Bidders who have not enrolled / registered in e-procurement should enroll / register before participating through the website <https://eprocure.gov.in/eprocure/app> .
- d) The portal enrolment is free of cost. Bidders are advised to go through instructions provided at 'Instructions for online Bid Submission.
- e) Bidders shall submit the Technical and Price Bids through this Portal.
- f) Any other condition or guideline for submission of the bids shall be notified by IIA/ITCC, if it finds necessary.
- g) IIA/ITCC may, at its discretion, extend the deadline for the submission of bids by amending the Bidding Documents, in which case all rights and obligations of IIA/ITCC and Bidder previously subject to the deadline will thereafter be subject to the deadline as extended.
- h) At any time prior to the deadline for submission of Bids, IIA/ITCC may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, notify changes in the bidding documents through an amendment.
- i) In order to allow reasonable time for the prospective bidders for taking the amendment into account in preparation of their bids, IIA/ITCC may, at its discretion, extend the deadline for the submission of the bids.
- j) The amendments, if any, shall be notified in writing at IIA/ITCC website and the amendments shall be binding on all the bidders. Hence the bidders shall view the notification in complete before submitting their bids.
- k) The company responding to announcement shall be deemed to have read and understood the documents in complete. Where counter terms and conditions have been offered by the company, the same shall not be deemed to have been accepted by IIA/ITCC, unless a specific written acceptance thereof is obtained.
- l) Any effort by a bidder to influence IIA/ITCC in the bid Evaluation, bid Comparison or contract award decisions may result in the rejection of their bid.
- m) Any clarifications pertaining to this document may be obtained from IIA/ITCC by the bidders by writing at the following address/email at least fifteen days prior to the due date for submission of bids.

5.2 TECHNICAL BID

5.2.1 General details (To Be Uploaded)

- a) Profile of the company with ISO certifications
- b) Technical compliance as per RFP
- c) Company brochure providing details of company infrastructure and manufacturing facilities.
- d) Audited balance sheets for the last three years.
- e) Solvency certificate (not older than 12 months) (for the quoted amount; this certificate may be provided) issued by scheduled/nationalized bank with which the bidder holds the current account.
- f) Copy of Registration, GST No., PAN No. and TIN No. allotted by concerned authorities.
- g) Appreciation/Reward letters from clients, if any.
- h) Confidentiality agreement.
- i) Commercial terms and conditions.
- j) Any other information relevant to the bid.

5.2.2 Technical Details (To Be Uploaded)

A compliance sheet clearly indicating any deviation with reference to the terms and specifications shall be included. Limitations and assumptions, if any, should be clearly mentioned. Scope description may explicitly state anything which is not covered.

The Technical details may include but not limited to the following items:

- a) Raw material sources and incoming inspection method.
- b) In-house precision machining capability and various types of machines, capacity and quantity held including Non-conventional machines. Detailed plan for using them for Edge Sensor manufacturing.
- c) Details of precision glass machining machines, suitable and planned to be used for the present work. Information of environmental control available in the machining area.
- d) Earlier experience in glass machining, details and pictures of earlier machined parts
- e) Details of Inspection Laboratory, Instruments, details of available precision inspection equipment's like VMM, 3D CMM, Profile Projector, Surface roughness tester, Height Measurement, non-contact measuring instruments, etc. including their accuracy
- f) Any other information / Facilities related to Laser engraving, surface treatment processes.
- g) Details of sub-contractor's facility, if any special operations are to be out-sourced.
- h) Sub-Contractor list with details of what and how work will be done there. Qualification program, if any.
- i) Experience in ASME Y 14.5 - 2009.
- j) Strategy to be followed for the execution of the project including tools and technologies to be used.
- k) Project execution and management plan, which shall include details of the project team, escalation paths etc.
- l) Prior experience in executing similar technically challenging projects.

- m) List of Customers within the State/Country/abroad.
- n) Details of the resources, infrastructure or data expected to be provided by IIA/ITCC to the successful bidder for undertaking the project.
- o) Risk register and mitigation plans.
- p) Quality audit, control and assurance plans.
- q) Change control process document.
- r) Details of Environmental, health and Safety standard followed.
- s) General workmanship standards for fabricated components
- t) Detailed proposed time schedule for the project.
- u) Responsiveness & Communication: facility of Video Conferencing.
- v) A copy of the Price Bid without indicating the quoted Price

5.3 PRICE BID (AS PER THE GIVEN FORMAT)

Price Bid is required to be submitted as given in the next section.

5.4 PRICE BID – DETAILS (TO BE UPLOADED)

- 1) The Price bids shall be uploaded with an item-wise break-up of the cost (as per the .xls format as given in Table 1) in Indian Rupees.
- 2) IIA/ITCC may ask for additional details on the break-up of the cost, at later stage.
- 3) The offer shall be complete to indicate that all products and services asked for are quoted.
- 4) Price bids shall be valid for a period of 180 days from the date of opening of bids. IIA/ITCC may ask for the bidder's consent to extend the period of validity. Such request and the response shall be made in writing only. A bidder agreeing to the request of IIA/ITCC for extension of the bid will not be permitted to modify the bid.

Table1: Costing Template for Prototype Edge Sensor Machining

| Tender Inviting Authority: Indian Institute of Astrophysics | | | | | | | | | | |
|---|--|------------------|----------|--------|---|--|----------|-----------------------------------|--------------------------------|-----------------------|
| Name of Work: MACHINING OF TMT Edge Sensors | | | | | | | | | | |
| Contract No: IIA/ITCC/TMT-SEN/... | | | | | | | | | | |
| Name of the Bidder/ Bidding Firm / Company : | Vendor Representative Name Vendor Name | | | | | | | | | |
| PRICE SCHEDULE | | | | | | | | | | |
| (This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only) | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| PRICE SCHEDULE | | | | | | | | | | |
| NUMBER # | TEXT # | TEXT # | NUMBER # | TEXT # | TEXT # | NUMBER # | NUMBER # | NUMBER # | NUMBER # | TEXT # |
| Sl. No. | Item Description | Item Code / Make | Quantity | Units | Quoted Currency in INR / Other Currency | BASIC RATE in Figures To be entered by the Bidder in Rs. P | GST % | TOTAL AMOUNT Without GST in Rs. P | TOTAL AMOUNT With GST in Rs. P | TOTAL AMOUNT in Words |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | Machinig of TMT MICS Edge Sensor - P3 Prototypes (As per NIT and RFP Document) | MICS-200-01001 | 75 | Nos | INR | | 0.00% | 0 | 0 | |
| Total in Figures | | | | | | | | 0 | 0 | |
| Quoted Rate in Words | | | | | | | | | | |

Note: The template of this table is given along with this RFP (in xls format).

5.5 TECHNICAL AND MANAGERIAL ELIGIBILITY CRITERIA

The Technical bids uploaded by the contractors will be evaluated by a Committee to ensure they have required technical capabilities (including facility, infrastructure and manpower) to undertake the work.

The criteria for the technical evaluation stage shall include the following as a minimum:

- 1) Core technical competencies and
- 2) Availability of in-house suitable machining facilities/equipment to manufacture the blocks and suitable qualified staff required to perform the work.
- 3) Prior experience in glass machining and glass parts manufacture
- 4) Availability of In-house precision inspection facility and equipment's required for the inspection of Blocks.
- 5) Quality Assurance, including Quality Control.
- 6) Project management capabilities, including scheduling and planning.
- 7) Prior experience in executing similar technically challenging projects.

5.6 PROCEDURE FOR EVALUATION OF BIDS

- a) Bidder may email the given contacts to obtain clarifications regarding the technical details and price bid terms and conditions.
- b) ITCC shall organize a pre-bid meeting approximately two weeks prior to the last date of submission of bids.
- c) The Technical and Commercial bids shall be evaluated by Expert Committee(s) of IIA/ITCC.
- d) Technical evaluation will be based on but not limited to: 1) Machines and equipment proposed by vendor to be used for this work, 2) Processes identified to conduct this work, 3) Prior experience of undertaking technically similar type of work.
- e) If shortlisted, Bidder may be requested to make presentations on their technical bids to the Committee. The points to be covered for presentation are as per the details indicated in Section 5.2.
- f) To assist in the evaluation of bids, IIA/ITCC may at its discretion ask Bidder for a clarification of its bid. IIA/ITCC may call for meetings with Bidder to seek clarification at appropriate times in its premises in Bengaluru. Bidder shall attend the meeting at their own cost. The request for clarification and the response shall be in writing. Expert Committee may visit and evaluate Bidder facilities and sub-contractor facilities (where they have planned to execute the work).
- g) After completion of the Technical Evaluation, the Price bid of all technically qualified bidders shall be opened from the e-procurement process by the Evaluation committee, and the final contractor selection will be made based on the lowest price offered (L1). The L1 cost shall be based on Total cost for Machining of 75 Nos. of Edge Sensors. However, L1 bidder should be ready to accept minimum order of 45 Nos. of Edge Sensors at the quoted cost.

- h) At the discretion of IIA/ITCC, may consider to placed orders with two Contractors L1 & L2. In such an instance, the distribution of quantity will be in the ratio of 60:40 % only upon L2 Bidder accept the L1 price offered by IIA/ITCC. There shall be no price variation between L1 and L2 Bidders.
- i) The evaluation committee may hold commercial discussion with Bidders to select the Contractor or Contractors.
- j) The meetings may be via telephone, video, or in person.

5.7 LOCAL CONTENT

As per Government of India orders on Public Procurement (Preference to Make in India) orders vendors need to submit a self-certification that the item offered meets the local content requirement giving details of the location at which the local value addition is made on the local content requirement, the brief details of which are as under:-

“Local content means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content on the item (including all custom duties) as a proportion of the total value xxx in percent;

Class-I local supplier, means supplies or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50%;

Class-II local supplier means a supplier means supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%”.

For detailed instructions on the above, please visit the web site <https://dipp.gov.in/public-procurements>

EXHIBIT A: CONTRACTOR PERFORMANCE EVALUATION

It is of extreme importance that Contractor maintains the quality and schedule at each phase of the manufacture of this work. The performance will be evaluated periodically. If the quality requirements are not met or if the schedule is not maintained, Contractor is liable to be disqualified and will not be able to continue to participate in the rest of the prototype/production process.

Contractor performance evaluation shall consist of, but is not limited to, the following criteria.

1. Quality Evaluation - The performance of contractor's adherence to quality shall be monitored.
2. Schedule Evaluation - Evaluation shall be based on extent of delay(s) (if any) in completion of work in comparison with Baseline Schedule.
3. Customer Satisfaction Evaluation - Evaluation shall be based on the following factors:
 - a. Communication/Responsiveness
 - b. Oversight required
4. Management effectiveness - Evaluation shall be based on management's pro-activeness over the course of the scheduled activities ensuring that the programme is on track to meet the overall schedule with the requisite conformance to specifications.

5.7.1 Note:

- 01) Vendor should attach the detailed technical specifications with drawings of the above materials along with test certificate.
- 02) Valid dealership certificate should be available with the dealer during and beyond warranty periods.
- 03) Warranty period should be 1 (One) year and the vendor should provide a OEM certificate from the manufacturer wherever applicable.
- 04) Any additional charges arising during the warranty period should be borne by the vendor.
- 05) Bank Guarantee for 3% of the total contract value to be submitted within 15 days from the issue of this Purchase order as Security towards performance & Warranty whose validity should be 2 months beyond warranty period.
- 06) Liquidated Damages at the rate of 0.5% per week to a maximum of 10% of contract value will be applicable.
- 07) Free door delivery / installation and commissioning of these items to Indian Institute of Astrophysics, 2nd Block, Koramangala, Bengaluru – 560034.
- 08) GST: GST @ 5%. IIA will issue GST Concessional Certificate as per Notification No.47/2017.
- 09) Loading and unloading charges born by the vendors.

Pre Bid Meeting (Online Meeting) on **Monday 4th April 2022** at 11:30 hours, **Vendors interested in participating the pre-Bid meeting should intimate through email by 31st March 2022, email prasanna@iiap.res.in and Vishnu.vardhan@iiap.res.in.**
