



BANARAS HINDU UNIVERSITY
(NOTICE INVITING TENDER)

On behalf of the Vice-Chancellor, BHU, sealed item rate tenders from manufactures (or their 'authorised' dealers by submitting letters/certificates, in original, from the manufacturers that they have been authorized to quote in response to *this* NIT) of the following items are invited:

Sl. No.	Tender no.	Specifications & quantity of the item	Estimated cost
1.	Tender no.IIT(BHU)/ME/12-13/FIST- 4152/85/L	Flexible Manufacturing and Reconfigurable System's	55 lakhs

The Tender Documents for items will be on two-Bid System consisting of Technical Bid and Price Bid. The Tender Documents will be submitted item-wise in two separate sealed covers clearly mentioning on the envelope the details of items for which bid is submitted. Any firm may bid for any number of items against the purchase of Tender Document but each offer must be item-wise in two bid cover enclosing item-wise EMD with Technical Bid.

The Tender Document (non-transferable) alongwith detailed specifications, terms and conditions may be purchased by the interested supplier on submission of a written application to the undersigned alongwith payment of non-refundable Tender price as mentioned below. The Tender price may be paid in the form of Bank Draft in favour of Registrar, Banaras Hindu University payable at Varanasi. The Tender document may be collected during office Hrs. (from 10.30am to 5.00pm) on all working days (Monday to Saturday) either in person or by post from the office of the undersigned. It can also be downloaded from the BHU website. The postal charges of Rs. 100/- (Rupees Hundred only) will be charged extra if tender document is required to be sent by post.

- a) Price of Tender Document: Rs. 500/- (five hundred Non-refundable).
This should accompany the tender, if the document has been downloaded from the BHU website.
- b) Date of commencement of sale of Tender Document: From the date of issue of the tender notice
- c) Last date for sale of Tender Document: Three weeks from the issue of the tender notice.
- d) Last date and time for receipt of Tender Document: Six weeks from the date of issue of tender notice in the news paper during the Office hours upto 5 pm. The tender should be addressed to the undersigned and should be delivered in person or sent by Registered post so as to reach the University by the due date. No tender will be accepted after the due date and time.

All Tender Documents must be accompanied with the Bid Security Form/Earnest Money Deposit (Refundable) equivalent to 2% of estimated cost of each item. The Earnest Money Deposit is to be paid in the form of Bank Draft in favour of the Registrar, Banaras Hindu University payable at Varanasi. The Bid Security Form/Earnest Money Deposit Bank Draft must be enclosed with Technical Bid. The details of Bank Draft Number of Earnest Money Deposit must be endorsed on top of envelop containing Technical Bid.

The University shall not be responsible for any delay in receiving Bids/sending of Tender Document by post.

The University reserves the right to accept or reject any bid, without assigning any reason thereof. No correspondence in this regard will be entertained.

Earnest Money shall be forfeited in case it is found at any stage that information/particulars regarding supply of tendered item(s) is false.

Head
Department of Mechanical Engineering,
Indian Institute of Technology
(Banaras Hindu University),
Varanasi – 221 005, U.P., INDIA

TENDER DOCUMENT FOR : “Flexible Manufacturing and Reconfigurable System’s”

BID REFERENCE	Tender no.IIT(BHU)/ME/12-13/FIST- 4152/85/L
DATE OF COMMENCEMENT OF SALE OF BIDDING DOCUMENT	3.1.2013
LAST DATE TIME FOR SALE OF BIDDING DOCUMENTS	20.1.2013
LAST DATE AND TIME FOR RECEIPT OF BIDS	15.2.2013
ADDRESS FOR COMMUNICATION	Head, Department of Mechanical Engineering

*It can be downloaded from the BHU website.

TENDER DOCUMENT FOR : “Flexible Manufacturing and Reconfigurable System’s”

INVITATION FOR BIDS

1. Sealed bids in two parts (techno commercial unpriced & Priced bids) are invited from eligible bidders for the following

Sl. No.	Tender No	Subject	Earnest Money Deposit
1.	Tender no.IIT(BHU)/ME/12-13/FIST- 4152/85/L	Flexible Manufacturing and Reconfigurable System’s	1,10,000/-

2. Interested eligible Bidders may obtain further information from and inspect the bidding documents at the office of the **Head , Department of Mechanical engineering**
3. Each set of bidding document can be purchased by any interested eligible bidder on payment of the cost of tender document. The cost of bidding documents as indicated above should be submitted in the form of a Demand Draft in favour of the Registrar BHU payable at Varanasi
4. All bids must be accompanied by earnest money deposit as specified above and must be delivered to the above office upto 5.00 pm of **15.2.2013**
5. The University reserves the right to accept or reject any or all tenders either in part or in full without assigning any reasons therefor.
6. This Tender Document contains the following:
 - A. Instructions to Bidders
 - B. General conditions of contract
 - C. Tender form (Techno commercial unpriced Bid)
 - D. Tender form (priced Bid)
 - E. Check-list for Bid/Tender submission
 - F. Bank guarantee form

INSTRUCTIONS TO BIDDERS

A. Introduction

1. Qualification criteria/ Eligible Bidders

- 1.1 This Invitation for Bids is open to all manufacturers & their dealers authorized to quote in response to this NIT.
- 1.2 Copies of valid Central/State sales tax registration certificate, Income tax clearance certificate, proof of manufacturing unit/dealership & general order suppliers and copies of two major supply orders valuing more than Rs. 20000/- executed during the preceding two years for Govt. depts. /PSUs and Central Autonomous bodies have to be submitted.

2. Cost of Bidding

- 2.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and "the Purchaser", will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

B. The Bidding Documents

3. Cost of Bidding Documents

Interested eligible bidders may purchase the bidding documents on payment of the cost of bidding documents as indicated in the invitation for bids. The cost of bidding documents should be submitted in the form of a Demand Draft in favour of the Registrar, BHU payable at Varanasi.

4. Content of Bidding Documents

- 4.1 The goods required, bidding procedures and contract terms are prescribed in the bidding documents. In addition to the Invitation for Bids, the bidding documents include:
- (a) Instruction to Bidders (ITB);
 - (b) General Conditions of Contract (GCC);
 - (c) Schedule of requirements;
 - (d) Tender form (technical bid).
 - (e) Tender form (financial bid)
- 4.2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the Bidder's risk and may result in rejection of its bid.

5. Amendment of Bidding Documents

- 5.1 At any time prior to the deadline for submission of bids, the Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the bidding documents by amendment.
- 5.2 All prospective bidders who have received the bidding documents will be notified of the amendment in writing, which will be binding on them.
- 5.3 In order to allow prospective bidders reasonable time within which to take the amendment into account in preparing their bids, the Purchaser, at its discretion, may extend the deadline for the submission of bids.

C. Preparation of Bids

6. Language of Bid

- 6.1 The bid prepared by the Bidder, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser, shall be written in English language.

7. Documents Comprising the Bid

- 7.1 **Techno commercial unpriced bid and priced Bids:** The bids are to be submitted in two parts in separate sealed envelopes i.e. Techno commercial unpriced bid and priced Bids.
- (a) Techno commercial unpriced bid along with Earnest Money Deposit (EMD) as shown in invitation to bids may be submitted either through Bank Guarantee valid for the duration of contract as per enclosure to the bidding documents or by a demand draft of Nationalised Bank in favour of the Registrar, BHU payable at Varanasi. If the EMD is not received along with the technical bid, such bid will not be considered. The samples of all the items shown in the

schedule of requirements of each tender should also accompany the techno commercial unpriced bid in a separate sealed envelope

(b) Priced bid.

7.2 Techno commercial unpriced bid: The Techno commercial unpriced bid prepared by the bidder shall be provided in the following Model Response format :

Model Response format

(a) Standing of each Bidder Manufacturer/Dealer and past experience in supply of the material (certificates to be enclosed), proof of manufacturing Unit/Dealership letter and general order supplier.

(b) List of other Govt. Departments , Public Sector units and Central Autonomous Bodies for which the bidder is supplying material or having the similar type of contracts and a certificate regarding the satisfactory performance of the contract.

(c) Copy of the audited balance sheet of the vendor for the previous financial year indicating the turnover in supply of the material.

(d) Details of Permanent Account Number and latest income tax clearance certificate.

(e) Details of S.T. No. along with a copy of certificate to be attached.

(f) Submission of samples if required, for all items indicated in the schedule of requirements. The make of items proposed to be supplied should be indicated in the format of the schedule of requirements and submitted along with the techno commercial un priced bid without indicating the pricing components.

(g) Willingness to execute all orders which are placed to meet emergency requirement on priority basis. The Bidder shall note that standards for workmanship, material and equipment, and references to brand names designated by the Purchaser in the schedule of requirements are intended to be descriptive only and not restrictive. The Bidder may substitute alternative standards, brand names and/or catalogue numbers in his bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications.

7.3 Priced Bid

The priced bid shall comprise the techno commercial bid along with the price component indicating the Unit prices for each and every item indicated in the schedule of requirements.

(a) The prices quoted must be net per unit as shown in the Schedule and must include all charges for delivery at the designated stores.

(b) The rate must be stated for each item separately both in words and figures. If there is a discrepancy between the price quoted in word and figures the higher price quoted will be treated as final.

(c) The price quoted by the renderers should be exclusive of Excise Duty & Sales Tax. However, the Excise Duty & Sales Tax payable should be quoted separately in the schedule enclosed.

(d) Quoted prices should be firm and inclusive of octroi, freight and forwarding charges, handling charges, loading and unloading charges, insurance charges etc.

(e) The prices once accepted by the University shall remain valid till the successful execution of the order and till supplies are fully effected and accepted or 12 months from the date of acceptance of tender whichever is later. The University shall not entertain any increase in the rates during the period. However, in the event there is a reduction or increase in Government levy/duties during the period of execution of the order, the rates shall be suitably adjusted with effect from the date notifying the said reduction or increase in the Government levy/excise duty. The quantity given in the schedule is approx annual requirement, which can be reduced or increased by 50%.

NOTE

1. THE TWO BIDS (BOTH TECHNO COMMERCIAL UNPRICED BID) ALONG WITH EARNEST MONEY DEPOSIT (EMD) AND SAMPLES (IF REQUIRED) AND THE PRICED BID SHOULD BE SUBMITTED SEPARATELY FOR EACH TENDER.

2. CONDITIONAL BIDS WILL NOT BE ACCEPTED

8. Bid Prices

8.1 The Bidder shall indicate on the Schedule of requirements, the unit prices of the goods it proposes to supply under the Contract and enclose it with the priced bid.

8.2 Prices indicated on the Price Schedule shall be entered separately in the following manner:

(i) the prices quoted must be net per unit as shown in the schedule of requirements and must include all charges for delivery at the designated stores.

(ii) any Indian duties, sales and other taxes which will be payable on the goods if this Contract is awarded;

8.3 Prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to variation on any account.

9. Bid Currencies

9.1 Prices shall be quoted in Indian Rupees only. In case of direct import the prices may be indicated in the foreign currency. The University may, at its discretion, arrive at approximate Rupee equivalent on the basis of exchange rate on the date of opening of price bid.

10. Period of Validity of Bids

10.1 Bids shall remain valid for 90 days after the date of bid opening prescribed by the Purchaser. A bid valid for a shorter period shall be rejected by the Purchaser as non-responsive.

10.2 In exceptional circumstances, the Purchaser may solicit the Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing. A Bidder may refuse the request without forfeiting its EMD. A Bidder granting the request will not be required nor permitted to modify the bid.

10.3 Bid evaluation will be based on the bid prices without taking into consideration the above modifications.

D. Submission of Bids

11. Sealing and Marking of Bids

11.1 The outer envelope containing Techno commercial unpriced bid along with EMD & samples, if required, and priced bid shall be addressed to **Head, Mechanical Engineering** and shall indicate tender number and due date.

11.2 The inner envelope shall indicate the name and address of the bidder, tender number due date and contents i.e. "Techno commercial unpriced bid along with EMD" and "Priced bid".

11.3 If the outer envelope is not sealed and marked as required, the Purchaser will assume no responsibility for the bid's misplacement or premature opening.

12. Deadline for Submission of Bids

12.1 Bids must be received by the Purchaser at the address specified not later than the time and date specified in the Invitation for Bids. In the event of the specified date for the submission of Bids being declared a holiday for the Purchaser, the Bids will be received upto the appointed time on the next working day.

12.2 The Purchaser may, at his discretion, extend this deadline for submission of bids by amending the bid documents in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

13. Late/Delayed Bids

13.1 Any bid received by the Purchaser after the deadline for submission of bids prescribed by the Purchaser, pursuant to Clause 5 of invitation of bids will be rejected and/or returned unopened to the Bidder.

14. Modifications and Withdrawal of Bids

14.1 The Bidder may modify or withdraw its bid after the bid's submission, provided that written notice of the modification or withdrawal is received by the Purchaser prior to the deadline prescribed for submission of bids.

14.2 The Bidder's modification or withdrawal notice shall be prepared, marked and dispatched in a sealed envelope. A withdrawal notice may also be sent by telex or cable or fax but followed by a signed confirmation copy, post marked not later than the deadline for submission of bids.

14.3 No bid may be modified subsequent to the deadline for submission of bids.

14.4 No bid may be withdrawn in the interval between the deadline for submission of bids and the expiry of the period of bid validity specified by the Bidder on the bid form. Withdrawal of a bid during this interval may result in the Bidder's forfeiture of its EMD.

E. Bid Opening and Evaluation of Bids

15. Opening of Techno commercial unpriced Bids

15.1 The purchaser will open all techno commercial unpriced bids in the first instance.

16. Clarification of Bids

16.1 During evaluation of the bids, the purchaser may, at its discretion, ask the Bidder for clarification of its bid. The request for clarification and the response shall be in writing and no change in price or substance of the bid shall be sought, offered or permitted.

16.2 No Bidder shall contact the purchaser on any matter relating to its bid from the time of the bid opening to the time the contract is awarded. If the Bidder wishes to bring additional information to the notice of the University it should be done in writing.

16.3 Any effort by a Bidder to influence the purchaser in its decisions on bid evaluation, bid comparison or contract award decisions may result in rejection of the Bidder's bid.

17. Evaluation of Techno commercial unpriced Bid

17.1 Prior to the detailed technical evaluation, the purchaser will determine the substantial responsiveness of each bid. A substantially responsive bid is one, which conforms to all the terms and conditions of the Bidding Documents without material deviations.

17.2 The purchaser will reject a bid determined as not substantially responsive.

17.3 The bidders may be called for discussion and may be allowed to modify their technical bids to suit the organization's requirement. The idea is to arrive at a threshold level of acceptability above which all the bidders shall be treated on par. Those whose technical specifications do not reach the threshold level of acceptability shall be rejected as technically unsuitable. The price bids of the bidders who finally emerge as technically acceptable shall be opened, evaluated and the contract awarded to the lowest evaluated bidder.

17.4 The bidders short-listed by the purchaser based on evaluation of their technical bids may be called for detailed discussions with a team selected for the purpose, at a specified date, time and venue, if needed.

18. Opening of Priced Bids

18.1 The Purchaser will open the Priced Bids of only those bidders whose techno commercial bids have been found to be substantially responsive.

18.2 The priced Bids of the technically qualified bidders shall be opened by the tender committee.

19. Evaluation and Comparison of priced Bids

19.1 Arithmetical errors will be rectified on the following basis: If there is a discrepancy between words and figures, whichever is the higher of the two shall be taken as bid price. If the Vendor does not accept the correction of errors, its bid will be rejected

19.2 Bidders shall state their bid price for the payment schedule outlined in the Clause 14 of General Conditions of Contract. Bids will be evaluated on the basis of this base price. Bidders are, however, permitted to state an alternative payment schedule and indicate the reduction in bid price they wish to offer for such alternative payment schedule. The purchaser may consider the alternative payment schedule offered by the selected Bidder but it may not be binding on the purchaser.

19.3 The purchaser, at its option may ask some more bidders to match the rates of the lowest bidder for creating parallel suppliers.

20. Purchasers right to accept any bid and to reject any bid or all bids

20.1 The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or bidders or any obligation to inform the affected Bidder or bidders of the grounds for the Purchaser's action.

21 Award Criteria

21.1 Subject to Clause 19, the purchaser will award the Contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined as the best evaluated bid provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

22. Notification of Award

22.1 Prior to the expiration of the period validity, the purchaser will notify the successful Bidder in writing by letter or by fax, to be confirmed in writing by speed post or hand delivered letter, that its bid has been accepted.

23. Factors Affecting the Award of Supply

23.1 The bidder should have its own Contract support facilities. The support facilities should be fully owned and managed by the bidder.

23.2 Conformity with the Request for Bid/Tender required and conditions.

23.3 The assessment based on the response to Model Response Outline.

23.4 The assessment of the capability of the bidder to meet the terms and conditions.

23.5 The bidders must have executed similar orders, for which the bidder is quoting, as indicated in clause 1 for Govt./Semi-Govt./Autonomous Organizations.

23.6 The cost and the discount offered, if any.

24. Fall clause

24.1 The price quoted by the supplier should not be higher than the maximum retail price, if any, for the stores and the same shall not be higher than the price usually charged by the supplier for stores of the same nature, class or description to any other purchaser.

24.2 The price charged for the stores supplied under the contract by the supplier shall in no event exceed the lowest price at which the supplier sells the stores of identical description to any other person during the period till performance of all supply orders placed during the currency of the contract is completed. If at any time during the period the supplier reduces the sale price of such stores or sells such stores to any other person including his dealers at a price lower than the price chargeable under the contract, he shall forthwith notify such reduction or sale to the purchaser and the price payable under the contract for these items of stores supplied after the date of coming into force of such reduction or sale shall stand correspondingly reduced.

24.3 If it is discovered that the supplier has contravened the above conditions, then without prejudice to any other action which might be taken against him, it shall be lawful for the purchaser to (a) revise the price at any stage so as to bring it in conformity with sub-clause (i) above, or (b) to terminate the contract and purchase the items of stores at the risk and cost of the supplier and in that event the provisions of Clause 28 of General Conditions of Contract shall, as far as possible, be applicable or recover the loss.

25. Samples

25.1 All suppliers are requested to submit samples of items indicated in the schedule of requirements for each tender separately in a separate envelope along with the technical bid (where ever applicable).

GENERAL CONDITIONS OF CONTRACT

1. Definitions

1.1 In this Contract, the following terms shall be interpreted as indicated:

- (a) "The order" means the agreement entered into between the Purchaser and the Supplier including all the attachments and appendices and all documents incorporated as per notification of award.
- (b) "The Contract Price" means the price payable to the Supplier under the Contract for the full and proper performance of its contractual obligations;
- (c) "The Goods" means all the items, which the Supplier is required to supply to the Purchaser under the Contract;
- (d) "Services" means services ancillary to the supply of the Goods, such as transportation and insurance, and any other incidental services training and other obligations of the Supplier covered under the Contract;
- (e) "GCC" means the General Conditions of Contract contained in this section.
- (f) "The Purchaser" means the organization purchasing the Goods i.e BANARAS HINDU UNIVERSITY, VARANASI.
- (g) "The Purchaser's country" is India.
- (h) "The Supplier" means the individual or firm supplying the Goods and Services under this Contract.
- (i) "Day" means calendar day.

2. Application

2.1 These General Conditions shall apply to the extent that they are not superseded by provisions in other parts of the Contract.

3. Standards

3.1 The Goods supplied under this Contract shall conform to the standards mentioned in the Technical Specifications, and, when no applicable standard is mentioned, to the authoritative standard appropriate to the Goods' country of origin and such standards shall be the latest issued by the concerned Institution.

4. Use of Contract Documents and Information

4.1 The Supplier shall not, without the Purchaser's prior written consent, disclose the Contract, or any provision thereof, or any specification, plan, drawing, pattern, sample or information furnished by or on behalf of the Purchaser in connection therewith, to any person other than a person employed by the Supplier in performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance.

4.2 The Supplier shall not, without the Purchaser's prior written consent, make use of any document or information except for purposes of performing the Contract.

4.3 Any document, other than the Contract itself, shall remain the property of the Purchaser and shall be returned (in all copies) to the Purchaser on completion of the Supplier's performance under the Contract if so required by the Purchaser.

5. Patent Rights

5.1 The Supplier shall indemnify the Purchaser against all third-party claims of infringement of patent, trademark or industrial design rights arising from use of the Goods or any part thereof in India.

6. Submission of the bids.

6.1 All bids complete in all respect must reach the purchaser within the last date and time of receipt of bid. No extension shall be allowed for any reason what so ever. Late tenders/delayed bids and tenders received without earnest money etc. shall be rejected.

6.2 Tender documents are available for sale with the purchaser. Interested bidders may purchase the tender documents on payment of the cost there of. The purchaser shall not be liable for either non-receipt of the tender document or for delay in receipt of tender document.

7. Inspections and Tests

7.1 The Purchaser or its representative shall have the right to inspect and/or to test the Goods to confirm their conformity to the Contract specifications at no extra cost to the Purchaser.

7.2 The inspections and tests may be conducted on the premises of the Supplier or its subcontractor(s), at point of delivery and/or at the Goods final destination. If conducted on the premises of the Supplier or its subcontractor(s), all reasonable facilities and assistance, including access to drawings and production data shall be furnished to the inspectors at no charge to the Purchaser.

7.3 Should any inspected or tested Goods fail to conform to the specifications, the Purchaser may reject the goods and the Supplier shall either replace the rejected Goods or make alterations necessary to meet specification requirements free of cost to the Purchaser.

7.4 The Purchaser's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival at Project Site shall in no way be limited or waived by reason of the Goods having previously been inspected, tested and passed by the Purchaser or its representative prior to the Goods shipment.

7.5 Nothing in GCC Clause 7 shall in any way release the Supplier from any warranty or other obligations under this Contract.

8. Consequences of rejection

8.1 If in the event the stores are rejected by the purchaser at the destination and the supplier fails to make satisfactory supplies within the stipulated period of delivery, the purchaser will be at liberty to :

(a) Allow the supplier to resubmit the stores in replacement of those rejected, within a specified time without any extra cost to the purchaser or

(b) Reject the material, which shall be final and binding on the contractor.

(c) Procure the rejected materials of comparable quality from the open market/Govt. stores and the supplier shall be liable to pay the difference in price over the RC prices or get the amount adjusted from the outstanding bills of the supplier, if any or EMD.

9. Packing

9.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit.

9.2 The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements as shall be provided for in the Contract including additional requirements, in any subsequent instructions ordered by the Purchaser.

10. Delivery and Documents

10.1 The Supplier shall make delivery of the Goods within 12 days from the placement of purchase order in pursuance of the notification of award. The purchase order would be placed after assessing the requirements on quarterly basis. However, the supplier shall also arrange to execute all orders on priority basis which would be placed to meet any emergent requirements.

10.2 In case the purchaser decides to conclude parallel rate contracts, then the requirements would be split on different firms on equitable basis as per the discretion of the purchaser.

10.3 The delivery of Stores shall be affected at the premises of the University free of all delivery charges and within the stipulated time and as may be elucidated in the confirmed order, accompanied by a delivery challan. No extension of time for delivery of Stores shall normally be accorded.

Time and date of delivery – the essence of the contract: The time for and the date of delivery of the stores stipulated shall be deemed to be of the essence of the contract and delivery must be completed not later than the date(s) specified.

11. Insurance

11.1 The Goods supplied under the Contract shall be fully insured in Indian Rupees against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery. The insurance shall be obtained by the suppliers in an amount equal to 110% of the value of the goods from “warehouse to warehouse” (final destinations) on “all risks” basis including war risks and strikes.

12. Transportation

12.1 Where the Supplier is required under the Contract to transport the Goods within India defined as Project site, transport to such place of destination in India including insurance, as shall be specified in the Contract, shall be arranged by the Supplier, and the related cost shall be included in the contract Price.

13. Warranty

13.1 The Supplier warrants that the Goods supplied under this Contract are new, unused, of the most recent or current models and that they incorporate all recent improvements in design and materials unless provided otherwise in the Contract. The Supplier further warrants that all Goods supplied under this Contract shall have no defect arising from design, materials or workmanship or from any act or omission of the Supplier, that may develop under normal use of the supplied Goods in the conditions prevailing in India.

13.2 This warranty shall remain valid for 12 months after the Goods or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the Contract, unless specified otherwise.

13.3 The Purchaser shall promptly notify the Supplier in writing of any claims arising under this warranty.

13.4 Upon receipt of such notice, the Supplier shall with all reasonable speed, repair or replace the defective Goods or parts thereof, without any extra cost to the Purchaser.

13.5 If the Supplier, having been notified, fails to remedy the defect(s) within a reasonable period, the Purchaser may proceed to take such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.

14. Payment

14.1 The payment shall be made after inspection of the materials and satisfactory performance.

14.2 The Supplier's request(s) for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the Goods delivered and the Services performed, and by documents, submitted pursuant to GCC Clause 10, and upon fulfillment of other obligations stipulated in the contract.

15. Prices

15.1 Prices charged by the Supplier for Goods delivered and Services performed under the Contract shall not vary from the prices quoted by the Supplier in his bid.

16. Change Orders

16.1 The Purchaser may at any time, by written order given to the Supplier, make changes within the general scope of the Contract in any one or more of the following:

- (a) Drawings, designs, or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser;
- (b) The method of shipping or packing;
- (c) The place of delivery; and/or
- (d) The services to be provided by the Supplier.

16.2 If any such change causes an increase or decrease in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or delivery schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this clause must be asserted within thirty (30) days from the date of the Supplier's receipt of the Purchaser's change order.

17. Contract Amendments

17.1 Subject to GCC Clause 16, no variation in or modification of the terms of the Contract shall be made except by written amendment signed by the parties.

18. Assignment

18.1 The Supplier shall not assign, in whole or in part, its obligations to perform under the Contract, except with the Purchaser's prior written consent.

19. Subcontracts

19.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under this Contract if not already specified in the bid. Such notification, in his original bid or later, shall not relieve the Supplier from any liability or obligation under the Contract.

20. Delays in the Supplier's Performance

20.1 Delivery of the Goods and performance of the Services shall be made by the Supplier in accordance with the time schedule specified by the Purchaser as per GCC clause 10.

20.2 If at any time during performance of the Contract, the Supplier or its sub-contractor(s) should encounter conditions impeding timely delivery of the Goods and performance of Services, the Supplier shall promptly notify the Purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may, at its discretion, extend the Supplier's time for performance with or without liquidated damages, in which case the extension shall be ratified by the parties by amendment of the Contract.

20.3 Except as provided under GCC Clause 23, a delay by the Supplier in the performance of its delivery obligations shall render the Supplier liable to the imposition of penalty pursuant to GCC Clause 21, unless an extension of time is agreed upon pursuant to GCC Clause 20.2 without the application of liquidated damages.

21. Penalty

21.1 Subject to GCC Clause 23, if the Supplier fails to deliver any or all of the Goods or to perform the Services within the period(s) specified in the Contract, the Purchaser shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as penalty, a sum equivalent to 1% per week and the maximum deduction is 10% of the contract price of the delivered price of the delayed Goods or unperformed Services for each week or part thereof of delay until actual delivery or performance. Once the maximum is reached, the Purchaser may consider termination of the Contract pursuant to GCC Clause 22.

22. Termination for Default

22.1 The Purchaser may, without prejudice to any other remedy for breach of contract, by written notice of default sent to the Supplier, terminate the Contract in whole or part:

- (a) If the Supplier fails to deliver any or all of the Goods within the period(s) specified in the purchase order, or within any extension thereof granted by the Purchaser pursuant to GCC Clause 20; or
- (b) If the Supplier fails to perform any other obligation(s) under the Contract.
- (c) If the Supplier, in the judgment of the Purchaser has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

'For the purpose of this Clause:

"Corrupt practice" means the offering, giving, receiving or soliciting of any thing of value to influence the action of a public official in the procurement process or in contract execution.

"Fraudulent practice: a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition;"

22.2 In the event the Purchaser terminates the Contract in whole or in part, pursuant to GCC Clause 22.1, the Purchaser may procure, upon such terms and in such manner as it deems appropriate, Goods or Services similar to those undelivered, and the Supplier shall be liable to the Purchaser for any excess costs for such similar Goods or Services. However, the Supplier shall continue the performance of the Contract to the extent not terminated.

23. Force Majeure

23.1 Notwithstanding the provisions of GCC Clauses 20 & 21, the Supplier shall not be liable for imposition of liquidated damages or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.

23.2 For purposes of this Clause, "Force Majeure" means an event beyond the control of the Supplier and not involving the Supplier's fault or negligence and not foreseeable. Such events may include, but are not limited to, acts of the Purchaser either in its sovereign or contractual capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions and freight embargoes.

23.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

24. Termination for Insolvency

24.1 The Purchaser may at any time terminate the Contract by giving written notice to the Supplier, if the Supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy, which has accrued or will accrue thereafter to the Purchaser.

25. Termination for Convenience

25.1 The Purchaser, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.

25.2 The Goods that are complete and ready for shipment within 30 days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices.

26. Resolution of Disputes

26.1 The Purchaser and the supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.

26.2 If, after thirty (30) days from the commencement of such informal negotiations, the Purchaser and the Supplier have been unable to resolve amicably a Contract dispute, either party may require that the dispute be referred for resolution to the formal mechanisms as specified below. These mechanisms may include, but are not limited to, conciliation mediated by a third party, adjudication in an agreed national or international forum, and national or international arbitration.

26.3 In case of Dispute or difference arising between the Purchaser and a supplier relating to any matter arising out of or connected with this agreement, such disputes or difference shall be settled in accordance with the Arbitration and Conciliation Act, 1996.

27. Governing Language

27.1 The contract shall be written in English language. Subject to GCC Clause 28, English language version of the Contract shall govern its interpretation. All correspondence and other documents pertaining to the Contract which are exchanged by the parties shall be written in the same language.

28. Applicable Law

28.1 The contract shall be governed by the Law of Contract for the time being in force.

28.2 Irrespective of the place of delivery, the place of performance or place of payment under the contract, the contract shall be deemed to have been made at the place from which the acceptance of tender has been issued.

28.3 Jurisdiction of Courts: The courts of the place from where the acceptance of tender has been issued shall alone have jurisdiction to decide any dispute arising out of or in respect of this contract.

28.4 One month notice will be given by either party for termination of Contract during the tenure of Contract for breach of Clause or otherwise.

29. Taxes and Duties

29.1 Suppliers shall be entirely responsible for all taxes, duties, licence fees, octroi, road permits, etc., incurred until delivery of the contracted Goods to the Purchaser.

TENDER FORM
(Techno commercial unpriced Bid)xc
(On the letter head of the firm submitting the bid)
Tender No.....

To
The _____

Dear Sir,

1. I/We hereby offer to supply the items as listed in the schedule to this tender hereto/portion thereof as you may specify in the acceptance of Tender at the price given in the said Schedule and agree to hold this offer open for a period of 90 days from the date of opening of the tender. I/we shall be bound by a communication of acceptance issued by you.

2. I/We have understood the Instruction to bidders and Conditions of Contract in the form as enclosed with the invitation to the tender and have thoroughly examined the specifications quoted in the Schedule hereto and am/are fully aware of the nature of the goods required and my/our offer is to supply the goods strictly in accordance with the specifications and requirements.

3. A crossed Bank Draft in favour of the Registrar, BHU for Rs.
(Rupees.....only) as Earnest Money is enclosed. The Draft is drawn on
.....Bank payable at Varanasi

4. The following have been added to form part of this tender.

- (a) Samples of items quoted for, as per instructions provided in the schedule of requirement.
- (b) Schedule of requirements, quoting the make only duly signed and stamped.(without indicating price)
- (c) Income Tax clearance certificate.
- (d) Copy of last audited balance sheet.
- (e) Copy of Valid Central/State sales tax registration certificate.
- (f) Copy of relevant major purchase orders valuing more than Rs. 20000/- executed during last two years for Govt. Deptts., PSUs & Central Autonomous bodies..
- (g) Proof of manufacturing Unit, dealership certificate/general order suppliers .
- (h) Statement of deviations from financial terms & conditions, if any.
- (i) Any other enclosure. (Please give details)

5. We undertake to execute all orders which have been placed to meet emergent requirements on priority basis.

6. Certified that the bidder is:

A sole proprietorship firm and the person signing the bid document is the sole proprietor/constituted attorney of the sole proprietor,

Or

A partnership firm, and the person signing the bid document is a partner of the firm and he has authority to refer to arbitration disputes concerning the business of the partnership by virtue of the partnership agreement/by virtue of general power of attorney.

Or

A company and the person signing the document is the constituted attorney.

(NOTE: Delete whatever is not applicable. All corrections/deletions should invariably be duly attested by the person authorized to sign the bid document).

7. We do hereby undertake, that, until a formal notification of award, this bid, together with your written acceptance thereof shall constitute a binding contract between us.

Yours faithfully,
(Signature of bidder)

Dated this day of _____

Address:.....

.....

.....

Telephone:_____

FAX_____

E-mail_____

Company seal

Tender Form

(Priced Bid)

(On the letter head of the firm submitting the bid document)

To _____
The _____

Ref: Tender No Dated-----
Sir,

Having examined the bidding documents and having submitted the techno commercial unpriced bid for the same, we, the undersigned, hereby submit the priced bid for supply of goods and services as per the schedule of requirements and in conformity with the said bidding documents.

We hereby offer to supply the Goods/Services at the prices and rates mentioned in the enclosed schedule of requirement.

We do hereby undertake, that, in the event of acceptance of our bid, the supply of Goods/Services shall be made as stipulated in the schedule of requirement and that we shall perform all the incidental services.

The prices quoted are inclusive of all charges net F.O.R University. We enclose herewith the complete Financial Bid as required by you. This includes:
Price Schedule as per schedule of requirement.
Statement of deviations from financial terms and conditions.

We agree to abide by our offer for a period of 90 days from the date fixed for opening of the bid documents and that we shall remain bound by a communication of acceptance within that time.

We have carefully read and understood the terms and conditions of the bid document and we do hereby undertake to supply as per these terms and conditions. The Financial Deviations are only those mentioned in the statement of deviations from financial terms and conditions.

Certified that the bidder is:

A sole proprietorship firm and the person signing the bid document is the sole proprietor/
constituted attorney of sole proprietor,

Or

A partnership firm, and the person signing the bid document is a partner of the firm and he has authority to refer to arbitration disputes concerning the business of the partnership by virtue of the partnership agreement/by virtue of general power of attorney,

Or

A company and the person signing the bid document is the constituted attorney.

(NOTE: Delete whatever is not applicable. All corrections/deletions should invariably be duly attested by the person authorised to sign the bid document.)

We do hereby undertake, that, until a formal notification of award, this bid, together with your written acceptance thereof, shall constitute a binding contract between us.

Dated this day of _____

Details of enclosures

Signature of Bidder

Full Address:
Telephone No.
Fax No.
E-mail:

COMPANY SEAL

Checklist for Bid/Tender Submission

The following check-list must be filled in and submitted with the bid document:

Pre-qualification Bid

- | | |
|--|--------|
| 1. Was the bid document issued to you? | Yes/No |
| 2. Have you attached the techno commercial unpriced bid form duly filled in appropriately ? | Yes/No |
| 3. Have you attached a copy of the last audited balance sheet of your firm | Yes/No |
| 4. Have you attached the details of the income tax clearance certificate, proof of manufacturing unit/ dealership letter/general order suppliers and copy of Central/State sales tax registration certificate(as per clause 1.2 of ITB) | Yes/No |
| 5. Have you attached the copies of relevant work orders from Govt. Deptt/PSUs and Central Autonomous Bodies.(as per clause 1.2 of ITB) | Yes/No |
| 6. EMD: Have you submitted EMD asked for- | Yes/No |
| 7. Have you submitted samples of all items indicated in the respective schedule of requirements. | Yes/No |
| 8. Have you enclosed the schedule of requirement indicating the make offered without indicating the pricing components along with the techno commercial unpriced bid (as per clause 6 of ITB). | Yes/No |
| 9. Have you submitted the bids both techno commercial unpriced and priced bid separately for each tender? | Yes/No |
| 10. Have you enclosed the statement of deviations from financial terms and conditions, if any? | Yes/No |
| Priced Bid: | |
| 1. Have you signed and attached the priced bid form. | Yes/No |
| 2. Have you attached the schedule of requirements duly priced | Yes/No |

FORMAT OF BANK GUARANTEE FORM

1. This guarantee should be furnished by a Nationalised Bank / scheduled Bank, authorised by RBI to issue a Bank Guarantee.
2. This bank guarantee should be furnished on stamp paper of Rs. 100/-
3. The stamp paper should have been purchased in the Name of the Bank executing the Guarantee.
4. In the case of foreign bidder the B.G may be furnished by an international reputed bank acceptable to the PURCHASER countersigned by any Nationalized / Scheduled Bank in India authorized by Reserve Bank of India.

DATE

BANK GUARANTEE NO:

Ref :

To
Banaras Hindu University
Varanasi
Dear Sirs,

In accordance with your 'Invitation to Bid' under your Tender No:.....
M/S:..... herein after called the Contractor/supplier, with the following Directors on their Board of Directors / partners of the firm.

1..... 2.....
3..... 4.....

agrees for the contract/supplies.

As an irrevocable Bank Guarantee for an amount of Rs.....(in words and figures) valid for days from is required to be submitted by the Contractor/Supplier which amount is liable to be forfeited by the purchaser in the event of 1) the withdrawal or revision of the offer by the Bidder as a condition within the validity period. (2) non-acceptance of the Letter of Intent / purchase order by the bidder when issued within the validity period. (3) failure to furnish the valid contract performance guarantee by the bidder within one month from the receipt of the purchase order and (4) on the happening of any contingencies mentioned in the bid documents such as

We, the Bank at..... having our Head office at(Local address) Guarantee and undertake to pay immediately on first demand by Banaras Hindu University the amount of..... (in figure and words) without any reservation., protest, demur and recourse. Any such demand made by the

Purchaser shall be conclusive and binding on the Bank irrespective of any dispute or difference raised by the purchaser.

The guarantee shall be irrevocable and shall remain valid up to
..... (This date should be 6 months after execution of the order). If
any further extension of this guarantee is required the same shall be extended to such required period (not
exceeding one year) on receiving instruction from
M/s.....on whose behalf this guarantee is
issued.

In witness whereof the Bank, through its authorised officer has set its hand and stamp on this
..... day of at
witness (Signature)

WITNESS

(signature).....

Name in (Block letters)

Designation

(Staff Code No.).....

(Bank's common Seal)

Official address:

Attorney as per power of Attorney No.

Specifications of the FMS and RMS System

[A]Automatic Storage & retrieval System

Micro ASRS BAY STORAGE RACK –

01 No

A sloped stack of 6 storage bays

- Table-mounted storage unit
- 12 storage cells on 3 tiers
- Black anodized aluminum
- 12 part carrying trays and pin sets for creating jigs.

[B] CNC Mill/Lathe for Machine Tending System [CNC Mill, CNC Lathe with a Robot]

TECHNICAL SPECIFICATIONS

1. FIVE AXES EDUCATIONAL ROBOTIC SYSTEM – 01 NOS.

Robotic Mechanical Arm

Mechanical Structure:	Vertically articulated; open frame.
Degrees of Freedom:	5 rotational axes + gripper.
Payload Capacity:	at least 2 kg
Axis Range:	
Axis 1: Base rotation:	At least 300°.
Axis 2: Shoulder rotation	At least +130° / -30°.
Axis 3: Elbow rotation:	At least +130°.
Axis 4: Wrist pitch:	At least +130°.
Axis 5: Wrist roll:	At least ± 570°
Reach:	at least 600 mm with gripper.
Speed:	min. 700 mm/sec
Repeatability:	± 0.18 mm or better
Homing:	Microswitch.
Gripper:	Servo motor, 2-finger parallel.

Robot Controller

Communication:	USB type A cable connection to PC.
Inputs/Outputs:	At least 8 digital inputs; 4 analog inputs; At least 8 digital outputs (4 relay, 4 open collector); 2 analog outputs.
Micro controller:	Full featured 32-bit Micocontroller
Axis Servo Control:	Real-time; PID; PWM.
Position Definition:	Absolute and Relative
Trajectory Control:	Joint, Linear, and Circular.
Speed Definition	At least 10 speed settings; travel time definition.
Control Parameters:	at least 150 user-accessible parameters.
Safety Features:	Emergency switch; short-circuit protection; automatic shut-down upon detection of impact, overheating, PC failure or

communication error.

2. TEACH PENDANT – 01 NO

Hand-held Teach Pendant capable of performing following functions:

- manual movement of robot axes and peripheral accessories
- moving either one axes (joint) at a time or along X, Y or Z axis.
- various move to position commands
- position recording
- position insertion and deletion
- speed setting

It should be equipped with a dead-man switch and emergency push-button.

Accessories and cables

Allen wrenches and installation hardware.

Dust covers for mechanical arm and controller.

Necessary cables and power cable

3. 1. LINEAR SLIDEBASE FOR MOUNTING THE ROBOT- 01 NO

The linear slidebase should serve to mobilize the robot and increase its work envelope. DC servo motors with belt-drive controlled by axis driver in robot controller. Smooth, quiet and accurate motion.

- Overall travel: 1000 mm
- Travel velocity: 500 mm/sec
- Repeatability: ± 0.1 mm

4. ROBOTIC WORKCELL SIMULATION & CONTROL SOFTWARE, SINGLE LICENSE - 01 No

- It should be possible to run the same program on-line on the robot and simulatneously view it in 3D simulation.
- It should be possible to design a robotics workcell (including CNC machines, feeders, storage devices, sensors, conveyor belt, rotary table, XY table, linear slidebase, etc.) from an exhaustive library.
- It should be possible to design robotics welding workcells
- Impact of robot with other workcell devices should automatically stop the program.
- It should be possible to enter XYZ coordinates for position.
- Position list should display all recorded positions and their coordinates
- Real-time, continuous display of robot and peripheral positions (encoder values and XYZ coordinates), I/Os, home switches' status, joint angles, command value (PWM) and position error
- Dynamic charting of encoder values, PWM and position error.

5. 12-BAY STORAGE RACK – 01 No

A sloped stack of 6 storage bays

- Table-mounted storage unit
- 12 storage cells on 3 tiers
- Black anodized aluminum
- 12 part carrying trays and pin sets for creating jigs.

6. CNC MILLING MACHINE – 01 No

A. PC-controlled (3)/(4)-axis (NC Dividing Head) Milling Machine for universal CNC Training With 8-station tool turret, Minimum- lubrication unit, ready for integration into CIM & fitted with automation components for CIM integration.

Must be programmable through Control software like:

Control Systems

SIEMENS 810D/840D
SIEMENS 810/820
GE FANUC Series 21
GE FANUC Series 0
HEIDENHAIN TNC 426/430
FAGOR 8055 MC
PAL
WinCAM

Operation: through Control keyboard equal to the industrial control units, Incl. connection cable USB, fitted with **TFT- Display**, display cable, power supply and attaching parts.

With **Control keyboard – key module**,

SIEMENS 810
SIEMENS 820
SIEMENS 810D/840D
GE FANUC Series 0
GE FANUC Series 21
EMCOTRONIC TM02
HEIDENHAIN TNC 426/430
PAL
FAGOR 8055 MC

B. Technical Data of the Machine

Working area should not be less then dimensions given below.

Working area

Longitudinal travel (X-axis) [mm] 190 (7,5 inch)
Cross travel (Y-axis) [mm] 140 (5,5 inch)
Vertical travel (Z-axis) [mm] 260 (10,2 inch)
Effective Z-stroke, with / without turret [mm] 120/190 (4,7/7,5 inch)
Distance spindle nose – table surface [mm] 77 – 337 (3,0-13,3 inch)

Milling table

Clamping surface (L x W) [mm] 420 x 125 (16,5 x 4,9 inch)
Maximum table load [kg] 10
2 T-slots acc. to DIN 650 [mm] 11 (0,4 inch)
T-slots distance [mm] 90 (3,5 inch)

Milling spindle

Bearing type Roller bearing

Tool system

Tool magazine Pick-up system with swivel arm on the left of the milling head placed; blow out facility

System drive / expiry : electr., mech.

Proceeding speed tool turret trick plate [m/min] 10 (393,7 inch/min)

Tool mounting similar DIN 2079 SK30

Draw bolts Works standard

Tool clamping automatic

Number of tool stations 8

Maximum tool weight [kg] 1

Maximum tool diameter with / without turret [mm] 40 / 60 (1,6 / 2,4 inch)

Details for 4th axis

Dividing head (without chuck)

Dividing head Ries RSC-20 with casing and mounting pieces for Montage on the Milling table

- continuously adjustable
- Nominal moment: 42 Nm
- Fast traverse: 8 min-1
- Accuracy of indexing: +/- 100"
- Repeating accuracy: +/- 15"
- Spindle height: 48 mm
- Total height: 95 mm

Tailstock for dividing head

- Center height: 48 mm
- Connection cone MK 1
- Displace range: 20 mm
- Max. workpiece length: 100 mm

Live center MT1 for dividing head

3-jaw lathe chuck dividing head

Chuck diameter 74mm, throat 15 mm with chuck wrench, incl. 1 set inside/outside graduated jaws

Main drive

Asynchronous AC motor, power [kW] 0,75

Speed range (stepless) [U/min] 150 - 3500

Maximum torque [Nm] 3,7

Speed per minute with option high speed spindle [U/min] 14.000

Feed drives

3 phase step motor in X/Y/Z axis with resolution of [mm] 0,0005 (0,00002 inch)

Feed rate and rapid traverse in X/Y/Z axis [m/min] 2 (78,7 inch/min)

Middle positioning variation acc. to VDI 3441 in X, Y/Z [mm] 0.006 / 0.008 (0,0002 / 0,0003 inch)

Maximum feed force X/Y/Z [N] 800 / 1000

Lubrication system

Guideways oil lubrication

Main spindle bearing lifetime grease lubrication

Electrical connection

Voltage supply (adjustable) 1/N/PE [V] 115/230

Admissible voltage fluctuation [%] +5/-10

Frequency [Hz] 50/60

Connection value [kVA] 0,85

Maximum pre-fusing of machine [A] 12

Safety devices

Fully enclosed working area, axis limit switch door limit switch, emergency-off switch

Safety category 3

Step motor drive with brake At tool turret

Procedures with the tool turret only with closed door, without setting function

Machine acceptance

Works standard similar DIN 8615

Safety rules/norms

Acc. to EEC-rules / acc. to CE

DOCUMENTATION:

Machine description

Software manual

Electrical documentation

Training manuals

(7) CNC LATHE MACHINE – 01 No

A. PC-controlled slant-bed lathe for the universal CNC education. ready for integration into CIM & fitted with automation components for CIM integration.

Must be programmable through Control software like:

Control Systems

SIEMENS 810D/840D

SIEMENS 810/820

GE FANUC Series 21

GE FANUC Series 0

FAGOR 8055 TC

CAD/CAM software

Operation: through Control keyboard equal to the industrial control units, Incl. connection cable USB, fitted with **TFT- Display**, display cable, power supply and attaching parts.

With **Control keyboard – key module**,

SIEMENS 810

SIEMENS 820

SIEMENS 810D/840D

GE FANUC Series 0

GE FANUC Series 21

FAGOR 8055 TC

B. Technical data of the machine

Working area should not be less then dimensions given below.

Swing over bed [mm] \varnothing 130

Swing over cross slide [mm] \varnothing 60

Max.machining diameter (chuck parts with tailstock) [mm] \varnothing 52

Max. parts length [mm] 215

Travel

Travel in X-axis [mm] 48

Travel in Z-axis [mm] 236

Main spindle

Spindle nose according factory standard

Spindle bore [mm] \varnothing 16

Chuck diameter [mm] 74

Hole to chuck [mm] \varnothing 15

Speed range [rpm] 120-4000

Mechanical spindle speed 2

Max. torque [Nm] 14

Main drive

AC-motor, power [W] 750

Speed range [rpm] 1400

Tool turret (Important)

Number of tool stations 8

Tool holding inside / outside 4 / 4

Tool section for square tools [mm] 12 x 12

Shank diameter for boring bars [mm] \varnothing 10

Feed drives

3-phase step motor with resolution [mm] 0,0005

Rapid traverse in X / Z [m/min] 2

Feed thrust in X / Z (stepless adjustable) [m/min] 0 - 2

Feed power in X / Z [N] 1000

Positioning variation according VDI 3441 in X [mm] 0,008
Positioning variation according VDI 3441 in Z [mm] 0,008

Tailstock

Quill stroke [mm] 35
Quill diameter [mm] 22
Internal taper MT 1

Lubrication system

Guide ways Oil
All other lubrication parts Grease

Power supply

Voltage (reversible) 1/N/PE [V] 115/230
Admissible voltage fluctuations [%] +5/-10
Frequency [Hz] 50/60
Connected load value of the machine [kVA] 0,85
Max. main fuse for the machine [A-slow] 12

Safety equipment

Machine full covered, axis limit switch, door limit switch, emergency off switch according CE standard

Machine acceptance

Works standard similar DIN 8605

DOCUMENTATION:

Machine description
Software manual
Electrical documentation
Training manuals

[C] Assembly and Quality Control Stations

1. MACHINE VISION SYSTEM – 01 No

The Vision system should be used for Quality Control Applications. It should also be possible to guide the robot to pick up objects without giving the X & Y co-ordinates.

Color USB Camera

- Interface: Universal Serial Bus port
- Power: Supplied by USB port
- Image Sensor: Progressive Scan CCD type
- Effective Pixels: 640x480
- Field of View: at least 40 degrees
- Focus Distance: 1 inch to infinity
- Cable Length 3 meters
- Frame Rate: Up to 30 fps for full-motion video

Still Images

- Resolution: 640x480 (VGA), 24-bit (16.8 million colors)
- File Formats: .jpg, .bmp, .fpx

Video

- Resolution: 640x480 (VGA) Captured;
320x240 (VGA) Displayed
24-bit (16.8 million colors)
- File Formats: .avi, .ivs

Software

- **User Interface and Image Manipulation**
 - It should be possible to write control scripts using custom dialog boxes
 - It should display color and monochrome images in a variety of predefined or custom formats
- **Image Processing Tools**
 - 3 colors histogram (display as bar, line or data)
 - Extract band operation.
 - Filters: Predefined (Erode, Dilate, Open, Close, etc.) and User defined
 - Threshold: (Band reject, Band pass, Low pass, High pass)
 - Fast Fourier transformations
 - Define and process non-rectangular regions of interest
- **Image Analysis Tools**
 - Color image analysis
 - Pattern matching (with mask and rotate operations)
 - Blob analysis
 - Part identification by blob statistics
 - Calibration (compensation for aspect ratio, rotation and other spatial distortion)
 - Measurements (distance, angle, and area measurements with sub-pixel accuracy; measurements in real world units)
 - Automatic movement detection.

2. ACCESSORIES

A. GRAVITY PARTS FEEDER – 2 NOS.

- Adjustable front leg support: 140 mm – 200 mm
- Adjustable rear leg support: 220 mm – 300 mm
- Slide angle: variable, 0 – 40 deg
- Slide width: variable, 25 mm – 100 mm
- Adjustable end stops on guide rails.
- Part-sensing microswitch with I/O connecting leads at part pick-up position

[D] Closed loop Conveyor with Pallet Tracking Machine/ Linear Conveyor with proximity Sensor 01 nos

- [1] Conveyor with continuously moving belt to transport parts/ temples carrying pallets. Pallets are stopped at the conveyor stations with pallet stop devices where temples and parts are loaded/ unloaded at conveyor. Modular conveyor components can be configured to meet specific requirements and requirement. Conveyor Dimensions Length 10 meters or above

(2) LINEAR CONVEYOR WITH PROXIMITY SENSOR – 01 No

- Construction: Metal base, heavy duty PVC belt.
- Dimensions (min.) L=80 mm, W=100 mm
- Controlled by axis driver in robot controller via software.
- Adjustable side supports should enable tilting of conveyor up to 5° angle.
- Variable travel speed
- Proximity Sensor with 15 mm detection distance

B. PARTS TRAY – 2 NOS.

Parts Tray for palletizing tasks. Different size pins should be available which may be set into peg holes on the tray to create jigs for holding objects of different shapes and sizes.

- Peg holes for positioning pins
- Dimensions: approx. 250 mm x 250 mm

- At least 25 pins (different sizes and shapes)

[E] CIM software

A. INTEGRATION PACKAGE – 2 NOS

B. FMS SIMULATION AND CONTROL SOFTWARE, SINGLE USER LICENSE – 1 No

- **Integration of Systems and Technologies**
 - It should support numerous elements and manufacturing processes.
 - Material storage and feeding (storage cells, feeders, palletizing racks).
 - Material handling (robots, slidebases, positioning tables, vises, end effectors and tool changers).
 - Automated manufacturing and fabrication (assembly, glue dispensing, screwdriving, grinding/deburring).
 - CNC machining (turning, milling, automatic tool changers).
 - Identification, detection and tracking (sensors, switches).
 - Quality control (machine vision, electronic calipers).
- **Open Software Architecture**
 - Object oriented technology should enable user modifications and integration with other applications.
 - Interfaces with a variety of machines and robots by means of device drivers. Device drivers should be supplied with the system.
 - It should be possible to interface it with third-party software tools such as MRP, ERP, CAD, CAM, SQC (statistical quality control, CRM (customer relationship management), PDM (product data management).
 - It should store all data in standard industrial database format, allowing easy access and manipulation on any level. It should be possible to read the data files by any Windows application (e.g., Excel, Access, MS-SQL) and exported to any other application.
- **Internet Access**
 - There should be provision for access of the FMS software via the Internet and allow users to monitor FMS cell operations in real time from remote locations.
 - It should be possible to operate the system using ISRO's edusat based LearnMate Live platform in both synchronous and asynchronous modes.
- **Real-Time Communication**
 - Multi-level, hierarchical communication network design, based on commonly used industrial communication networks; it should allow user to practice and understand different communication networks and protocols.
 - It should use TCP/IP protocol for real-time communication between the FMS control station and device drivers: LAN (Microsoft, Novell or any other Windows-compatible network)
 - It should use additional communication protocols: RS232 (connecting PCs to machine and robot controllers); I/Os (connects external inputs/outputs to machine and robot controllers)
- **Dynamic 3D Graphic Simulation**
 - Fully functional, dynamic 3D simulation module.
 - It should accurately simulate operations and movements of machines, robots and peripheral axes, including components such as safety shields, chucks and spindles.
 - It should accurately simulate part movement and manipulation, including supply of parts from storage cells and feeders.
 - It should be possible for the user to define the simulation speed.
- **FMS Cell design for simulation**
 - User should be able to design, create and modify FMS cells and components.
 - Object library should include: robots; CNC machines; peripheral axis devices (e.g., conveyor belt, linear slidebase, rotary table); positioning devices (e.g., jigs, XY tables), quality control devices (e.g.,

machine vision, calipers), sensors and I/O devices; storage devices and feeders; tables, workbenches, computers.

➤ **Data Acquisition and Visualization**

- **Online 3D graphic tracking** should show movement of robots, machines, parts and other FMS elements in a dynamic simulation of the shop floor.
- **Gantt charts** should present planned and actual scheduling of manufacturing processes.
- **Status views** should allow user to track production through various screens that display data such as manufacturing orders; status of storage locations; current activity of all machines, robots and devices; status of pallets; log of all transmitted messages, etc.
- **Report generator** should let user view and print at least ten types of predefined reports (e.g., machines, ASRS contents, manufacturing orders), or an unlimited number of own user-defined reports using Crystal or other report generating software.
- All data should be written and stored in standard industrial database format to enable easy access, manipulation and use by any software application.

➤ **Advanced (MES) Operations**

- It should enable optimization according to specific requirements, such as minimum price, minimum time, maximum quality. User should be able to alter the manufacturing process by adjusting the parameters used for part dispatching and machine queues.

[F] Local Items

1. Computers suitable for above CIM system
2. Tables as needed
3. Chairs as needed