

BHARAT HEAVY ELECTRICALS LIMITED
HEEP: HARDWAR-249 403 (UA)
Fax: 01334-223948/226462, Phone: 285291
E-mail: asanyal@bhelhwr.co.in

No. Cap/OT/06

Date: 20th Dec.'06

OPEN TENDER (EXPRESSION OF INTEREST)

1. Sealed tenders (expression of interest) with the Tender No. and opening date clearly super scribed on the cover are invited from the manufacturers for the supply of the following items:-
2. Last date for taking tender documents and opening of tenders is indicated against each tender. Tenders will be received up to 1.45 P.M. on opening date and opened on the same day at 2.00 P.M. in the Tender Room.
3. Intending vendors must remit the tender fee of Rs. 2,000.00 for indigenous supplies (equivalent foreign currency \$ 50.00 / € 40.00) from foreign vendors against each tender along with the requisite EMD in the form of bank draft while submitting the tender documents as detailed in "Instruction to Bidders", after down loading from this web site.
4. BHEL will not be responsible for any type of postal delay / incomplete information from vendor.
5. Other terms and conditions will be as per tender documents.

Sl. No.	Tender No.	Description of Equipment	Qty. (Nos.)	Last date to get from BHEL	Opening date
1.	C6410/6/6198T	CNC Gantry Milling Machine (as per enclosed specification)	01	09.01.07	10.01.07

(A. Sanyal)
DGM (Capital Purchase)



BHARAT HEAVY ELECTRICALS LIMITED
HEEP HARIDWAR INDIA-PIN 249403
FAX NO: 0091 1334 226462/223948
PHONE NO: 0091 1334 285291

Enq. No.: C6410/6/6198T

Date of issue: 20th Dec.'06
Due Date: 10th Jan.'07

M/S.....

.....

Sub: Tender Enquiry No..

Dear Sir,

We are pleased to invite Expression of Interest., strictly as per enclosed terms and conditions and instruction to bidders, in sealed covers for the under mentioned equipment/systems.

S.N.	Description	Qty.	Delivery Required	EMD (Earnest Money Deposit)
1.	CNC Gantry Milling Machine as per enclosed Specifications	01	28.02.2009	Rs. 1,00,000.00/- (One lac only or equivalent Foreign currency)

Please submit your Techno-Commercial offer only for the above requirement subject to our terms and conditions. Your offer should reach us on or before the due date by 1.45 PM.

Bids shall be opened of those vendors **ONLY AFTER ENSURING PROOF OF EMD AND TENDER FEE (PLEASE SUBMIT SEPARATE DRAFTS FOR EMD AND TENDER FEE {drawn in favour of BHEL Hardwar} IN ANOTHER ENVELOPE SUPERSCRIBED WITH BOLD LETTERS "EMD & TENDER FEE")** at 2 PM on the due date in the presence of authorized representatives of the bidders who may like to be present. The authorized representative should bring authority letter from their parent company (Manufacturer) for attending the bid opening. All Govt. of India / PSU / State Govt. entities are exempted from submission of EMD. Purchase preference will be given to CPSE s as per GOI notification no. DPE/13(12) 2003-Fin. Dated 26th Oct'04.

KINDLY READ "INSTRUCTIONS TO BIDDERS", QUOTATION NOT IN ACCORDANCE WITH THE ABOVE INSTRUCTIONS ARE LIABLE TO BE DISQUALIFIED AND IGNORED.

Thanking You,
Yours Faithfully,
For & ON BEHALF OF BHEL, HARDWAR

(A. Sanyal)
DGM (Purchase Capital)

INSTRUCTIONS TO BIDDERS FOR OPEN TENDER **(Expression of Interest)**

Only those bids will be opened which has been submitted with requisite EMD & tender fee.

1.0 The tenders shall be submitted as Techno -Commercial Bid along with vendor evaluation form as described below on or before the due date.

- **The Quotation should be from the Principal / Original Manufacturer, failing which the quotation is likely to be ignored.**
- Any corrections / amendments shall be properly & fully authenticated with signature.

1.1 TECHNO-COMMERCIAL BID shall comprise of following documents:

- a) Complete Technical offer in TWO sets (one original + one copy).
- b) Catalogue of the Equipment,
Complete reference of the past supply of equipment for the same or similar specification giving details of customer with Name of the contact person, Fax no, phone no, E-mail if available.
- c) General Terms & Conditions as per **Annexure-I**
- d) Acceptance of commercial terms by vendor as per **Annexure II**.
- e) Deviation with reference to specification to be laid down on separate sheet.
- f) Validity of offer should be at least 180 days from tender opening.
- g) Quality plan to be submitted on the prescribed format as per BHEL Quality requirements for approval, Quality plan should enclose vendor's own standard, test procedures, list of sub vendors for Bought out items cross-referred, if any.
- h) Acceptance to submit Security Deposit and Performance Bank Guarantee as per enclosed format **Annexure-III**.
- i) Warranty 24 months from commissioning of the equipment unless other wise specified in the technical specifications.
- j) The rating of the company quoting for this tender from a third party (independent agency) preferably by M/S Dun and Bradstreet should be submitted. (DUN NUMBER), however this is not mandatory.
- k) Any additional documents (please specify).
- l) Consortium Bank List is at **Annexure-IV**. Bank Guarantees necessarily to be submitted through any of them.

The VREF duly filled up will be assessed for manufacturing capability, quality systems being followed, organizational soundness and financial worthiness.

2.2 The techno-commercial part and part containing vendor Registration/ evaluation form will be opened on the date and time specified in the covering letter, in the presence of those tenderers who wish to attend.

2.3 BHEL reserves the right to open the price bid (part-II) along with the opening of techno-commercial offer at its option and in that case vendor will be informed accordingly.

The decision to go for reverse auctioning or processing through supplementary bid will be solely at the discretion of BHEL management

3.0 MARKING OF ENVELOPE:

3.1 The following shall be subscribed on the envelopes:

1. EMD AND TENDER FEE. : is enclosed
2.
 1. TENDER NO. AND ITEMS DESCRIPTION.
 2. DUE DATE FOR OPENING.
 3. "TECHNO-COMMERCIAL BID"
 4. VENDOR REGISTRATION FORMS ENCLOSED

Note: No price bid to be submitted along with this offer.

3.2 Envelopes not marked as above are liable to be ignored and will not be opened.

4.1 Tenders when finalized shall be in the name of the bidder only and change of name during tender evaluation (without certificate from registrar of company) and after submission of the tender is liable to make the offer ineligible for participation.

4.2 All test certificates / Guarantee certificates to be submitted in TRIPLICATE prior to despatch of materials for review and acceptance by BHEL.

IN CASE YOU ARE NOT MAKING AN OFFER AGAINST THIS ENQUIRY, THEN PLEASE ARRANGE TO SEND A LETTER OF REGRET IF YOU HAVE COLLECTED THE TENDER DOCUMENTS FROM BHEL / HAVE RECEIVED NIT AGAINST THIS TENDER.

Thanking You,

Yours faithfully,
For & on behalf of BHEL, Hardwar.

(A. Sanyal)
DGM (Capital Purchase)

GENERAL TERMS AND CONDITIONS OF RA

Against this enquiry for the subject item /system with detailed scope of supply as per enquiry specifications, BHEL may resort to “REVERSE AUCTION PROCEDURE” i.e., ON LINE BIDDING ON INTERNET.

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.
3. BHEL will inform the vendor in writing in case of reverse auction, the details of Service Provider to enable them to contact & get trained.
4. Business rules like event date, time, Start price, bid decrement, extensions etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the Compliance form in the prescribed format (provided by Service provider) before start of Reverse auction. Without this, the vendor will not be eligible to Participate in the event.
6. BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at “Total Cost to BHEL” like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the vendor to enable them to fill-in the price and keep it ready for keying in during the Auction.
7. Reverse auction will be conducted on scheduled date & time.
8. At the end of Reverse Auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to Fax the duly signed Filled-in prescribed format as provided on case-to-case basis to BHEL through Service provider within 24 hours of Auction without fail.
10. Any variation between the on-line bid value and the signed document will be considered as sabotaging the tender process and will invite disqualification of vendor to conduct business with BHEL as per prevailing procedure.
11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL’s standard practice.

Annexure-II

TENDER NO. SL. NO.	DESCRIPTION	VENDOR'S CONFIRMATION
1) <u>Payment terms:</u>	80% of the material cost to be paid against delivery / dispatch documents. Balance 20% of material cost and E&C and proving charges will be paid after satisfactory erection & Commissioning. (Through Bank for Indigenous & L/C in case of Import).	
NOTE:		
a) As per payment terms, minimum 20% will be released by BHEL after successful erection, commissioning and job proving. b) Further this 20% will be released against submission of performance bank guarantee valid for entire warranty period from the date of commissioning. c) The security deposit is to be as per the tender condition.		
Loading on payment terms if not agreed by vendor will be as follows: Loading: Advance amount, if any (Amount – X) 1.5% per month for the quoted delivery period for the amount 'X' Payment at the time of dispatch against shipping/dispatch documents (Amount Y): "1.5% per month for the amount X+Y exceeding 80% of contract value i.e. 1.5% of (X+Y-0.8Z) where Z is the contract value. As such loading of 6% will be done for imported and 3% for indigenous items."		
In case any bidder does not accept any of the condition at (a) to (c) above then, their offer is likely to be rejected by BHEL and technical bid will not be processed, and no correspondence in this regards will be entertained		
1.2 <u>P.B.G. TERMS:</u> Performance Bank Guarantee to be submitted on the prescribed format equal to the value of 10% of the total order value valid WARRANTY / GUARANTEE agreed period. This bank guarantee in the format to be prescribed by BHEL shall have to be submitted before release of last balance payment.		
1.3 <u>CURRENCY OF PAYMENT:</u> (Euro / Dollar / CHF etc.)		
1.4 For indigenous supply the currency shall be Indian Rupees.		

<p>1.2 SUPERVISION CHARGES: For Indian Suppliers: It should be quoted in Rupees.</p> <p>For Foreign suppliers: If supervision is being carried out by persons residing in India, it should be quoted in Indian Rupees.</p>	
<p><u>1.6 TAXES:</u></p> <p>All statutory taxes, if any, will be deducted at source & to be borne by the beneficiary. Tax deduction certificate shall be issued at the end of financial year if required.</p>	
<p><u>2. Security Deposit:</u></p> <p>Vendor has to submit security equal to the amount of 5% of the total order value in the currency of order within one month of receipt of order in the form of Bank Guarantee in BHEL format valid for two months beyond shipment.</p>	
<p><u>2.1 Submission of Bank Guarantee :</u></p> <p>All bank guarantee for security deposit as well as proforma bank guarantee should be from one of the BHEL consortium banks and the bank guarantee should be in the proforma as prescribed by BHEL. The performance bank guarantee as well as the list of consortium banks is displayed at BHEL web-site www.bhelhwr.co.in however, in case the bank guarantee is not from BHEL consortium banks, then the vendor has to confirm bank guarantee on consortium bank and the bank charges are to be borne by the bidder.</p>	
<p><u>3. Liquidated damages:</u></p> <p>L.D. shall be applicable for delayed delivery @ 0.5% per week and part thereof subject to a maximum of 10% for total P.O. value. If any vendor do not accept the LD @ of 0.5% per week and part thereof subject to a maximum of 5% of total PO value, their offer will be ignored. Vendors accepting LD terms different from the proposed terms of 0.5% maximum 10% will be loaded @ %age deviation from the range of 10% on their prices (FOB for imported and ex-factory for indigenous). If the vendor does not accept as above their offer is likely to be ignored and technical bid will not be processed.</p>	
<p><u>4) Delivery of the equipment:</u> * Categorically indicate time period required for delivery of the equipment.</p> <ul style="list-style-type: none"> Firm delivery period for the equipment to be stated w.e.f. date of LOI/ Order. <p>Commissioning & Handing over of complete system in weeks.</p>	

<p>5) <u>Settlement of Disputes:</u></p> <ul style="list-style-type: none"> • Settlement of disputes through arbitration shall be in accordance with Arbitration Rules of Conciliation and Arbitration of the ICC, Paris. The venue of arbitration shall be Delhi. The courts of Delhi shall have exclusive jurisdiction. • For Indigenous Source. The venue of arbitration shall be Haridwar Courts, which will have exclusive jurisdiction. 	
<p>6) <u>Authorization of pre-inspection:</u></p> <p>BHEL is authorized to pre inspect the material at your works. The material will be dispatched only after getting clearance form BHEL .</p>	
<p>7) <u>Drawing / Data approval:</u></p> <p>Any drawing / data approval required from BHE after placement of order shall be the responsibility of the vendor and any delay on account of the same shall be the responsibility of the vendor and have no bearing on the penalty applicable.</p>	
<p>8) <u>Drawing / design / information use:</u></p> <p>The vendor will have to give an undertaking that the drawing / design / information enclosed with the enquiry / proposed order will not be parted to any agency and will also not be used for manufacturing for any other customer.</p>	
<p>9) <u>Time period for Foundation / Erection & Commission:</u></p> <p>Vendor will have to ensure deputation of their people for erection & commissioning or for attending to any complaint during guarantee period within 7 days of intimation. In case of delay BHEL will be within their rights to get the job completed at the risk and cost of the supplier.</p>	
<p>10) <u>5 Sets of O&M Manual:</u></p> <p>5 Sets of Operation & Maintenance Manual shall have to be supplied along with the equipment. Final payment will be released only after receipt of the required documentation.</p>	
<p>11) <u>Training:</u></p> <p>Vendor shall provide required training to BHEL personnel free of cost.</p>	
<p>12) <u>Purchasing of BOI items:</u></p> <p>Vendor shall purchase the BOUGHT OUT ITEMS only from vendors of repute and indicate the same to BHEL at the time of approval of GA drawing. BHEL reserves the right to visit / inspect the works of supplier and that of their sub contractors before or after placement of order.</p>	

<p>13) <u>Spares, tooling, jigs and fixtures:</u> The equipment being new, above items shall be needed in bulk at a later stage. However two separate lists of spares, tooling, jigs and fixtures should be sent along with quotation.</p> <ol style="list-style-type: none"> 1. Items which you recommend very necessary to be available along with the equipment. 2. Item which may be required at a later stage. (The price validity of these items should be for a minimum period of two years from the date of commissioning of the equipment). 	
<p>14) Warranty/ Guarantee: 24 months from the date of commissioning.</p>	
<p>15) Details of Contact person Name, Designation, Department complete postal, E-mail address & Fax no, phone, Mobile no. to be mentioned.</p>	
<p>16) Phyto sanitary Certificate essential for packages (Wooden).</p>	
<p>17) Validity: Validity of the offer should be 180 days from tender opening.</p>	
<p>18) Bank Charges: Bank Charges to be borne by vendor.</p>	
<p>Note: Attach separate sheet for additional information if necessary. The above terms & condition supersedes the terms & conditions found contradictory written else where in the tender enquiry.</p>	

NOTES :-

- a) Item wise breakup of the prices shall be as per TECH. SPECIFICATION / DISCUSSIONS; ELSE, THE BID IS LIABLE FOR REJECTION.
 - b) Bidder to note that total price indicated above SL 1.1-1.6 shall be considered for evaluation and hence should be complete in all respects for the full scope defined and considering all terms and conditions. Optionals as indicated in specification will not be taken for evaluation.
 - c) Any item not included in this price quoted above and shown separately will not be taken cognizance of and shall be ignored while evaluation.
- 3.0 Total weight -- /Gross / Net in Kg. Also package size essentially should be indicated if not exact then approximate.
- 4.0 Following details shall be provided in separate Annexure.
A) Unit prices for variable items.
B) Prices for any other OPTIONAL items.
- 5.0 **Excise duty:** Concession forms requirements etc. to be stated wherever applicable.

NOTE:

1. BHEL will evaluate the technical bids against essential criteria/requirements. BHEL may seek clarifications, if required, from the qualified bidders only. These clarifications will be communicated to the eligible vendors and they will be asked to attend techno-commercial discussions on specified dates. The bidders will be given 15 days notice to come prepared with the required documents/ clarifications. No extension will be given. **The offers of those bidders, who are unable to respond in this time frame, are likely to be ignored.**
2. The vendors found technically acceptable against their original technical offer and subsequent technical discussion BHEL will communicate equivalent scope of supply to the qualified bidders who will be required to submit their final bid in two parts. Un-priced technical part-I & price bid part-II **OR** vendor will be furnished a common scope and will be made to participate in the process of reverse auction if required.
It is clarified that no correspondence – technical or commercial – other than the above bids is permissible. In case any uncalled for correspondence– technical or commercial – is received, the same will be ignored and entire bid also may be ignored. It is also clarified that no commercial discount will be acceptable.
3. All the bidders whose offers have been accepted by BHEL will be given one-week notice for opening price bid.

Date

Signature

Name

Designation

Department

M/S

LIST OF CONSORTIUM BANK

- | | |
|---|--|
| <p>1. State Bank of India
CAG Branch,
10-th Floor, Vijaya Building,
Barakhamba Road,
New-Delhi-110001</p> | <p>10. HDFC Bank Ltd
5th Floor, HT House,
K G Marg,
New-Delhi-110001</p> |
| <p>2. Canara Bank
74, Janpath,
New-Delhi-110001</p> | <p>11. CITI Bank N A
Jeevan Vihar Building,
Sansad Marg,
New-Delhi-110001</p> |
| <p>3. Punjab National Bank
74, Janpath,
New-delhi-110001</p> | <p>12. Standard Chartered Bank
H2 Block, Connaught place,
New-Delhi-110001</p> |
| <p>4. Bank of Baroda
Corporate Banking Branch,
11th Floor, BOB Building,
Sansad Marg,
New-Delhi-110001</p> | <p>13. ICIC Bank Ltd.
ICIC Tower,
Bisham Pitamah Marg,
Pragati Vihar,
New Delhi 110003</p> |
| <p>5. Deutsche Bank
Tolstoy Marg,
New-Delhi-110001</p> | <p>14. IDBI Bank Ltd.
19, K G Marg,
Surya Kiran Building,
New-Delhi-110001</p> |
| <p>6. State Bank of Hyderabad
Surya Kiran Building,
K. G. Marg,
New-Delhi-110001</p> | <p>15. HSBC Ltd.
ECE House,
28 KG Marg,
New-Delhi-110001</p> |
| <p>7. State Bank of Mysore
Antriksh Bhawan,
K. G. Marg,
New-Delhi-110001</p> | |
| <p>8. State Bank of Mysore
Industrial Finance Branch,
Ramanashree Arcade,
MG Road,
Bangalore-560001</p> | |
| <p>9. State Bank of Travancore
Travancore House,
IF Branch, K G Marg,
New-Delhi-110001</p> | |



ANNEXURE-IV

WAM-28

Proforma for Bank Guarantee

In consideration of the Bharat Heavy Electrical Limited Siri fort N. Delhi through Division HEEP Hardwar (hereinafter called the Company') having agreed to exempt ----- (hereinafter called 'the said Contractor' which term includes 'Suppliers' for the purpose of this Bond) from the demand under the terms and conditions of an Agreement date. ----- Made between ----- and ----- -- for (hereinafter called 'the said Agreement') of Security Deposit for the due fulfillment by the said Contractor of the terms and conditions contained in the said Agreement, on production of a Bank Guarantee for Rs. ----- (Rupees-----only).

1. We, ----- (Indicate the name of the Bank) (hereinafter referred to as 'the Bank') at the request of----- (Contractor (s) do hereby undertake to pay to the Company an amount not exceeding Rs. ----- against any loss or damage caused to or suffered or would be caused to or suffered by the Company by reason of any breach by the said Contractor (s) of any of the terms and conditions contained in the said Agreement.
2. We, ----- do hereby undertake to pay the amounts due and (indicate the name of the Bank) payable under this guarantee without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or would be caused to or suffered by the Company by reason of breach by the said Contractor(s), of any of the terms of conditions contained in the said Agreement or by reason of the contractor(s), failure to perform the said Agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee However, our liability under this guarantee shall be restricted to an amount not exceeding Rs.---- .
3. We undertake to pay to the Company any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this bond shall be a valid discharge of our liability for payment there under and the Contractor(s) shall have no claim against us for making such payment.

4. We, ----- further agree that the Guarantee herein contained (indicate the name of the Bank) shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till ----- Office / Department / Division of Bharat Heavy Electrical Limited certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said contractor(s) and accordingly discharged this guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the ----- we shall be discharged from all the liability under this guarantee thereafter.
5. We, -----, further agree with the Company that the (indicate the name of the Bank) Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said contractor(s) from time to time or to postpone for any time or from time to time any of the power exercisable by the company against the said contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by any reason of any such variation or extension being granted to the said contractor(s) or for any forbearance, act or omission on the part of the company or any indulgence by the company to the said contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.
6. This guarantee will not be discharged due to the change in the constitution of the Bank or the contractor(s).
7. We,----- lastly undertake not to revoke this guarantee during its (indicate the name of Bank) currency except with the previous consent of the Company in writing.

Date the -----day of -----
For -----

(Indicate the name of the Bank)

CNC GANTRY MILLING MACHINE

1



BHARAT HEAVY ELECTRICALS LIMITED
HEAVY ELECTRICAL EQUIPMENT PLANT, RANIPUR, HARDWAR - 249403 UTTARANCHAL, INDIA
CONTACT PERSON'S NAME/ DESIGNATION/ PHONE NO/ E-MAIL (FROM PURCHASE DEPTT): MR. A.SANYAL DGM (PPX-CAP) PHONE NO: 0091-1334-28-5291 E-MAIL: asanyal@bhelhwr.co.in

ENQUIRY NO:	
DUE DATE:	
SUPPLIER'S QUOTATION NO:	
DATE:	

SPECIFICATION CUM COMPLIANCE FORMAT FOR CNC GANTRY MILLING MACHINE

NOTE:
1 Vendor must submit complete information against clause No: 39. The offer meeting this clause would only be processed.
2 The following format must be completely filled and deviations mentioned in the appropriate columns. Inadequate/ incomplete, ambiguous or unsustainable information against any of the clauses of the specifications/ requirements shall be treated as non-compliance.
3 The offer and all documents enclosed with offer should be in English language only.

NAME & ADDRESS OF THE SUPPLIER:
TELEPHONE NOS:
FAX NOS:
E-MAIL ADDRESS:

CNC GANTRY MILLING MACHINE

2

TECHNICAL SPECIFICATIONS / COMPLIANCE FORMAT FOR CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
1	PURPOSE:			
	The machine is to be used mainly for Joint Plane facing, drilling, boring, threading, reverse counter boring as well as complete peripheral finish machining and rough machining of blade and shaft sealing grooves in Steam Turbine Casings. The casing halves are to be mounted on the machine with joint plane horizontal. Machine should be suitable for heavy duty Milling, Drilling, Boring, Threading, Reverse counter boring, Core Drilling, Reaming and blade groove rough machining etc. on high alloy steel castings.	Vendor to confirm		
2	WORK PIECE MATERIAL:			
	The components to be machined will be mainly high temperature & creep resistant alloy steel castings of Mat. grade 17CrMoV511, X22CrMoV121 having tensile strength 40-95 Kg/mm ² , %Elongation 15-22% & Hardness up to 300BHN.	Vendor to confirm		
3	MACHINE SPECIFICATIONS:			
3.1	MAIN SPINDLE			
a	No. of Milling head. :01	Vendor to confirm		
b	Spindle Nose Taper: ISO 60 with DETACHABLE CONVERSION SLEEVE ISO60 TO BT50	Vendor to confirm & submit details		
c	Speed Range, Step less: Min.: 5 rpm (or less) & Max.: 2000 rpm (or more)	Vendor to inform		
d	Spindle Motor Power (AC Drive) : 100 KW (Min.)	Vendor to inform		
e	Torque at 100% Duty Cycle : To be intimated by vendor	Vendor to inform		
f	Power/ Torque available after mounting of conversion sleeve ISO60/BT50 : To be intimated by vendor	Vendor to inform		
g	Power/Torque-Speed characteristic diagram of the spindle motor to be submitted.	Vendor to submit details		
h	Power/Torque-Speed characteristic diagram of the spindle motor after mounting of Conversion Sleeve ISO60/BT50 to be submitted.	Vendor to submit details		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
i	Max. weight of tool that can be accommodated in the spindle : To be intimated by vendor	Vendor to inform		
j	Max. weight of tool that can be accommodated in the conversion sleeve ISO60/BT50	Vendor to inform		
k	Pull stud for conversion sleeve ISO60/BT50 should also be provided along with detail drawing.	Vendor to confirm & submit details		
l	10 numbers of Pull-Studs for ISO60 taper shall be included along with detailed drawing in the standard scope.	Vendor to confirm & submit details		
3.2	MACHINE TABLE:			
a	Table length : 12000 mm.	Vendor to inform		
b	Table width : 4000 mm.	Vendor to inform		
c	Loading capacity of table : 10,000 Kg/sq. meter. (minimum)	Vendor to inform		
d	Cost of extension of Table length in the steps 500mm to also be quoted.	Vendor to inform		
3.3	TRAVELLING GANTRY.(X-axis):			
a	Longitudinal traverse of Gantry (X-axis) : 13000 mm.	Vendor to inform		
b	Rapid Traverse Rate (X-axis) : 10000 mm/min.(min)	Vendor to inform		
c	Feed Rate, Stepless (X-axis) : 1-5000 mm/min.	Vendor to inform		
d	The offer should include the price for extension of X-axis in steps of 500mm	Vendor to inform		
3.4	MOVING CROSS RAIL:			
a	Distance between table top to spindle face: 3500mm (minimum)	Vendor to inform		
b	Cross Rail traverse : 2000mm (Minimum)	Vendor to inform		
c	Step Positioning automatically every : 200mm	Vendor to inform		
d	Feed for Step Positioning : To be intimated by the supplier	Vendor to inform		
3.5	Distance / Clearance between Columns: 5000mm	Vendor to inform		
3.6	HORIZONTAL TRAVERSE OF MILLING HEAD.(Y-AXIS):			
a	Cross traverse. Y - axis. : 6000 mm or more	Vendor to inform		
b	Available Y-axis traverse with various attachments/ heads mounted : To be informed by the supplier	Vendor to inform		
c	Rapid Traverse Rate (Y-axis) : 10000 mm/min.(minimum)	Vendor to inform		
d	Feed Rate, Stepless. (Y-axis) : 1-5000 mm/min.	Vendor to inform		
3.7	VERTICAL TRAVERSE OF RAM (Z-AXIS):			
a	Ram Cross Section. : 600 mm x 600 mm. (Min)	Vendor to inform		
b	Vertical traverse of ram : 1500 mm	Vendor to inform		
c	Rapid Traverse Rate (Z-axis) : 10000 mm/min.(min)	Vendor to inform		
d	Feed Rate, Stepless. (Z-axis) : 1-5000 mm/min.	Vendor to inform		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
e	Ram shall have Hydraulically/ Pneumatically operated balancing system. Its details shall be submitted with the offer with sketches.	Vendor to confirm & submit details		
f	The vendors with Square Ram, as per tender specifications, only are required to offer their machine. Offer without Square Ram shall not be considered.	Vendor to confirm		
3.8	The machine shall be equipped with compensation system for deflection / deformation in cross-rail due to movement of saddle / headstock with or without various attachments.	Vendor to confirm & submit details		
3.9	The table top should be provided with T-slots of size 42 MM as per DIN650 at a suitable pitch. The sketch of the same is to be submitted.	Vendor to inform		
3.10	The details of arrangement of power transmission of feed drives for all axes shall also be submitted.	Vendor to submit details		
3.11	Feed motors for all axes should be of Siemens 1FT6 type. Motor details, together with its torque ratings, are to be submitted along with the offer.	Vendor to confirm & submit details		
3.12	All moving and rotating elements of the machine should be suitably lubricated. X & Y Axes traverse shall necessarily be with Hydrostatic Guide ways. The lubricating system for guide ways of Z-Axis is to be intimated. In case of lubrication failure alarm/ interlock system shall be provided in the machine. The details of these systems should be submitted with the offer.	Vendor to confirm & submit details		
3.13	All rotating elements should be dynamically balanced to avoid undue vibrations etc.	Vendor to confirm		
3.14	If hydraulic accumulator is used in machine, the charging pressure to be below 100kg/sq cm, if possible	Vendor to inform		
4	<u>AUTOMATIC TOOL CHANGER:</u>			
	The tool magazine should be mounted on one side of the gantry column and should be equipped with a double rotary arm for rapid change of tools. ATC should be capable of changing tool from ISO 60/ BT50 Conversion Sleeve mounted in the Main Spindle and Right Angle Head as well as Universal Milling Head.	Vendor to confirm & submit details		
a	Tool Change : Automatic (Including spindle orientation)	Vendor to confirm		
b	Loading/ unloading of tools to be possible in vertical and horizontal position of spindle	Vendor to confirm		

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
c	Type : Preferably Chain Operated	Vendor to inform		
d	Tool Selection System : Shortest path, Random	Vendor to confirm		
e	Tool Magazine Capacity : 50	Vendor to inform		
f	Suitable for automatic change of tools with shanks as per : BT 50	Vendor to inform		
g	Max. Tool Diameter with all pockets loaded. : 150 mm.	Vendor to inform		
h	Max. Tool diameter with alternate pocket loaded :350 mm.	Vendor to inform		
i	Max. Tool Length. : 500 mm	Vendor to inform		
j	Max. Tool Weight : 35 Kg.(min)	Vendor to inform		
k	Approximate tool loading/unloading time. : To be intimated by the vendor	Vendor to inform		
l	The Machine operation should be possible with or without referencing ATC.	Vendor to confirm		
m	The spindle taper and tool pocket at changer station will have the provision of cleaning by compressed air blow during ATC cycle. The spindle taper will also have the provision of compressed air blow through push button mounted on machine head stock during manual tool change.	Vendor to confirm		
n	The machine will have manual tool loading/ unloading with push buttons mounted on headstock at convenient location.	Vendor to confirm		
o	One set of tool holder retention stud comprising of 50 Nos. (or equal to Tool magazine capacity) shall be provided along with detailed drawing as standard item with the machine.	Vendor to confirm & submit details		
p	Tool Changer arm working should be explained in details. Full ATC catalogue should be submitted with the offer.	Vendor to submit details		
q	Suitable arrangement-Software based (OEM screen) and M code based, should be provided to extract a tool trapped in the ATC cycle. Details of both the system to be provided along with the offer.	Vendor to confirm & submit details		
5	TOOL COOLING SYSTEM:			

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	Recirculating type Flood coolant system with all it's accessories like pump, tank etc. and nozzles around spindle to be offered. The flood coolant system will be switchable through program as well as switches provided on operator's control panel. The pressure shall be sufficient so that coolant reaches tool up to a distance of 500 mm from the spindle face. Pressure and total discharge rate shall be intimated by supplier.	Vendor to confirm & inform		
b	Internal Coolant system/ through spindle coolant system working through the same pump as above at (a) to be offered. Pressure and total discharge rate shall be intimated by supplier. The internal coolant system should also be switchable through program as well as switches provided on operator's control panel.	Vendor to confirm & inform		
c	Machine should be equipped with Vacuum Rotary Drum Type Coolant Filtration Unit. The details of the same to be submitted.	Vendor to confirm & submit details		
d	The coolant tank shall be fitted with skimmer for regular cleaning of coolant from contamination with tramp oil.	Vendor to confirm		
e	Along with M codes and push buttons provided on the operator's panel for activation & deactivation of coolant supply, additional rotary switch shall also be provided on the operator's panel for finer control of coolant flow rate and its pressure after its activation through M codes/ Push button.	Vendor to confirm & inform		
f	The coolant tank capacity shall also be intimated. Coolant tank capacity, discharge rate & pressure of coolant should be sufficient enough to meet the requirement of the solution offered for deep drilling operation (Drilling of dia. 65mm upto a depth of 2400mm approx.) in the prove-out component	Vendor to confirm & inform		
6.0(A)	<u>COMPRESSED AIR POINT :</u>			
a	Programmable Compressed air point in the head stock to be used as coolant for carbide tools.	Vendor to confirm		
b	Compressed air point with manually operated ON/OFF valve and flexible piping for work piece cleaning.	Vendor to confirm		
6.0(B)	<u>PNEUMATIC SYSTEM:</u>			

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	Refrigeration type air dryer to be provided in the pneumatic system of the machine.	Vendor to confirm & submit details		
b	Independent Air Compressor of Indian make to meet the total compressed air requirement of the machine is also to be quoted. Details & brief catalogue of the same are also to be submitted along with the offer.	Vendor to confirm & submit details		
7	<u>AUTOMATIC SWarf CONVEYOR:</u>			
a	No.of swarf / chip conveyors. : 2 (one on each side of work table along X-axis.)	Vendor to confirm		
b	Type of chip conveyor. : Slat type Elevating at the end.	Vendor to confirm		
c	The chips shall be brought by chip chutes manually as well as by gravity into the coolant channels, which are provided on both sides along the machine table. Chip chutes shall be provided by the vendor. Detailed drawings of the same shall also be provided by the vendor. With the help of a slat type chip conveyor the chips are to be transported to a suitable container located at one end of the machine. The container shall be included in the standard scope.	Vendor to confirm & submit details		
8	<u>ACCESSORIES AND ATTACHMENTS:</u>			
8.1	<u>AUTO ATTACHMENT CHANGER SYSTEM:</u>			
	Loading & unloading of all the attachments should be possible through Auto Attachment Changer system (Pick-Up station). The same to be offered alongwith attachment rack of suitable capacity. Pick up station should be placed along X axis on separate / independent rails. Number of seats are also to be intimated. The sideways placing of pick-up station should be such that while setting the job on one half of table there should be arrangement for moving entire pick up station magazine to the other end of the table with requisite interlocks for machining of job on the other end of the table.	Vendor to confirm & submit details		
8.2	Following attachments are to be offered:			
8.2.1	<u>BORING & FACING HEAD (FOR VERTICAL M/CING):</u>			

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	Boring and Facing Head: Boring & Facing Head (preferably D'Andrea UT5-630S) with suitable arrangement for machining of Max. internal Dia. 1050mm and min. internal Dia. 160mm approx. in vertical position shall be offered. The accuracy of bores are to be of H7 tolerance and both axial & radial run outs of various bores should be within 0.02mm with surface finish of Ra 1.6 micron. Length of bores to be machined without entry of Boring Head shall be 500mm approx. The Head shall be capable of thread cutting operation also.	Vendor to confirm & submit details		
b	Complete set of standard tool holders & tools are to be offered along with complete technical details. Any special arrangement required to meet our requirement is also to be quoted along with details & drawings.	Vendor to submit details		
c	Tool holder with BT50 taper for presetting of the tools to be used on Boring and Facing Heads shall also be offered. Details of the same to be provided along with the offer.	Vendor to confirm & submit details		
d	Catalogue of above head along with details of the same to be submitted.	Vendor to submit details		
e	All standard tool holders and accessories, available with above Head, should be quoted on item wise basis.	Vendor to submit details		
f	External Coolant System shall be available on the Head. Its details shall be submitted with the offer.	Vendor to confirm & submit details		
8.2.2	RIGHT ANGLE HEAD:			
a	Right Angle Head with programmable indexing of 1deg x 360 position, Spindle power of 100KW & spindle taper ISO60 with detachable conversion sleeve of ISO60/BT50. The other details of the head alongwith tool holding system, make, model no & photograph shall be submitted with the offer.	Vendor to confirm & submit details		
b	Speed Range: 5 to 2000rpm (same as Main Spindle)	Vendor to confirm		
c	Power/Torque-Speed characteristic diagram of the Right Angle head with ISO 60 taper to be submitted.	Vendor to submit details		
d	Power/Torque-Speed characteristic diagram of the Right Angle head with conversion sleeve ISO60/BT50 to be submitted.	Vendor to submit details		
e	Pull-stud for Conversion sleeve ISO60/BT50 and BT50 taper should also be included and its detailed drawing submitted with the offer.	Vendor to confirm & submit details		

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
f	External as well as through spindle Coolant System shall be available on the Head. Its details shall be submitted with the offer.	Vendor to confirm & submit details		
8.2.3	The machine should be ready to adopt Programmable Indexable Universal Milling Head (mentioned at clause no: 41.1). Proper interface (electronic as well as mechanical) should be provided in the machine for the same.	Vendor to confirm & submit details		
8.2.4	The machine should be ready to adopt Boring & Facing Head for Horizontal Machining (mentioned at clause no: 41.3). Proper interface (electronic as well as mechanical) should be provided in the machine for the same.	Vendor to confirm & submit details		
9	<u>OTHER FEATURES:</u>			
9.1	Flashing/rotary type end of cutting and program stop light	Vendor to confirm		
9.2	In-cycle hour counter with reset facility.	Vendor to confirm		
9.3	The control cabinets will have electrical illumination and a 220 V/5A socket.	Vendor to confirm		
9.4	Safety Lights at both ends of moving column (preferably Flashing during X-travel).	Vendor to confirm		
9.5	Portable Lamp with magnetic base and chord of suitable length. Plug point for its use shall be provided on Head Stock at suitable location.	Vendor to confirm		
10	<u>MEASUREMENT SYSTEM:</u>			
a	<u>JOB MEASUREMENT SYSTEM:</u>			
	Job measuring system comprising of Spindle mounted, wireless Renishaw make probe interfaced to CNC System, probe holder, required interface, receiver module, Calibration master including Calibration programs etc. shall be offered with complete details. It shall be supplied with standard software to probe the dimensions of the workpiece (i.e. diameters of bore, slot width & depth, grooves, pocket size, center values of bore etc.) for all type of milling & turning applications.	Vendor to confirm & submit details		
b	<u>IN PROCESS GAUGING:</u>			

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
	In addition to above, spindle mounted probe system, a probing system with an auxiliary Ram/ quill mounted on machine saddle / headstock, or at any other suitable location, should be offered for in-process precision measurement of diameters of grooves milled or turned in Steam Turbine Casings in halves; i.e. measurement of half bores . Details of the above system to be provided along with sketches/ photographs and write-up.	Vendor to confirm & submit details		
11	CNC SYSTEM:			
	The machine shall be equipped with Siemens 840D CNC System with latest Window NT / Window XP based operating system. The CNC System, Sinumerik 840D will have PC version PCU 50 with Intel technology, 566 MHz/256MB or higher as the case may be at the time of ordering, NCU573.4 or higher version. It should consist of OP 015A operator's panel having 15 inch TFT colour Display , 19 inch machine control panel and MF II standard PC key Board with PS2 mouse in a sliding / folding tray. The CNC system should have following features along with other features:	Vendor to confirm & submit details		
11.1	Replaceable Hard disk 10GB, 3GB for User Data or higher as the case may be at the time of ordering	Vendor to inform		
11.2	RS232-C interface for I/O devices, COM1(V.24), COM (V.24), LPT1, VGA, MPI interface, PS2 mouse, PS2 keyboard & USB, 2Channels AND Expansion slots	Vendor to inform		
11.3	Standard interfaces	Vendor to inform		
11.4	Floppy drive 3.5 " with requisite interface	Vendor to confirm		
11.5	Access locks on the operator panel	Vendor to confirm		
11.6	Coordinate System Rotation	Vendor to confirm		
11.7	Coordinate System Transformation	Vendor to confirm		
11.8	Look Ahead of 70 blocks	Vendor to confirm		
11.9	Helical Interpolation	Vendor to confirm		
11.10	Scaling	Vendor to confirm		
11.11	Programmable mirror image machining	Vendor to confirm		
11.12	Simulation	Vendor to confirm		
11.13	5 Axis machining capability with Universal Milling Head.	Vendor to confirm		
11.14	Foreground/Background editing	Vendor to confirm		
11.15	Process oriented Canned Cycles for Drilling, Milling & Turning operation.	Vendor to confirm		

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
11.16	Rigid Tapping	Vendor to confirm		
11.17	Tool Management	Vendor to confirm		
11.18	Note Book PC with DVD RAM, PEN DRIVE of 1GB and licensed copy of Operating System to be used for Part Program transfer and storage in case of need.	Vendor to confirm & submit details		
11.19	DC-UPS module with battery module to ensure automatic unattended shutdown of the system in case of power failure or even in normal machine shutdown.	Vendor to confirm & submit details		
11.20	Display of PLC on 840D monitor and Simatic S-7 loaded on the hard disk	Vendor to confirm		
11.21	Display of servo-waveforms on 840D monitor	Vendor to confirm		
11.22	All standard features of CNC System Sinumerik 840D should be listed as well as item wise price of all available optional features of CNC system 840D must also be quoted	Vendor to inform		
12	AUXILIARY HAND PENDANT :			
	Hand held unit type B-MPI of SIEMENS make with all its features or equivalent along with sufficient length of interfacing cable may be offered.	Vendor to confirm & submit details		
13	MANUAL MODE OF OPERATION:			
	Complete manual control of machine through or independent of CNC system with required switches/keys shall be provided on the operator panel for selection of required axis, axis direction, RPM, cutting feed, RPM Direction i.e. CW / CCW, cutting feed ON/OFF, display of axis position values etc. for manual machining cuts without using CNC program. Diagram / sketch for switches/keys provided on operator's pendant to be submitted.	Vendor to confirm & submit details		
14	THERMAL STABILITY OF OIL			
	The equipment for refrigeration type cooling and electric heating (if needed) for re-circulating lubricating oil, spindle head oil and hydraulic system oil for tropical temperature fluctuations, as indicated at clause no. 21.0, of sufficient capacity should be offered with detailed specifications.	Vendor to confirm & submit details		
15	FIRST FILLING OF OILS :			

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	Supplier is to provide first filling of all oils / lubricants / coolant required for the machine from Indian source indicating grade of all oils used.	Vendor to confirm & submit details		
b	Supplier may recommend three alternative sources for all types of hydraulic & lubricating oil.	Vendor to inform		
16	<u>OPERATOR'S PENDANT:</u>			
	It shall be mounted on the operator's platform and shall have all the controls for machine & CNC system with CRT.	Vendor to confirm & submit details		
17	<u>OPERATOR'S PLATFORM:</u>			
a	Operator's Platform attached to the Cross rail or having independent motorized movement in Z Axis direction shall be offered. There will be provision for movement of operator for full Horizontal (Y Axis) traverse of the machine. Power Socket of 220V with switch shall be provided on operator's Platforms at convenient location. The Operator's Pendant shall be movable on operator's platform across full traverse of Y-axis.	Vendor to confirm & submit details		
18	<u>NETWORKING:</u>			
	Machine control should have necessary hardware and software including cables so that it is ready for interfacing with gigabit Ethernet Local Area Network with 100 MB/sec. speed available on machine on UTP cables for NC program and other related data transfer. This network to be connected to wide area network/Internet. The networking should have following capabilities:	Vendor to confirm		
a	The machine shall appear as a node in the Entire Network.(Network Neighborhood)	Vendor to confirm		
b	The program transfer shall be by simple copy and paste method provided sharing access is allowed between any PC and the machine across the network.	Vendor to confirm		
c	The program transfer between CNC system and network should also be possible in CNC Mode.	Vendor to confirm		
d	The above capability of NC Program and other file/data transfer across network shall be established and demonstrated by the vendor during machine commissioning.	Vendor to confirm		

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
19	DIAGNOSTIC SYSTEMS:			
19.1	REMOTE TELE DIAGNOSTIC SERVICE:			
a	Tele diagnostic service package consisting of Modem and other hardware with all necessary software package for remote diagnosis and remote control of CNC System should be offered. With this facility, complete Graphic User Interface of CNC system can be looked at and operated from remote controlled PC of supplier so that errors can be recognized and changes or correction can be made from supplier's end.	Vendor to confirm & submit details		
b	Initially, it is proposed to avail tele-diagnostics through telephone line. It should be possible to use other platforms such as Internet or ISDN subject to availability in future.	Vendor to confirm		
c	Tele-diagnostic service would be free of cost during the warranty period. Charges if any, and the mode of payment should be offered for service beyond the warranty period.	Vendor to confirm & inform		
19.2	FAULT DIAGNOSTIC SYSTEM:			
	Supplier's own diagnostic system with required Hardware, preferably note Book PC and software (Licensed Copy) should be supplied and installed on the CNC system. This should include customised auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display with full video diagnostic help for faults related to mechanical and electrical maintenance. The system shall be loaded with complete Electrical Schemes, Mechanical Assembly drawings, Hydraulic Circuit Diagrams, Operation and Maintenance Manuals, Machine Alarm list alongwith Help text wiring diagram, On-Line display of PLC user program.	Vendor to confirm & submit details		
20	TROPICALISATION:			
	All machine electricals, controls, instrumentation and paints shall be suitably tropicalised.	Vendor to confirm		
21	OPERATING CONDITIONS:			

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
21.1	Power supply : 3 phase 3 wire AC 415 V +/- 10% and 50 Hz +/- 3%	Vendor to Note		
21.2	Compressed air : 4 - 6 Kg/ sq. cm	Vendor to Note		
21.3	Maximum variation of Ambient temperature during the year: 0 to 45 deg C with 20 deg Celcius in 24Hours.	Vendor to Note		
21.4	Humidity : 95% RH max.	Vendor to Note		
21.5	Weather conditions are tropical. Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 20 deg Celsius in 24 hours. Thermal Stability of the complete machine keeping in view the specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine is to be ensured by vendor.	Vendor to confirm		
21.6	Confirm that the machine is suitable for above. Details of provisions made in the machine for the same are to be furnished to BHEL.	Vendor to confirm & submit details		
21.7	Vendor to confirm that machine is suitable for successful running with guaranteed accuracies and production of jobs with accuracies as specified in proveout components in the conditions specified above. Details of provisions made on the machine for the same are to be furnished to BHEL.	Vendor to confirm & submit details		
21.8	should be suitable for 24 hrs. continuous operation to its full capacity for 24 hour a day and 7 days a week throughout the year. Vendor to ensure and confirm the same.	Vendor to confirm		
22	<u>AIR CONDITIONERS:</u>			
	Electrical cabinet and the operator panel will be fitted with suitable Air-Conditioners with dehumidifiers of sufficient capacity keeping in view the existing ambient conditions. Detailed specifications of Air Conditioners with dehumidifiers may be submitted.	Vendor to confirm & submit details		
23	<u>VOLTAGE STABILIZER & ULTRA ISOLATION TRANSFORMER:</u>			
23.1	<u>VOLTAGE STABLIZER (INDIAN MAKE):</u>			

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	A servo-controlled voltage stabiliser of APLAB/NEEL/AUTOMATIC ELECTRIC/ SERVO FRESH-make and of appropriate rating shall be supplied and connected to the machine by the vendor. There should not be any undesirable harmonics in the stabiliser output. Complete catalogue of the same shall be submitted along with the offer.	Vendor to submit details		
b	The offer should be submitted with full details and with complete spares package required for long term maintenance of the servo-stabiliser.	Vendor to submit details		
23.2	ULTRA ISOLATION TRANSFORMER (INDIAN MAKE):			
a	Ultra Isolation Transformer of appropriate rating and preferably of NEEL/AUTOMATIC ELECTRIC/SERVO FRESH-make shall be supplied.	Vendor to submit details		
b	The offer should be submitted with full details and with complete spares package required for long term maintenance of the Isolation Transformer.	Vendor to submit details		
23.3	BHEL shall provide power at one point on the nearest columns. It will be the responsibility of the supplier to provide switches, cables etc to connect machine & other supplied items from this point.	Vendor to confirm		
24	MACHINE LIGHT:			
24.1	To be offered to provide sufficient illumination of working area. Consumables should be available in India.	Vendor to confirm		
24.2	Any lights required in the foundation / pit area shall also to be supplied by the vendor. Consumables for the same should be available in India.	Vendor to confirm		
25	SPLASH GUARD / CHIP GUARD:			
	To be provided around the operator's platform with sufficient height to avoid scattering of cutting fluid and chips.	Vendor to confirm		
26	METALLIC TELESCOPIC COVERS:			
	The guide ways of all axes should have suitable protective steel telescopic covers with wipers and adequate sealing on joints to prevent seepage of dust & coolant oil inside.	Vendor to confirm & submit details		
27	ERECTION AND COMMISSIONING:			

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	Supplier shall install the machine on the foundations at BHEL's Works with the assistance of BHEL personnel. All special lifting tackles, toolings, instruments and equipment (including the laser alignment equipment, test mandrels etc) required for the erection and commissioning of the machine shall be arranged by the supplier at their cost and responsibility. Schedule of Erection & Commissioning shall be intimated in the offer. Commissioning shall include the successful proving of proveout components. All cover plates required for the machine & its peripherals shall be supplied by the vendor. Detailed drawings of the same shall also to be submitted by them.	Vendor to confirm & submit details		
b	Out of the complete supply of tackles, toolings, mandrels etc, the ones required by BHEL to maintain the machine after commissioning shall not be taken back by vendor. Vendor shall offer accordingly.	Vendor to confirm		
c	The vendor shall supply sufficient quantity of paint of the machine and carry out touching wherever the paint is damaged during transit or erection of the machine.	Vendor to confirm		
d	Charges, duration, terms & conditions for E&C should be furnished in details separately by vendor along with offer.	Vendor to submit details		
28	ACCURACY TESTS:			
a	The measurement of accuracy of positioning and repeatability of all traversing axes of the machine should be as per VDI/ DGQ 3441 standard:	Vendor to confirm & submit details		
i	Positional Accuracy (Pa) for 2000mm traverse in X & Y axes should be 0.015mm	Vendor to confirm		
ii	Positional Accuracy (Pa) for 1000mm traverse in Z axis should be 0.015mm	Vendor to confirm		
iii	Repeatability / Positional Scatter (Ps) for X,Y & Z axes should be 0.010mm			
iv	The value of positional accuracy & repeatability for entire traverse of X,Y,Z axes are also to be intimated along with offer.	Vendor to inform		

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
b	Geometrical Accuracy tests shall be in accordance with ISO 8636-2 or better. The detailed test charts shall be submitted with the offer specifying clearly the accuracies to be achieved on the machine.	Vendor to confirm & submit details		
c	Since the machine shall be installed in shop with operating conditions as per clause No 21.0, the vendor shall guarantee achieving the drawing accuracies on the job throughout the year.	Vendor to confirm		
d	Details of all standard accuracy tests to be conducted at supplier's as well as BHEL's works should be submitted with the offer.	Vendor to submit details		
e	Details of NAS and any other test piece machining, as per relevant standard, are to be submitted by the vendor. NAS test piece shall be provided by the vendor at their works as well as at BHEL, Hardwar.	Vendor to confirm & submit details		
29	PROVEOUT OF COMPONENTS AT BHEL, HARDWAR:			
	After successful completion of erection, testing and test piece machining at BHEL Hardwar, supplier shall carry out machining of the following component to the specified design accuracies and surface finish to prove the machine using cutting tools and CNC Program provided by the vendor. The prove-out component is likely to be:	Vendor to confirm		
29.1	HP Inner Casing (Drg No.:0-10502-09000) with Groove Plans (Drg No: 9-10107-45051). The job will be completely machined except for finish machining of Blade and Shaft Sealing Grooves and turning of Outer Peripheral Diameters. Only rough machining of blade & shaft sealing grooves to be performed.	Vendor to Note		
29.3	Complete process, process sheet, tool layout, setting scheme and time studies of the prove-out components are to be submitted with the offer. Time-study should be prepared separately for Upper & Lower halves.	Vendor to submit		

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
29.4	In the component (mentioned at S.No:29.1) there should be 2 set ups for each half. First Setup with the joint plane up for joint plane machining, rough groove machining, side face machining , lug machining & drilling etc. Second setup with joint plane down for peripheral machining. It is advised to carry out blade groove rough machining operation with Right Angle Head using Large Diameter Side & Facemill cutters. Diameter of the aforesaid cutter should be minimum 200mm more than the diameter of the front face of Right Angle Head.	Vendor to Note		
29.6	While preparing the time study and offer of the tools for the component, the vendor shall take care of the following points:			
a	Complete set of Tools & Tool- Holders required for prove-out of this Casing should be offered with item wise details & prices.	Vendor to confirm & submit details		
b	Consumables like inserts etc should be separately quoted for machining of 2 more similar casing in addition to the prove-out casing.	Vendor to confirm		
c	It is advised to use long tool holders with standard tools to meet the requirement of long tools wherever it is possible. HSS drills to be avoided wherever possible.	Vendor to Note		
d	For both special & standard tools, sketches/ catalogue details should be provided.	Vendor to submit details		
e	Tools of reputed tools manufacturer like Sandvik, Ingersoll, Walter Kennametal-Widia, Iscar, Seco etc., whose tools are easily available in India, shall be used for prove-out of component.	Vendor to Note		
f	Thread whirling / Thread Milling tools shall be used for threading M52 or above. Below this size taps can be used.	Vendor to Note		

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S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
29.7	Vendor shall be fully responsible for machining of proveout component as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Any additional item required for completion of prove out component shall be supplied by the vendor in the specified quantity without any implications to BHEL. Clarifications, if any required by vendor, regarding accuracy requirements of the proveout component, whether specified or not, should be discussed and cleared by vendor during initial technical discussions.	Vendor to confirm		
29.8	During proveout, all measurement of machined dimensions of the job shall be done by supplied Job Measuring System	Vendor to confirm		
29.9	Vendor shall be responsible, financially or otherwise, for any deviation/ rejection in proveout component due to wrong machining or malfunctioning of the machine during proveout machining and also for the delay in machining due to improper recommended tooling etc..	Vendor to confirm		
30	MACHINE ACCEPTANCE:			
30.1	Tests/Activities to be carried out at vendor's works by vendor on the machine before dispatch :			
a	Geometrical Accuracy Tests as per test chart.	Vendor to confirm & submit details		
b	Positioning Accuracy Tests as per VDI-DGQ/3441	Vendor to confirm & submit details		
c	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor to confirm		
d	Demonstration of all features of the machine, CNC system and all Accessories.	Vendor to confirm		
e	Machining of NAS Test Piece. Vendor to supply test piece.	Vendor to confirm & submit details		
30.2	Test to be carried out at BHEL works by the vendor while commissioning the machine :			
a	Geometrical Accuracy Tests as per test chart.	Vendor to confirm & submit details		
b	Positioning Accuracy Tests as per VDI-DGQ/3441	Vendor to confirm & submit details		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
c	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to confirm		
d	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor to confirm		
e	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to confirm		
f	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to confirm		
g	Machining of NAS Test Piece. Vendor to supply Test pieces.	Vendor to confirm & submit details		
h	Successful Job prove out as per clause 29	Vendor to confirm		
i	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts/ engineers during their stay at BHEL works	Vendor to confirm		
31	SPARES :			
31.1	Following spare parts of electrical/electronics/CNC system should be offered (All spares to be quoted with item-wise prices unless otherwise mentioned) :			
i	PCU-50 (as used on machine) with system software and with preloaded hard disk, Operator Panel OP-15A 15" TFT colour display, Diskette unit for PCU-50 with connecting cable, and NCU module used in the machine with PCMCIA Card & NCU box having fan and battery. -- to be quoted as package	Vendor to offer		
ii	PLC input and output cards set comprising 1 no. each type.-- to be quoted as package	Vendor to offer		
iii	I/R Module for 611D/U, Power Modules for milling spindle, X-axis (Gantry axis), Y-axis (horizontal traverse of the Universal Milling Head), Z-axis (Vertical Traverse of the Ram), B-and C axes of the Universal Milling Head.-- to be quoted as package	Vendor to offer		
iv	Heidenhain scanning heads for X-axis, Y-axis, Z-axis, Heidenhain encoders for B and C axes.-- to be quoted as package	Vendor to offer		
v	DC-UPS module with battery module (same as attached in machine) --1 no	Vendor to offer		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
vi	Power supply for PCU 50, DC 24V ---1no	Vendor to offer		--
vii	All PROFIBUS components -- to be quoted as a spare package if the vendor uses PROFIBUS in the machine	Vendor to offer		
viii	Renishaw control unit and set of probes. -- to be quoted as package	Vendor to offer		
31.2	Following spare parts should be included in the price of the machine:			
i	All proximity switches--2nos.each type used in machine	Vendor to offer		
ii	Set of Push Buttons--5nos. each type used in the machine	Vendor to offer		
iii	Set of Indicating Lamps--5nos each type used in machine	Vendor to offer		
iv	Limit Switch blocks--1 no each type used in the machine	Vendor to offer		
v	Magnetic contactors, relays, Protection Devices & Special Modules --1no each type used in m/c	Vendor to offer		
vi	Cables with connectors for Boring & Facing Head--1no each type	Vendor to offer		
31.3	Following spares to be offered for mechanical maintenance:			
i	Set of Gears for Right Angle Head.	Vendor to offer		
ii	All pumps (one of each type) including hydraulic, lubrication and coolant pumps & oil cooling pumps	Vendor to offer		
iii	All types of valves (2 Nos of each type) including D.C. control valves, Relieve valves, Reducing valves, Check valves, Flow control valves, Proportionate valves, pressure regulators, pressure reducer valves used on m/c.	Vendor to offer		
iv	All types of pressure switches, flow switches and float switches (2no. each type)	Vendor to offer		
v	Hydraulic Hoses - one set	Vendor to offer		
vi	Set of seals (for all clamping cylinder, all cylinders & pistons) & Shaft seals (2 Nos each type)	Vendor to offer		
vii	Metering valves/progressive lubrication system blocks & seals	Vendor to offer		
viii	All types of filter inserts (4 nos. each of regenerative type & 20 nos. each of disposal type)	Vendor to offer		
ix	Set of belts (including timing belts)	Vendor to offer		
x	O-Rings and Piston rings (5nos. of each type)	Vendor to offer		
xi	Accumulator with charging kit if the same is used in the m/c (1 no each type)	Vendor to offer		
xii	All types of pneumatic valves (1 no. of each type)	Vendor to offer		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
xiii	All couplings including hydraulic pump couplings, pressure sleeves etc.	Vendor to offer		
xiv	Any other recommended spare part essential for 2 years 2 shift trouble free working of machine should also be quoted with item wise price, specification and source of supply.	Vendor to offer		
31.4	Recommended set of Spares for 5 years, required for Chiller / Cooling Unit for oil (if Chiller / Cooling Unit is provided on the machine)	Vendor to offer		
32	TRAINING:			
a	Training for BHEL Engineers in English Language in the following fields for four weeks each shall be provided at supplier's works.	Vendor to confirm		
i	Programming	Vendor to confirm		
ii	Electrical / Electronics maintenance	Vendor to confirm		
iii	Mechanical maintenance	Vendor to confirm		
iv	Operation	Vendor to confirm		
b	Electrical / Electronic Maintenance Engineer and Programmer shall be provided training for 1 week each at the works of supplier of CNC System in India for the advanced features of Sinumerik 840D CNC system.	Vendor to confirm		
c	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	Vendor to Note		
d	basis.	Vendor to offer		
33	MANUALS:			
a	2 hard copies of All Siemen's Programming (Basic and Advance), Cycles, Measuring cycles, Tool Management, etc. and all Operation manuals will be supplied in English language along with the machine.	Vendor to confirm		
b	Following list/ diagrams/specs will be supplied in English language along with the machine.			
i	Basic Machine manual.	Vendor to confirm		
ii	Complete list of parts used in the machine.	Vendor to confirm		
iii	Assembly diagrams of all major assemblies with list of parts.	Vendor to confirm		
iv	Hydraulic, Pneumatic, lubrication and Coolant circuit diagrams along with part list with complete specification and make of each element used.	Vendor to confirm		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
v	List of all bearings, L.M. Guides, ball bushings etc. with full specification and make.	Vendor to confirm		
vi	Complete catalogue and list of all B.O.I. in a separate folder.	Vendor to confirm		
vii	Complete details with technical brochure of Cooling / Chilling Unit for oil, if provided on the machine	Vendor to confirm		
c	Following manuals will be supplied in English language along with the machine.	Vendor to confirm		
i	Electric Schematic of the machine -- 3 copies	Vendor to confirm		
ii	Wiring Layout of the machine -- 3 copies	Vendor to confirm		
iii	Machine Service manual which should include detailed written instructions on ATC and AWC --3 copies	Vendor to confirm		
iv	Catalogues of all bought-out items will be supplied. -- 3 Sets	Vendor to confirm		
v	Two CDs of latest Siemens 840D/611D documentation	Vendor to confirm		
vi	PLC program print-outs with comments in English. -- 3 Copies	Vendor to confirm		
vii	PLC program on CD, NC data & PLC data on floppy.---2copies	Vendor to confirm		
viii	Complete back-up of PCU-50 hard disk on GHOST CD and clear written Instructions (3 copies) to take back-up and reloading of a new hard disk.	Vendor to confirm		
ix	Diagnostic / service manual of the machine with detailed instructions on manual operation of ATC	Vendor to confirm		
34	<u>FOUNDATION BOLTS & LEVELING SHOES:</u>			
	The foundation bolts / anchoring materials / fixators / leveling shoes etc for the erection of the machine shall be provided by the supplier with the machine.	Vendor to confirm		
35	<u>FOUNDATION DETAILS / MACHINE LAYOUT:</u>			
35.1	In case of order, Supplier shall submit the preliminary layout drawing for getting BHEL's approval within 2 months from the date of placement of LOI / PO. Foundation design along with complete details and Final Layout drawings shall be submitted by the supplier within 2 months from the date of BHEL's approval. BHEL shall construct complete foundation for the machine under supervision of supplier and at supplier's responsibility.	Vendor to confirm		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	The value of allowable bearing capacity may be adopted as 11t/m ² (Lowest obtained from shear and settlement criteria at 4.2m depth). The gross value of bearing capacity may be adopted as 17t/m ² for an assumed footing size of 4m x 6m at a depth of 4.2m.	Vendor to Note		
b	The value of Angle of Internal Friction () may be adopted as 32deg at 4.2m depth.	Vendor to Note		
c	The Coefficient of Elastic Uniform Compression (Cu) may be adopted as 3.0 kg/cm ³ at 4.2m depth for 10m ² or more contact area of foundation.	Vendor to Note		
35.2	Vendor to indicate detailed specifications of grouting compound, grouting procedure etc required for grouting of foundation bolts of machine in the foundation of machine.	Vendor to confirm		
36	<u>OPERATION SAFETY:</u>			
	The design of the machine should be such as to provide for utmost operational safety. Mechanical and electrical stoppers, electronic interlocks should be provided to ensure co-ordinated functioning and to prevent damage to various elements of the machine. Headstock , Spindle, Guideways etc. to be protected against fall in oil level, overload or fall in compressed air pressure.	Vendor to confirm		
	Emergency Switches at suitable locations as per International Norms are to be provided.	Vendor to confirm		
37	<u>GUARANTEE:</u>			
	Vendor should offer Performance Guarantee of the Machine with all it's System & supplied items for a period of 24 months from the date of successful proveout, acceptance and handing over of the machine.	Vendor to confirm		
38	<u>ENVIRONMENTAL PERFORMANCE OF THE MACHINE:</u>			
	The machine shall conform to following factors related to environment :			
a	Maximum noise level shall be 85 dB(A) at normal load condition, 1M away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635-16. Supplier to demonstrate compliance to noise level, if asked for.	Vendor to confirm		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
b	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to confirm		
c	There should not be any effluent from the machine. In case there are any effluents from the machine, requisite effluent treatment plant or pollution control device should be built into the machine by the supplier.	Vendor to confirm		
d	No hazardous chemicals shall be required to be used in the machine.	Vendor to confirm		
e	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to confirm		
f	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to confirm		
39	QUALIFYING CONDITIONS:			
39.1	<p>Only those Vendors are required to quote who have supplied and commissioned at least one CNC Gantry Milling Machine for machining of large precision components of following minimum size and accuracies.</p> <p>1 SIZE: Length: 2700 mm, Width: 2000 mm & Height: 1000 mm in various shapes</p> <p>2 ACCURACIES: A. Surface finish of Ra 1.6 Microns with flatness of 30 Microns per meter. B. Geometrical Accuracies, like Perpendicularity, Parallelity, Run out etc., of 20 Microns on various surfaces and Holes on the jobs.</p> <p>The vendor will certify that the aforesaid accuracies have been achieved on the machine, referred by them for meeting the qualifying criteria of the tender. The vendor will also submit a certificate indicating willingness of their customer to allow visit of BHEL personnel to verify the same, if so desired by BHEL. The visit of BHEL personnel for its verification at the works of their customer will be at BHEL's cost. The machine should have been supplied during last 15 years and the supplied machine(s) should be presently working satisfactorily after its commissioning and acceptance.</p>	Vendor to confirm		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
39.2	The following information should be submitted by the vendor about the companies where similar machines have been supplied. This is required from all the vendors for qualification of their offer.	Vendor to submit		
a	Name and address of the customer/ company where supplied CNC Gantry Milling machine is installed.	Vendor to inform		
b	Application for which machine has been supplied complying with aforesaid.	Vendor to inform		
c	Year of commissioning.	Vendor to inform		
d	Following broad specifications of the aforesaid machine:			
	-- Machine model	Vendor to inform		
	-- Clearance between columns	Vendor to inform		
	-- Max. distance between spindle face & table top	Vendor to inform		
	-- Floor Plate size	Vendor to inform		
	-- Size of Square Ram	Vendor to inform		
	- Longitudinal travel (X – axis)	Vendor to inform		
	- Cross travel (Y – axis)	Vendor to inform		
	- Ram travel (Z – axis)	Vendor to inform		
	-- Vertical travel of Cross rail	Vendor to inform		
	-- Power of spindle motor	Vendor to inform		
39.3	Performance certificate from the customer regarding satisfactory performance of the machine supplied to them (Original performance certificate on company letter head or through e-mail directly from the customer) to be submitted. The original performance certificate can be returned after verification by BHEL, if required. Performance certificate should mention the Model No., Year of commissioning and broad specifications of the supplied machine confirming that the machine is being used for machining of large precision components as specified at 39.1 above. Name, designation, Phone No, Fax No and E-mail address of the contact person/ issuer of the Performance Certificate of the customer is to be informed.	Vendor to submit		
39.4	The supplied machine should be with square ram.	Vendor to confirm		
39.5	The vendor should have experience of manufacturing machines with Hydrostatic Guide Ways on linear axis.	Vendor to confirm & submit details		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
39.6	Technical evaluation of only those offers will be made who qualify as per the above qualifying conditions. Other offers shall not be considered.	Vendor to Note		
40	SPECIAL INSTRUCTIONS:			
a	Complete Reference list of the customers, to whom such machines have been supplied should be submitted with the offer, mentioning customer, M/c model, major specifications, CNC system, year of supply etc.	Vendor to inform		
b	The vendor should reproduce the specification and submit compliance / agreement / comment against each and every feature/item. Any deviation in the offer should be clearly highlighted against that particular item/feature.	Vendor to submit		
c	No tandem pump should be used.	Vendor to Note		
d	In case machine of exact specifications as mentioned above is not available, a machine nearest to these specifications on the higher side may be offered.	Vendor to Note		
e	Supplier should submit following details along with the technical offer :			
e1	The total connected load of machine and its peripherals.	Vendor to inform		
e2	Overall size of the machine	Vendor to inform		
e3	Total space requirement for the machine along with all the peripherals. Proper Layout drawing to be submitted along with the offer.	Vendor to inform		
e4	Weight of the machine and its major assemblies	Vendor to submit		
e5	Hardness of the Guideways.	Vendor to inform		
e6	Weight of the heaviest part & sub-assembly of the machine.	Vendor to inform		
e7	Size and details of the lead screws / ball screws.	Vendor to inform		
e8	Colour of the machine, RAL 6011	Vendor to confirm		
e9	Detailed catalogues , sketch / photographs of the m/c and accessories / attachments.	Vendor to submit details		
e10	Actual available machine traverses with Attachments.	Vendor to inform		
f	Hydraulic, Pneumatic & oil pipings should be preferably metallic except places where flexible pipings are essential.All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to confirm		
g	Oil & water piping shouldnot be located in the tray / trench in which electrical cables are laid.	Vendor to confirm		

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
h	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to confirm		
i	Vendor should ensure the proper earthing for the machine and its peripherals. Any material required for the same shall also to be supplied. The vendor can take earthing connection from the nearest column of the production shop.	Vendor to confirm		
j	In case of order, vendor shall supply the preventive maintenance work schedule/ requirement/ charts for the complete machine.	Vendor to confirm		
k	Vendor shall send bi-monthly progress report with digital photographs of machine, its major components and Sub-Assemblies for appraisal of progress of the machine by BHEL.	Vendor to confirm		
41	OPTIONAL ITEMS:			
41.1	PROGRAMMABLE UNIVERSAL MILLING HEAD WITH INDEXABLE B/A & C AXES FOR POSITIONING	Vendor to confirm		
a	C-axis : 360 Deg.	Vendor to inform		
b	A/B - axis : +/- 95 Deg. (minimum)	Vendor to inform		
c	Resolution : 0.5 Deg.(in both A/B & C axes)	Vendor to inform		
d	Transmittable Power : 50 KW	Vendor to inform		
e	Speed Range : 5 to 2000 rpm.	Vendor to inform		
f	Spindle taper : BT 50.	Vendor to inform		
g	Complete specifications of Indexable Universal Milling Head with its make, model number, photograph etc. are to be provided.	Vendor to submit details		
h	Power/Torque-Speed characteristic diagram of the Universal Milling head to be submitted with the offer.	Vendor to submit details		
i	External as well as through spindle Coolant System shall be available on the Head. Its details shall be submitted with the offer.	Vendor to confirm & submit details		
41.2	SETTING DEVICE (PORTABLE TYPE):			
	A suitable portable type job setting device for setting one job on one end of the table while machining on other job is under progress on the other end shall be offered by the vendor with complete details.	Vendor to confirm & submit details		
41.3	BORING & FACING HEAD (FOR HORIZONTAL M/CING):			

CNC GANTRY MILLING MACHINE

S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	Boring and Facing Head: Boring & Facing Head (preferably D'Andrea UT8-800) with suitable arrangement for machining of Max. internal Dia. 1300mm approx. and external diameter of 1100mm, in horizontal position. The accuracy of bores are to be of H7 tolerance and both axial & radial run outs of various bores should be within 0.02mm with surface finish of Ra 1.6 micron. Length of bores to be machined without entry of Boring Head shall be 500mm approx. The head shall be capable of working in 4 positions at 90 degrees each (i.e. 0 deg, 90 deg, 180 deg, 270 deg) in horizontal position. The vendor shall take care of the following points also	Vendor to confirm & submit details		
b	Complete set of standard tool holders & tools are to be offered along with complete technical details. Any special arrangement required to meet our requirement is also to be quoted along with details & drawings.	Vendor to submit details		
c	Tool holder with BT50 taper for presetting of the tools to be used on Boring and Facing Heads shall also be offered. Details of the same to be provided along with the offer.	Vendor to confirm & submit details		
d	Catalogue of above head along with details of the same to be submitted.	Vendor to submit		
e	All standard tool holders and accessories, available with above Head, should be quoted on item-wise basis.	Vendor to submit details		
f	External Coolant System shall be available on the Head. Its details shall be submitted with the offer.	Vendor to confirm & submit details		
41.4	MACHINE MONITORING SYSTEM (MMS) SIGNALS:			
	Following MMS signals would be made available on a specifically earmarked terminal strip. These MMS signals would be sourced from a SIMATIC S-7 PLC output card separately.	Vendor to confirm		
a	Control ON	Vendor to Note		
b	Cycle ON	Vendor to Note		
c	Spindle Running	Vendor to Note		
d	Feed Active (Any of the axes moving)	Vendor to Note		
e	M30 (Program Stop)	Vendor to Note		
41.5	SPECIAL OPERATOR'S PLATFORM:			

CNC GANTRY MILLING MACHINE

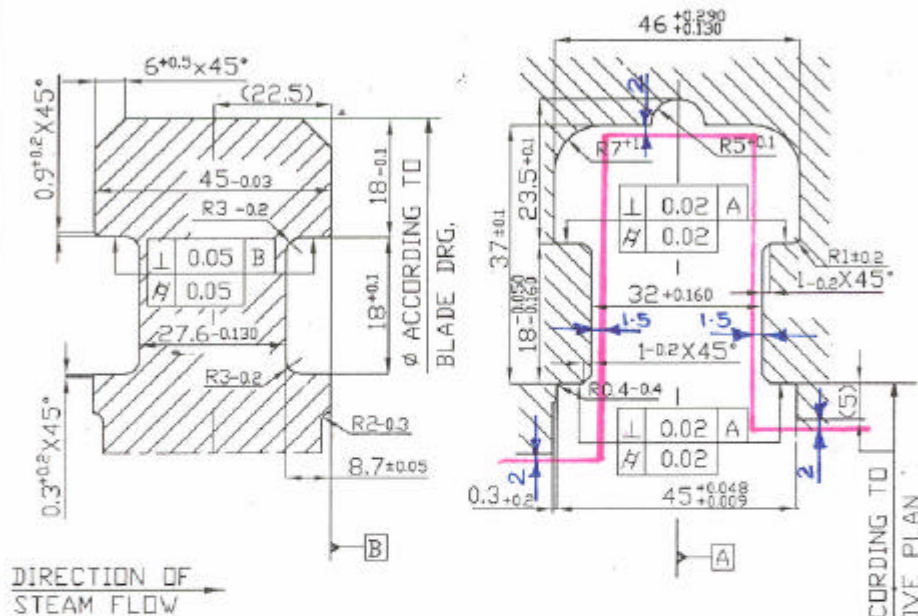
S.NO	FEATURES AS PER SPECIFICATIONS	OFFERED BY VENDOR	DEVIATIONS	REMARKS
a	As an alternative to Operator Platform mentioned at clause No.: 17, Operator's Platform shall be mounted on an auxiliary portal. This auxiliary portal shall be attached to the main portal for movement along X axis. The platform shall move in vertical direction by more than the vertical clearance of 3.5m of the machine. The horizontal movement along Y axis shall be such that the operators platform moves across to other side by complete traverse along Y-axis. The horizontal & vertical movement shall be motorized and independent of each other and shall work with suitably mounted push buttons. The operator's pendant shall be located on the operator's platforms on both sides. Power Socket of 220V with switch shall be provided on operator's Platforms at convenient location.	Vendor to confirm & submit details		
b	Party shall submit the details of the operator's platform offered along with sketches, photographs. Layout / Location of the offered Operator's platform on the machine should also be submitted.	Vendor to submit details		

FIRST ANGLE PROJECTION

(ALL DIMENSIONS ARE IN mm)

FOR

REV	DATE	ALTERED	REV	DATE	ALTERED	GMS No./ C.B.O.M. NO.			STATUS OF DRG U								
		CHECKED				CHECKED	91010741000										
ZONE					ZONE					AGREED	NAME	SIGN	DATE				
										DEPT							
										STT				Y.P. ANAND			
						NCT	P.K.ARORA										
GRADE OF UNTOLODIM M/CG. 2/M/F -AA0230208														WELDING A/B/C/D AAD621104		GAS CUTTING-T3 AAD621101	

3D
VALL OVERDIRECTION OF
STEAM FLOW

BLADE ROOT

BLADE GROOVE

LEGEND



AREA TO BE MACHINED

6661576
Ref. Drawing No.

Sign & Date

BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

	NAME	SIGN	DATE	NO. OF VAR
DRN	HANS LAL	Sd/-	07.3.03	
CHD	P.K.BANSAL	Sd/-	20.3.03	
APPD	T.K.GHOSH	Sd/-		

Inventory No.	DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
	CODE 4011	NTS		91010741000		
TITLE : ROOT AND GROOVE FOR GUIDE BLADE				CARD CODE	DRAWING NO. 4-10107-41012	22 23 24
				SHEET No. 01 No. OF SHEETS 01		

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6661576

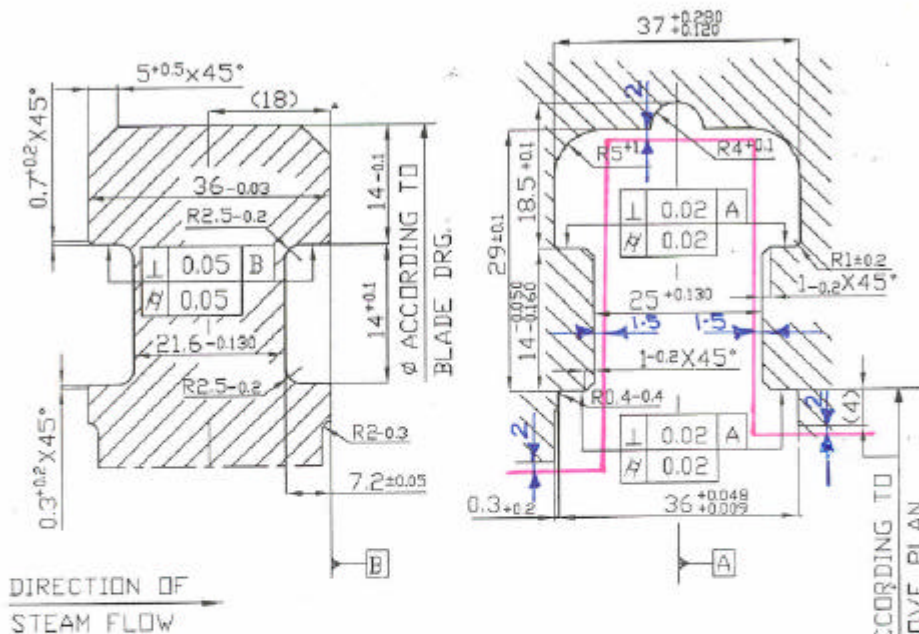
Ref. Drawing No.

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm)

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REV	DATE	ALTERED	REV	DATE	ALTERED	SMS No./ C.B.O.M. NO.	STATUS OF DRG
		CHECKED			CHECKED	91010741000	U
ZONE			ZONE			AGREED DEPT	NAME
						STT	Y.P. ANAND
						NCT	P.KARORA
GRADE OF UNTOL.DIM		M/CG. 2/4/7 -AA0230208	WELDING V/B/E/D		AA0621104	GAS CUTTING-T3 AA0621101	

32 ALL OVER



BLADE ROOT

BLADE GROOVE

LEGEND

AREA TO BE MACHINED

6661556
Ref. Drawing No.

Sign & Date



BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

NAME	SIGN	DATE	NO. OF VAR
DRN HANS LAL	Sd/-	07.3.03	
CHD P.K.BANSAL	Sd/-	20.3.03	
APPD T.K.GHOSH	Sd/-		

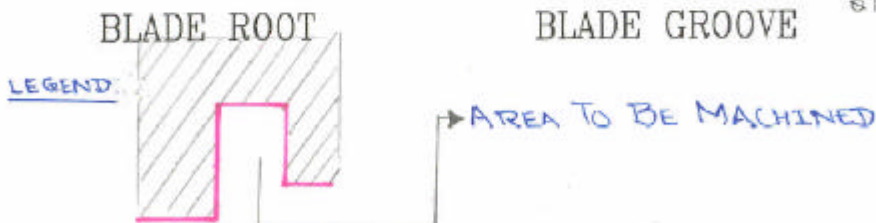
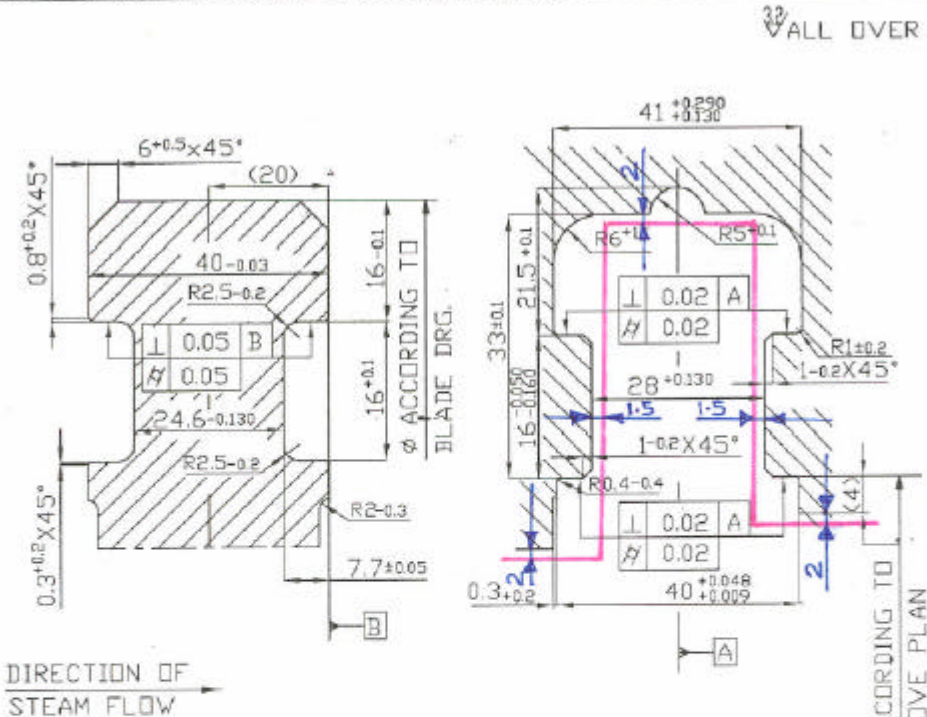
DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	NTS		91010741000		
TITLE : ROOT AND GROOVE FOR GUIDE BLADE			CARD CODE	DRAWING NO. 4-10107-41013	
				SHEET No. 01 No. OF SHEETS 01	

100 200 300 400 500 600 700 800 900 1000

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN mm) FORM DG-400

REV	DATE	ALTERED	REV	DATE	ALTERED	GMS No./ C.B.O.M. NO.	STATUS OF DRG U
		CHECKED			CHECKED	91010741000	
ZONE			ZONE			APPROVED DEPT	NAME
						STT	Y.P. ANAND
						NCT	P.K. ARORA
GRADE OF UNTOLD DIM		M/CG. 1/4/F		-AA0230208		WELDING A/B/G/B AA0621104	
						GAS CUTTING-T3 AA0621101	

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6661566
Ref. Drawing No.

Sign & Date




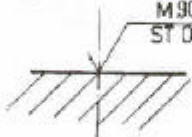
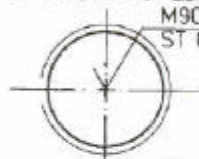
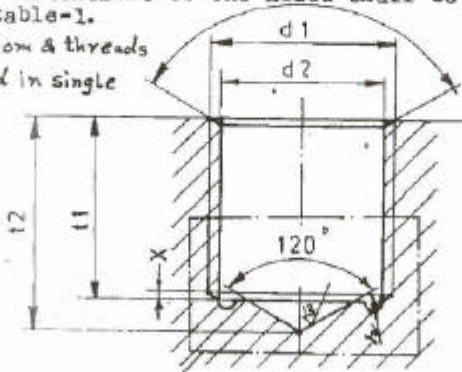
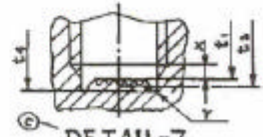
BHARAT HEAVY ELECTRICALS LTD.
RANIPUR, HARDWAR

NAME	SIGN	DATE	NO. OF VAR
DRN HANS LAL	Sd/-	07.3.03	
CHD P.K. BANSAL	Sd/-	20.3.03	
APPD T.K. GHOSH	Sd/-		

DEPT STE	SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM No.	NO. OF ITEMS
CODE 4011	NTS	—	91010741000	—	—
TITLE : ROOT AND GROOVE FOR GUIDE BLADE			CARD CODE	DRAWING NO.	
				4-10107-41014	
				SHEET No. 01	No. OF SHEETS 01

102 5 102 102

102 102 102

SIGN & DATE INVENTORY No. SUPERSEDES COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company. TUN 12100-02 SIGN & DATE INVENTORY No.		PRODUCT STANDARD STEAM TURBINE ENGINEERING	FORM ST 01013 PAGE 2 OF 4			
	DIMENSIONS OF THREADED HOLES FOR STUDS AND BOLTS (WITH RELIEVING GROOVES)					
	1. SCOPE: 1.1 This standard gives information as to the correct dimensions of threaded holes for heat resistant studs or bolts. 2. DESIGNATION: The representation on the drawings may be outlined either with complete dimensions or by listing the abbreviated designations with reference lines as per fig.1 or fig. 2 depending on the position of hole. For example threaded hole size $d_1 = M90 \times 6$ shall be designated as:-					
	<div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  FIG. 1 </div> <div style="text-align: center;">  FIG. 2 </div> </div>					
3. DIMENSIONS, TOLERANCE AND SURFACE FINISH: Course and fine pitch basic thread size as per AAO230202 Tolerance class 6H 3.1 Other dimensions of the holes shall be as per fig.3 and table-1.						
<div style="display: flex; align-items: flex-start;"> <div style="flex: 1;"> <p>Blind hole bottom & threads to be machined in single setting.</p>  FIG. 3 </div> <div style="flex: 1; padding-left: 20px;"> <p>3.2 THE REST</p> <p>Shape & dimensioning as per Detail-Z acceptable if hole is drilled with special drill specified by Turbine Technology.</p>  DETAIL-Z </div> </div>						
Revision : Date :		Distribution : Qty. Approved : <div style="text-align: center; border: 1px solid black; padding: 5px;"> ENGG. DEV. MANAGER </div> <table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:33%;">Prepared</td> <td style="width:33%;">Issued</td> <td style="width:33%;">Date</td> </tr> </table>		Prepared	Issued	Date
Prepared	Issued	Date				

SIGN & DATE

SUPERSEDES

INVENTORY No.

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TUN

12100-02

SIGN & DATE

INVENTORY No.

P-1047



PRODUCT STANDARD

STEAM TURBINE ENGINEERING

FORM

ST 01013

PAGE 2 OF 5

TABLE-1: All dimensions are in MM.

Thread d ₁	M30	M33	M36	M39	M42	M45	M48	M52	M56	M64	M72x6
d ₂	26.5	29.5	32	36	37.5	40.5	43	47	50.5	58	66
r	1.6	1.6	1.6	1.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5
t ₁	46.5	49	54.5	57	62.5	65	70	74	80	90	97
Allw. dev.	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6	+0.6
t ₂	48.5	51	56.5	60	65.5	68	76	80	86	96	103
X	9	9	10	10	11.5	11.5	12.5	12.5	14	15	15
t _{3 max.}	48.5	52	57.5	60	65.5	68	74	78	84	94	102
t ₄	49.5	53	58.5	61	66.5	69	75	79	85	95	103

CONTD.

Thre- ad d ₁	M80x6	M90x6	M100x6	M110x6	M120x6	M130x6	M140x6	M160x6	M180x6
d ₂	74	84	94	104	114	122	132	152	172
r	2.5	4	4	4	4	4	4	4	4
t ₁	104	113	122	131	140	159	168	188	206
Allw. dev.	+ 1	+1	+1	+1	+1	+1	+1	+1	+1
t ₂	110	119	128	139	148	172	182	204	224
X	15	16	15	15	15	20	20	20	20
t _{3 max.}	109	116	127	137	146	167	176	196	214
t ₄	110	119	128	138	147	168	177	197	215

4 AREAS IN TURBINE PARTS WHERE THESE TAPPED HOLES MUST BE MADE:

4.1. All tapped holes in valve housing which is used for the entry of live steam, Reheat steam, and saturated steam, inclusive of steam dump valve and extraction valve.

4.2. Areas on IP innercasing and saturated steam inner housing only these tapped holes, as shown in FIG.4

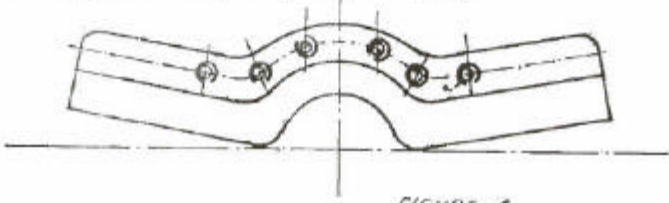
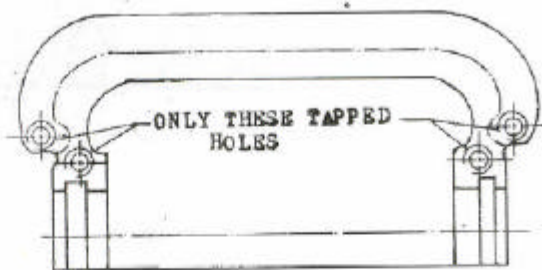
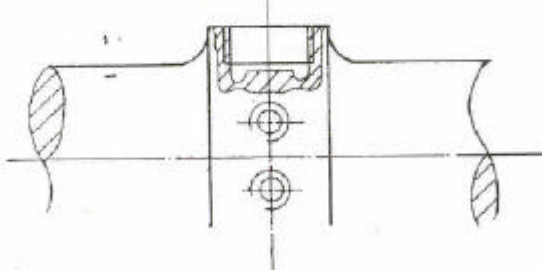


FIGURE - 4

SIGN & DATE SIGNATURE DATE		PRODUCT STANDARD STEAM TURBINE ENGINEERING		FORM 1 ST 01013 PAGE 4 OF 5	
SUPERSEDES INVENTORY No.		4.3 AREA ON SATURATED STEAM - OUTGASING			
COPYRIGHT AND CONFIDENTIAL The information contained herein is the property of BUSHAW HEAVY ELECTRICALS LIMITED. It shall not be used directly or indirectly in any way prejudicial to the interest of the company.		 <p>ONLY THESE TAPPED HOLES</p>			
12100.02 TUN		FIG-5			
12100.02 TUN		4.4 HOLES FOR BEARING ON ROTOR			
12100.02 TUN					
12100.02 TUN		FIG-6			
12100.02 TUN		5. NOTE 5.1 FOR HOLES WITHOUT RELIEVING GROOVES REFER STANDARD ST-01007 6. Cross referred standard. AA 0230202, ST01007			

QUALITY PLAN FOR CAPITAL MACHINE TOOLS

BHEL QC-178			NAME OF SUPPLIER-----NAME OF EQUIPMENT----- - Q.P NO.-----REV NO.-----INDENT NO----- SPECIFICATION NO.-----REV NO.-----						SHEET-----OF----- * P-PERFORMANCE 1.BHEL REP W-WITNESSED BY 2.VENDOR V-VERIFIED BY 3.SUB - VENDOR FINALLY TO BE REVIEWED BY BHEL HARDWAR			
SL. NO.	MAJOR COMPONENTS / SUB ASSEMBLIES	DETAILS OF COMPONENTS GOING IN THE ASSLY 'COL-2'	CLASSIFICATION MATERIAL GRADES	TYPE OF CHECKS (SEE DETAILS AT ANNEX-I)	QUANTUM OF TEST REFERENCE DOCUMENT FOR TESTING	REFERENCE DOCUMENT FOR TESTING	ACCEPTENCE NORMS	FORMAT OF RECORDS	AGENCY FOR TESTING (TO BE PROPOSED BY VENDOR)*			REMARKS
1	2	3	4	5	6	7	8	9	10	11	12	13

Prepared by:
 (Signature and seal of the Head of
 Quality Management Of Supplier's works)
NOTE: Annexure-I is enclosed herewith

Approved by:
BHEL Hardwar
 (Signature & Seal of Approving Authority)

TYPE OF CHECK FOR COL. NO. 5

Code	Description	Code	Description
1.	Visual	17.	No Load / Free running Test
2.	Dimensional	18.	Load / Over Load Test
3.	Fitment and alignment	19.	Measurement of speed / RPM
4.	Physical Test (Sample)	20.	Surface Finishing
5.	Chemical Test (Sample)	21.	Manufacturing Test Certificate for Bought
6.	Ultrasonic Test (UT)		Out Items (BOIs)
7.	Magnetic Particle Test (MPI)	22.	Internal Inspection Report by Contractor
8.	Radiography Test (RT)	23.	Hardness Test
9.	Dye Penetration Test (DPT)	24.	Acoustical Test
10.	Welder's Qualification Test	25.	High Voltage (HV) Test
11.	Heat Treatment	26.	Megger Test
12.	Pressure Test Leakage Test Balancing	27.	Circuit / Continuity Check
13.	Leakage	28.	Simulation Checking
14.	balancing	29.	Any other relevant tests to Assure the
15.	Vibration Test		performance of the Equipment
16.	Performance	30.	Proof Testing at BHEL Hardwar