



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirapalli – 620014, TAMIL NADU, INDIA

MATERIALS MANAGEMENT / CAPITAL EQUIPMENT

ENQUIRY NOTICE INVITING TENDER	Phone: +91 431 257 7653 Fax : +91 431 252 0719 Email : skaruna@bheltry.co.in Web : www.bhel.com
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TWO PART BID Tender to be submitted in Two Parts	Enquiry Number: 2731200004	Enquiry Date: dt. 29.06.2012	Due date for Submission of quotation dt. 31.07.2012
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You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 Hrs on the date of tender opening

Item No.	Item Description	Quantity
10	Supply of Bridge Type Double Column Moving Table CNC drilling and Milling Machine as per the Technical Specification, & Commercial Conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.

Important Points to be taken care during the submission of offer:-

1. Check list to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
2. Guarantee for the Items to be 18 months from the date of supply or 12 months from the date of commissioning.

BHEL's General guidelines /instructions including bank guarantee formats and list of consortium banks, commercial terms checklist can be downloaded from BHEL web site <http://www.bhel.com> or from the government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) Tender Enquiry reference "2731200004"

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED Engineer / MM / Capital Equipment
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COE – TI - ATP : Bridge Type Double Column Moving Table CNC Drilling cum Milling Machine
PART A

SECTION – I : QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer:

Sl. No.	REQUIREMENTS	VENDOR's RESPONSE
1	<p>Only those vendors (OEMs), who have supplied and commissioned at least ONE Bridge Type - Double Column- Moving Table CNC Drilling cum Milling Machine – 1 No (with drilling Capacity of dia 50 mm or higher and milling capacity of dia 30mm or higher with Spindle travel of 300 mm or higher) in the past ten years (from the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (from the date of opening of Tender) should quote.</p> <p>However, if such machine had already been supplied to BHEL, then that machine should be presently working satisfactorily for more than six months after its commissioning and acceptance (from the date of opening of Tender).</p>	
	The vendor should submit following information where similar machine has been supplied for qualification of their offer.	
1.1	Name and postal address of the customer or company where similar machine is installed.	
1.2	Name and designation of the contact person of the customer.	
1.3	Phone, FAX no and email address of the contact person of the customer.	
1.4	Month and Year of commissioning of the machine.	
1.5	Application for which the machine is supplied	
1.6	Along with the Technical offer, the Vendor should submit one Performance certificate from the customer for the satisfactory performance of the machine supplied to them. For obtaining the Performance certificate, a suggestive format is provided in SECTION – IV .	
1.7	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	
2.0	<p>DELIVERY - The bidder shall quote the best possible delivery. However the delivery shall not exceed 9 months with an additional grace period of 3 months. The additional grace period will attract a penalty which is explained in the commercial terms of the enquiry.</p> <p>The delivery period shall be reckoned from date of purchase order to despatch from the vendor works.</p>	

COE – TI - ATP : Bridge Type Double Column Moving Table CNC Drilling cum Milling Machine
PART A

SECTION – II

The BIDDER / VENDOR is requested to provide the following information:

S. No.	REQUIREMENTS	VENDOR'S RESPONSE
3.0	The BIDDER/VENDOR to furnish Reference List of Customers, with full address, details of contact person, where Bridge Type Double Column Moving Table CNC Drilling cum Milling Machine have been supplied in the past.	
4.0	Details of Bridge Type Double Column Moving Table CNC Drilling cum Milling Machine supplied to other BHEL units, if any. (Year of commissioning, Spindle size of machine, Spindle motor power)	
5.0	Details on SERVICE-AFTER-SALES Set-Up in India including the Address of Agents / Service Centers in South India.	
6.0	Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment.	

SECTION – III

The BIDDER to note:

S. No.	PARTICULARS	VENDOR'S RESPONSE
7.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS. 1. Technical Offer [with PART A & PART B] & commercial offer 2. Price Bid.	
8.0	The Technical Offer shall contain a comparative statement of Technical Specifications demanded by BHEL and Offer Details submitted by the Bidder , against each clause. A just 'CONFIRMED' or 'COMPLIED' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
9.0	The Technical Offer shall be supported by product Catalogues & Data Sheets and also technical details of Bought-Out-Items with copies of Product Catalogue to the extent possible.	
10.0	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation.	

COE – TI - ATP : Bridge Type Double Column Moving Table CNC Drilling cum Milling Machine
PART A

SECTION – IV

The performance certificate should be produced on **Customer's Letter Head**.

PERFORMANCE CERTIFICATE

1. Supplier of the machine		
2. Make & Model of the M/C		
3. Month & Year of Commissioning		
4. Application for which M/C is used		
5	a) Spindle Taper b) Maximum drilling & milling capacity c) Spindle Power d) Table Size e) WT. Carrying Capacity f) CNC System	
6. Performance of the Machine (Strike off whichever is not applicable)		Satisfactory / Good / Average / Not Satisfactory
7. Any Other remarks		
Date:		Signature & Seal of the Authority Issuing the Performance Certificate

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
1.0	PURPOSE: This machine is intended for machining and drilling of castings, forgings, fabricated equipments, assemblies and sub-assemblies of heat exchangers and pressure-vessels. The various operations to be carried out are: Profile milling (Internal and External), Drilling, reaming, Tapping, and Thread cutting NOTE: During machining operations, the machine will be subjected to intermittent load as machining will be carried out on welded and clad surfaces.	Vendor to Confirm
1.1	WORKPIECE MATERIAL SPECIFICATION: The work piece material will be Carbon steel, Alloy steel, Special steels (like quenched and tempered steel), Stainless steel, Incoloy and Titanium. The hardness of the material will be in the range of 200 to 250 BHN. Some of the work piece materials are work hardening types.	Vendor to Confirm
2.0	MACHINE DETAILS:	
2.1.0	CONSTRUCTION:	
2.1.1	Vendor to furnish constructional details of the machine including explanatory drawings of various components/ assemblies like column, bridge, spindle head stock, machine bed, guide ways, feed Transmission System, Feedback System etc. of the machine with details of material & their hardness.	Vendor to Furnish
2.1.2	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features should be enclosed with the offer	Vendor to Submit
2.1.3	Machine should be Metric execution. (Construction wise)	Vendor to Confirm
2.1.4	All guide ways shall suitably be designed to maintain required accuracy level for a long life cycle.	Vendor to confirm & provide details
2.2.0	Spindle head stock:	
2.2.1	No. of milling heads – One	Vendor to Confirm
2.2.2	Spindle head stock shall be of rigid enclosed box type construction with proper guide ways and “Ball screw & Nut arrangements” for precise vertical and horizontal movements.	Vendor to confirm & provide details
2.2.3	Spindle Nose Taper – preferably ISO 50	Vendor to specify
2.2.4	Speed range: Stepless – Min. 5 RPM (or less) to 2500 RPM (or more)	Vendor to specify
2.2.5	Spindle Motor Power – Min 22 KW (AC Continuous Rating - S1): The spindle drive and motor shall be of Fanuc / Siemens. (Details of model, make, type etc. of the motor & drives to be furnished in the offer	Vendor to confirm & provide details
2.2.6	Torque at 100% Duty cycle	Vendor to Specify

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.2.7	Maximum weight of the Tool that can be mounted on the spindle	Vendor to specify
2.2.8	Vertical Travel of the Spindle (Z-axis) : Min. 600 mm.	Vendor to Confirm & Specify
2.2.8	Spindle Feed range	Vendor to specify
2.2.9	Spindle Speed range selection : Electro Hydraulic system through CNC	Vendor to confirm
2.2.10	Vertical feed rate of the Spindle (Z axis) (Stepless)	Vendor to specify
2.2.11	Rapid speed of the Spindle in Z axis	Vendor to specify
2.2.12	Torque-Power-Speed characteristics of the spindle system to be submitted by the vendor along with offer	Vendor to provide details
2.2.13	The machine shall be equipped with compensation system (if required) for deflection / deformation in cross rail due to movement of Spindle head / Ram – with or without tools & attachments	Vendor to confirm & provide details
2.3.0	Columns & Cross rail	
2.3.1	No. of columns – Two	Vendor to confirm
2.3.2	Distance between columns : around 3000mm	Vendor to specify
2.3.3	Horizontal travel of the Spindle head / Ram along the Cross rail (Y Axis) – Around 3000 mm	Vendor to specify
2.4.0	Vertical Travel of Ram (OR) Cross Rail (W- Axis): Either the Ram or Cross rail carrying the spindle shall have a movement in vertical direction (W–Axis) which may a programmable (or) non-programmable axis.	Vendor to confirm & specify
2.4.1	Vertical travel (W –Axis) distance of the Ram (or) Cross Rail	Vendor to specify
2.4.2	Vertical feed rate of the Ram / Cross rail (W axis) :	Vendor to specify
2.4.5	Rapid speed of the Ram / Cross rail in W axis	Vendor to specify
2.4.6	Motor power for Cross travel of the Spindle head / Ram. The motor shall be of Fanuc / Siemens. (Details of model, make, type etc. of the motor & drives to be furnished in the offer	Vendor to confirm & provide details
2.4.7	Feed rate of the Spindle head / Ram along the Y Axis (Stepless)	Vendor to specify
2.4.8	Rapid speed of the Spindle head / Ram along the Y Axis	Vendor to specify
2.5.0	Movable machine Table :	
2.5.1	Length X Width of the Table : Around 3000 mm X 3000 mm	Vendor to specify
2.5.2	Weight carrying capacity of the Table: Approx 10,000 Kg	Vendor to specify

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.5.3	Longitudinal travel of the table (X Axis) : Around 3000 mm	Vendor to specify
2.5.4	Feed rate of the table along X-Axis	Vendor to specify
2.5.5	Rapid Speed of the table along X-Axis	Vendor to specify
2.5.6	Table Drive Motor Power – (AC Continuous Rating - S1): The drive and motor shall be of Fanuc / Siemens. (Details of model, make, type etc. of the motor & drives to be furnished in the offer	Vendor to Confirm & Specify
2.5.7	Min distance between table top face and the face of the spindle, when the spindle at its bottom most position.	Vendor to specify
2.5.8	T slot size	Vendor to specify
2.5.9	T slot pitch & No. of Slots	Vendor to specify
2.5.10	The machine shall be equipped with balancing system (if required) for deflection / deformation of the bed with or without the component load.	Vendor to confirm & provide details
2.6	<u>Metallic Telescopic Covers</u> Roof shaped Metallic Telescopic Covers (walk on type) of rust resistant material to be provided with wipers for the traversing axes. Telescopic covers should be sealed to avoid mixing of coolant & hydraulic oil. Column guide ways are to be completely covered.	Vendor to Confirm
2.7	CHIP AND COOLANT SPLASH GUARD: Guard is to be provided to protect the area around the machine against flying chips and coolant splash. Vendor to furnish the details.	Vendor to specify
2.8	FEED DRIVE SYSTEM	
2.8.1	Axes Feed motors [AC servo motors] and drives (digital) shall be of FANUC / SIEMENS make (Details of model, make, type etc. to be furnished in the offer)	Vendor to confirm & provide details
2.8.2	Feed- back system: Linear Scale / rotary encoder shall be of FANUC/ SIEMENS/ HEIDENHAIN make. (Details to be furnished in the offer)	Vendor to specify

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.8.3	<p>Type of power transmission: Pre-loaded backlash-free re-circulating ball screw drive for feed drive axes.</p> <p>Detailed Specification for all ball screws used in the machine shall be submitted. The specification shall address the following points: (a) Diameter, (b) Pitch (c) Length (d) Make (e) Model</p>	Vendor to confirm & provide details
2.8.0	OPERATION AND CONTROL SYSTEM:	
2.9.1	<p>OPERATOR'S PANEL: Operator's panel having complete CNC and machine control system with monitor of required configuration shall be provided for convenient and efficient operation.</p> <p>All switches should be within reach of operator. All displays/indications should be conveniently placed. Chip guard / splash guard shall be provided for the operator. (Layout showing complete details should be submitted with the offer)</p>	Vendor to Submit
2.9.2	CNC SYSTEM & FEATURES:	Vendor to specify
2.9.2.1	Make: Fanuc / Siemens	Vendor to confirm
2.9.2.2	Type: PC based latest version (With Simultaneous interpolation of three axes)	Vendor to confirm
2.9.2.3	Model: Suitable and Latest version, as available at the time of ordering, should be supplied.	Vendor to Submit
2.9.2.4	Details of Standard features. List to be submitted by vendor.	Vendor to Submit
2.9.2.5	Details of optional features: Optional features recommended by vendor to be submitted.	
2.9.2.6	The system should have full alphanumeric keyboard, TFT color display unit (preferably 17"), additional draw-out type QWERTY Key Board and mouse in suitable enclosure, RS232C serial interfaces, parallel interface for printer, COM port for tele-diagnostics, network ready for LAN, MPG unit with axis selector switch for all axes, USB port / PCMCIA port for data transfer, graphic simulation and preinstalled system software & other required software etc. (Details should be submitted by Vendor).	Vendor to Confirm & Vendor to Submit
2.9.2.7	Spindle power display shall be available on the operator's panel / screen	Vendor to Confirm
2.9.2.8	The CNC system should have a feature for locking axes through M codes.	Vendor to Confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.9.3	MANUAL CONTROL: Complete manual control of machine with required switches / keys should be provided on operator's panel for selection of required axis, axis direction, cutting feed, spindle rpm, Direction of Spindle Rotation (with inching) i.e. CW/ CCW, cutting feed and spindle rpm on/off, display of axis position values etc, for manual operation without using CNC program or MDI mode. (Diagram/ Sketches for switches/ keys provided on operator's pendant to be submitted).	Vendor to Confirm & Vendor to Submit
2.9.4	HAND HELD UNIT (HHU): Hand held unit of FANUC/SIEMENS make with sufficient length cable to be provided. The HHU shall have the following features: axis selection, movement of axis through Manual Pulse Generator (MPG), position display for the selected axis, Emergency stop. This is required for job setting. Details of the offered HHU to be furnished.	Vendor to Confirm & Vendor to Submit
2.9.5	UPS FOR CNC SYSTEM: A UPS to give a minimum backup of 15 minutes for the CNC system in case of sudden power failure to be provided.	Vendor to specify
2.10	MACHINE LIGHTS:	
2.10.1	Machine Lights for sufficient illumination of complete working area.	Vendor to Confirm
2.10.2	A magnetic base portable spotlight with sufficiently long cable should also be provided. Voltage for the lamp shall be 24 V	Vendor to Confirm
2.10.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents.	Vendor to Confirm
2.10.4	Flashing / rotary type light shall be provided to indicate End of Cutting and Program Stop.	Vendor to Confirm
2.11	AIR CONDITIONERS: Suitable cooling system (considering specified ambient conditions) to be provided for all Electrical / Electronic Panels / Cabinets and Operator's Panel. Make: Rittal / Warner & Finley / Advance Cooling or any other reputed make acceptable to BHEL. Detailed specifications to be submitted.	Vendor to Submit

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.12	HYDRAULIC SYSTEM:	
2.12.1	The System should be centralized, modular / stacked valve construction having minimum number of pipes / pipe joints and located on ground level with easy accessibility of components for maintenance.	Vendor to Furnish Details
2.12.2	Pumps, valves, accessories etc shall be of Rexroth / Vickers or equivalent reputed make acceptable to BHEL. (Details to be submitted along with the offer). The seals used in cylinders shall be of Merkel / Parker / Bushak + Shamban / Hunger / Simrit make.	Vendor to confirm & furnish details
2.12.3	Each pump should have an independent motor. Tandem pumps shall be avoided. Immersion type pumps also to be avoided.	Vendor to confirm
2.12.4	Suitable filtration system should be provided with Duplex / standby filter units. It is preferable to use re-usable type of filter elements in the system. The filter unit shall be of Hydac / Parker / Rexroth or equivalent reputed make acceptable to BHEL. (Details to be submitted along with the offer).	Vendor to confirm & furnish details
2.12.5	The flexible hoses used in the system shall be of Gates / Aeroquip / Parker or any other reputed make acceptable to BHEL.	Vendor to specify
2.12.6	Alarm indication / messages for oil low level, over temperature, low pressure, filter clogging should be provided in the CNC system.	Vendor to confirm & furnish details
2.12.7	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System at a temperature not exceeding 50 deg C irrespective of the ambient conditions to be provided. BHEL prefers to have direct cooling of oil in the chiller rather than indirect water cooling type. Complete details should be submitted with the offer.	Vendor to confirm & furnish details
2.12.8	It should be possible to replace hydraulic elements like valves, manifolds etc without disturbing the associated pipelines. The positioning of hydraulic elements should allow easy maintenance	Vendor to furnish details
2.12.9	Maximum Operating Pressure of hydraulic system	Vendor to specify
2.12.10	Main Pump flow in lpm and Motor Power in kW	Vendor to specify
2.12.11	Reservoir capacity (in litres)	Vendor to specify
2.12.12	All oil pipelines shall be of seamless steel and should undergo pickling process.	Vendor to confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.12.13	Pressure measuring minimess check points (preferably with ¼" BSP stud end) shall be provided for important pressure measurements from operation, trouble shooting and maintenance point of view. Two sets of hand held minimess pressure gauge of suitable range with minimess hose (1.0 to 1.5m length) also to be supplied along with the power pack.	Vendor to furnish details
2.12.14	All cylinders used in the machine should have standard bore and rod sizes. The piston rod shall be hard chrome plated.	Vendor to furnish details
2.12.15	Suitable stand-by pump unit, filter unit, etc shall be provided for critical areas	Vendor to furnish details
2.12.16	The Power pack should be designed taking into account the energy efficiency (Hi-low pump system, proper unloading of motor during pump idling, etc.). The motor used for pumps shall be energy efficient one (EFF-1).	Vendor to furnish details
2.12.17	All the pipe / hose end fittings shall be of standard weld nipple with O-ring seating type (DIN 3865 or equivalent) - female swivel nut with 24° cone and o-ring and no ferrule joints are to be used in the hydraulic system. All threaded connections shall be of metric sizes	Vendor to confirm
2.12.18	Suitable vibro-mounts, compensators (flexible bellows), flexible hose at the pump outlet, polypropylene clamps for pipes & hoses, etc are to be provided to minimize the vibration induced and transmitted to the hydraulic joints.	Vendor to confirm
2.12.19	The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68	Vendor to specify
2.12.20	The maximum pressure of the system should preferably not to exceed 310 bar	Vendor to specify
2.12.21	The coil voltages for the Solenoids used in the machine shall be of 24-V DC and all solenoid operated DC valves should have provision for manual over-ride and light indication.	Vendor to specify
2.12.22	The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems.	Vendor to furnish details
2.12.23	All hydraulic pipelines, hoses and electrical control cables to be neatly laid out with proper clamps and flexible hose conveyors wherever required.	Vendor to confirm
2.12.24	Suitable metallic tray for collecting leakage oil to be provided wherever required.	Vendor to confirm
2.12.25	Metallic identification number plates shall be pasted near all the components in the hydraulic power pack as per the numbering scheme used in the hydraulic circuit.	Vendor to confirm
2.12.26	First filling of all required Oils & Grease etc. should be supplied by vendor. The supplied Oils & Grease should be Indigenous (Indian) source of Indian Oil Corporation Ltd. (IOC) only.	Vendor to confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.13	Machine lubrication: Automatic centralized lubrication system with timer control and suitable metering cartridges to be supplied.	Vendor to confirm & provide details
2.14	COOLANT SYSTEM:	
2.14.1	Coolant System with all accessories for following types shall be provided. Selection of required type shall be enabled through program as well as manual (by push buttons on the Operator's panel).	Vendor to Confirm
2.14.2	a) Re-circulating type Flood Coolant System.	Vendor to Confirm
2.14.3	b) High Pressure Coolant system through Spindle.	Vendor to Confirm
2.14.4	Coolant Pressure for each type to be furnished.	Vendor to Furnish
2.14.5	Coolant flow rate for each type be furnished.	Vendor to Furnish
2.14.6	All Spindle mounted tool holders, boring bars and adapters etc. shall have through tool coolant provision.	Vendor to Confirm
2.14.7	Coolant collection and re-circulation system shall be leak proof to avoid spillage on shop floor.	Vendor to Confirm
2.14.8	Coolant Filtration System: Re-circulating type with suitable filtration unit. Vendor shall give details of offered filtration unit.	Vendor to specify
2.14.9	Coolant Flow Diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.	Vendor to Submit
2.14.10	Details of coolant pump & motor for all types of coolant system are to be submitted with the offer.	Vendor to specify
2.14.11	Provision for finer control of Pressure and Coolant Flow Rate to be made available with indicators.	Vendor to Confirm
2.14.12	The coolant tank should be fitted with skimmer for regular cleaning of coolant from contamination with tramp oil.	Vendor to Confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.15	ELECTRICAL SYSTEM:	
2.15.1	415V $\pm 10\%$, 50HZ ± 3 HZ, 3 Phase AC (3 wire system without neutral) Power Supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/ earthing with required material details is to be informed by vendor well in advance so that it could be incorporated during construction of foundation.	Vendor to specify
2.15.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized	Vendor to Confirm
2.15.3	All electrical & electronic control cabinets & panels should be dust and vermin proof and shall have IP 54 protection.	Vendor to Confirm
2.15.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm
2.15.5	All electrical and electronic panels should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220Volts, 5/15 Amp AC. All adapters/receptacles should have compatibility with Indian equivalents.	Vendor to Confirm
2.15.6	Motors shall conform to IEC or Indian Standards. The motors shall be of reputed make like Siemens, ABB, or equivalent reputed make acceptable to BHEL.	Vendor to Confirm
	All the power and control cables used in the machine shall of un armoured, copper cable.	
2.15.7	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain. Wherever required, the cables shall be routed through cable trays / flexible conduit hose and in the required locations the cable trays shall be covered to avoid spilling over of coolant/oil/chips over the cables. The cable drag chains shall be in steel material, non – rusting type and of completely closed type. If plastic cable drag chains are used, then only IGUS make is acceptable. All the cable trays required for laying the cables shall be included in the offer.	Vendor to Confirm
2.15.8	Vendor should ensure proper earthing for the machine and its peripherals.	Vendor to Confirm
2.15.9	In-cycle hour counter with reset facility (for knowing machine operation) and digital energy meter is to be included in the offer.	Vendor to Confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.16	SAFETY ARRANGEMENTS:	
2.16.1	Following safety features in addition to other standard safety features should be provided in the machine:	Vendor to Confirm
2.16.2	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available	Vendor to Confirm
2.16.3	A detailed list of all alarms / indications provided in the machine should be submitted by the supplier.	Vendor to Submit
2.16.4	All the pipes, cables etc. on the machine should be well supported and protected.	Vendor to Confirm
2.16.5	All rotating parts of the machine should be provided with guards and should be statically & dynamically balanced to avoid undue vibration.	Vendor to Confirm
2.16.6	Emergency Switches at suitable locations as per International Norms are to be provided	Vendor to Confirm
2.16.7	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor to Confirm
2.17	ENVIRONMENTAL PERFORMANCE OF THE MACHINE:	
2.17.1	The Machine should confirm to following factors related to environment:	Vendor to Confirm
2.17.2	Maximum noise level shall not exceed 85 dB(A) at normal load condition, 1 meter away from the machine.	Vendor to Confirm
2.17.3	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to Confirm
2.17.4	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to specify
2.17.5	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to Confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
3.0	SERVO VOLATGE STABILIZER (SVS):	
3.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, CNC, drives, controls, PLC etc with no undesirable Harmonics in the stabilizer output.	Vendor to specify
3.2	Make. : NEEL / SERVO MAX	Vendor to Confirm
3.3	Model & Rating (Suitable for the machine load.) is to be specified. Vendor to specify the noise level also	Vendor to specify
3.4	Spares Package for the Voltage Stabilizer for 2 years working should also be offered.	Vendor to Confirm
3.5	Catalogue of the Voltage Stabilizer shall be submitted with the offer.	Vendor to Submit
3.6	First fill of oil if the SVS is oil cooled	Vendor to confirm
4.0	ULTRA ISOLATION TRANSFORMER	
4.1	Ultra Isolation Transformer (Indian make) suitable for - CNC, drives, controls & PLC etc. shall be supplied.	Vendor to Confirm
4.2	Make: NEEL / SERVO MAX	Vendor to specify
4.3	Model and Rating:	Vendor to specify
4.4	Spares Package for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor to Confirm
4.5	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Vendor to Submit
5.0	COMPRESSED AIR POINTS: BHEL will provide compressed air at 60 to 70 psi at one point. The vendor shall indicate the inlet point for compressed air in the layout drawing of the machine. Vendor to supply suitable refrigeration type air drier along with the machine.	Vendor to Confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
6.0	TOOLING:	
6.1	List of tooling required:	
6.1.2	<p>For milling: the following items shall be supplied, suitable to the spindle:</p> <p>1) Face Milling cutter for Max. dia that can be used in the machine – 1 No.</p> <p>2) Adaptor for the above mentioned face mill cutter - 1 No.</p> <p>3) Collet type Adaptors of following sizes</p> <ul style="list-style-type: none"> i. With Collet 16mm: 1 No ii. With Collet 20mm: 1 No iii. With Collet 25mm: 1 No iv. With Collet 32mm: 1 No v. With Collet 36mm: 1 No vi. With Collet 40mm: 1 No <p>4) MT (screwed end) Adaptors for following</p> <ul style="list-style-type: none"> i. MT2 =1 No. ii. MT3 =1 No. iii. MT4 =1 No. <p>5) Pull-Studs to match with Spindle taper & Holders (along) – 10 Nos.</p>	Vendor to Confirm & provide details
6.1.3	<p>For Drilling: the following items shall be supplied, suitable to the spindle:</p> <p>1. Adaptors for following tang end Morse tapers.</p> <ul style="list-style-type: none"> i. MT2: 1 No ii. MT3: 1 No iii. MT4: 1 No iv. MT5: 1 No <p>2. Adaptor for One shot drill of size 13.5mm (like delta drill)</p>	Vendor to Confirm & provide details

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
6.2.0	Machine accessories:	
6.2.1	QUICK CHANGE TAPPING ATTACHMENTS: Quick change Tapping attachment shall be supplied for Thread Diameter Range: M16 to to the maximum size that can be machined.	Vendor to Confirm & provide details
6.2.2	For Job holding: The following items shall be supplied. i. Set of adjustable V Blocks (in pairs) to accommodate job diameters ranging from 150mm to 600mm. ii. A pair of Clamping chain, for each V block set, preferably with ratchet mechanism and Tenons to suit the table T-Slots. iii. Two numbers of Cast Iron Tilting T slotted table 725 mm (L) X 500 mm (W) X 600 mm (H) – M24 T slots of Capacity 2000 Kgs.	Vendor to Confirm & provide details
6.2.3	The vendor shall also supply 1. T Nuts suitable to table T slots – 50 Nos. 2. Studs to suit the above T Nut – length 300 mm – 20 Nos. 3. Studs to suit the above T Nut – length 500 mm – 20 Nos. 4. Pull studs (with detailed drawing) – 20 Nos.	Vendor to Confirm & provide details
6.2.4	All cutting tools, tool holders, arbors, boring bars, clamping elements etc. shall be supplied for machining of prove-out components indicated in 6.3.0 Itemized pricing of the cutting tools, tool holders, arbors, boring bars must be indicated separately in the commercial offer. The technical offer should contain the unpriced list.	Vendor to Confirm & provide details
6.3.0	Machine Prove out & Toolings: The vendor has to provide the prove-out details along with relevant drawings for proving the maximum machining capacity and features of the machine. The vendor shall also supply additional toolings, if any required for this prove-out, (required over and above the toolings mentioned vide 6.1.0 & 6.2.0).	Vendor to Confirm & provide details
7.0	MEASURING SYSTEM: (OPTIONAL) Automatic job measuring system, comprising of Spindle Mounted Renishaw make Wireless system, with measuring cycles, calibration system and all types of probes / styli required for measuring all machined dimensions of the prove-out components. Vendor to furnish detailed description of the system along with offer.	Vendor to specify

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
8.0	DIAGNOSTIC SYSTEM:	
8.1	TELE DIAGNOSTIC SYSTEM: Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied CNC system for remote diagnosis and correction of the problems in both CNC System and PLC of the machine. This should be provided free of charge for the guarantee period. Vendor should inform terms and conditions for this service after guarantee period. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.	Vendor to confirm
9.0	FAULT DIAGNOSTIC SYSTEM:	
9.1	The diagnostic system in the machine shall show detailed Cause & remedy for faults related CNC system, electrical & mechanical.	Vendor to confirm
9.2	The CNC system shall have Online Help guide facility for knowing detailed cause & remedy for the faults.	Vendor to Confirm
10.0	PORTABLE DATA LOADING DEVICE: (optional) Portable Data loading device with sufficient length of interface cable, HDD of size not less than 160GB, CD / DVD Drive, TFT Display of size 14" and suitable preinstalled licensed software for loading PLC program, RS 232 Port, Ethernet chord, USB port, Machine data and CNC part programs shall be supplied with the machine.	Vendor to specify
11.0	LEVELING & ANCHORING SYSTEM: Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the Machine, Rotary Table, Floor Plates etc.	Vendor to Confirm
12.0	TOOLS FOR OPERATION & MAINTENANCE: The vendor shall supply special tools required for the operation and maintenance of the machine. The vendor shall also supply necessary standard tools like Torque Wrench, Spanners, Keys, grease guns, digital multi meter, tool kit for electrician consisting of stark type screw drivers, etc. for operation and maintenance of the machine. List of all such Special and standard tools shall be submitted with offer.	Vendor to Confirm Vendor to Submit

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
13.0	<p>SPARES: The Vendor shall recommend and submit list of spares required for the machine for two years of trouble free operation on three shifts /day basis under two headings as</p> <p>a) Mechanical & hydraulic spares and</p> <p>b) Electrical & electronic spares.</p> <p>The list shall generally include the following items.</p>	
13.1	<p>a) Mechanical & hydraulic spares: The list may generally include all types of pumps, Valves, pressure switches / transducers, filters, seals etc.</p>	
13.1	<p>b) Electrical & electronic spares: The list may generally include all types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Scanning Heads for Linear Scales, MMC module, NCU module, Operator's panel with Display Unit, Floppy Disk Unit, I/O Cards for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.</p> <p>c) Un-priced list of spares with quantities, specified at a&b above, should be submitted with this technical offer.</p> <p>d) Unit Price of each item figuring in c shall be submitted in a sealed cover with the commercial bid to capital purchase department of BHEL.</p>	Vendor to Submit
13.2	<p>All types of spares for the total machine and its accessories should be available for minimum ten years, after supply of the machine. If any spares or controls are likely to become obsolete within this period, the vendor should inform BHEL and provide details of it's suppliers to enable BHEL to procure them in advance.</p>	Vendor to Confirm
13.3	<p>The list of spares included in Annexure – XX shall be offered</p>	Vendor to confirm
13.4	<p>In case of ordering, a complete list of spares for the machine and its accessories along with spares specification / type / model, and name & address of the spare supplier shall be submitted along with documentation while supplying the machine.</p>	Vendor to Confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
14.0	DOCUMENTATION:	
14.1.0	Set of Documents to be submitted along with the Offer for technical evaluation:	Vendor to confirm
14.1.2	General Lay-out of the machine with major and critical dimensions in line with the specification	Vendor to furnish
14.1.3	General Assembly drawing of the machine with bill of materials and critical dimensions	Vendor to furnish
14.1.4	Sub-assembly drawings with bill of materials and critical dimensions for all the major sub-assemblies in the machine.	Vendor to furnish
14.1.5	List of bought out items with make and specification along with catalogues: Motors, Gear boxes, Controllers, Drives, Cylinders, Seals, CNC system, PLC, etc.	Vendor to furnish
14.1.6	Hydraulic / Pneumatic Circuit with Bill of Materials giving specification and make of components used.	Vendor to furnish
14.1.7	Lubrication / Coolant Circuit with Bill of Materials giving specification and make of components used.	Vendor to furnish
14.1.8	Electrical Circuit with Bill of Materials giving specification and make of components used.	Vendor to furnish
14.1.9	Video images on CD /Hard copy of literature with photographs & drawings explaining the technical features.	Vendor to furnish
14.1.10	Quality plan	Vendor to furnish
14.2.0	Set of Documents to be submitted after placement of order for approval / verification before manufacturing:	Vendor to confirm
14.2.1	General Lay-out of the machine with major and critical dimensions in line with the specification and Preliminary Foundation drawing.	Vendor to confirm
14.2.2	General Assembly drawing of the machine with bill of materials and critical dimensions	Vendor to confirm
14.2.3	Sub-assembly / Arrangement drawings with bill of materials and critical dimensions for all the sub-assemblies in the machine.	Vendor to confirm
14.2.4	Hydraulic / Pneumatic Circuit with Bill of Materials giving specification and make of components used.	Vendor to confirm
14.2.5	Lubrication / Coolant Circuit with Bill of Materials giving specification and make of components used.	Vendor to confirm
14.2.6	Electrical Circuit with Bill of Materials giving specification and make of components used.	Vendor to confirm
14.2.7	Drawings / Sketches for Prove out component mentioned vide 6.3.0	Vendor to confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
14.3.0	Set of Documents to be submitted along with machine:	Vendor to confirm
14.3.1	Three sets of following documents as Hard copies and 1 set of all documents including bought out item catalogues – soft copy in CD in English Language should be supplied along with the machine.	Vendor to confirm
14.3.2	One set of complete documents as Hard copy and complete documents in CD / Pen drive to be submitted during inspection at supplier's works for verification. This forms part of acceptance criteria at supplier's works.	Vendor to confirm
14.3.3	Operating Manuals of Machine & CNC system	Vendor to confirm
14.3.4	Programming Manuals for the machine & CNC system.	Vendor to confirm
14.3.5	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical /PCB circuit diagrams/ Pneumatic/ Hydraulic Circuit Diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list / Bill of Materials giving complete specification and make of components.	Vendor to confirm
14.3.6	Hydraulic / Pneumatic Circuit with Bill of Materials giving specification and make of components used. Function diagram of the Hydraulic / Pneumatic system to be provided with the circuit.	Vendor to confirm
14.3.7	Lubrication / Coolant Circuit with Bill of Materials giving specification and make of components used.	Vendor to confirm
14.3.8	Electrical Circuit with Bill of Materials giving specification and make of components used.	Vendor to confirm
14.3.9	Maintenance, Interface & Commissioning Manuals for for CNC system, spindle & feed drives.	Vendor to confirm
14.3.10	Manufacturing drawings for all wearing components like bushes, pulleys, gears, clutch plates, etc.	Vendor to confirm
14.3.11	Manufacturing drawings for all supplied tool holders, cutting tools, adapters, sleeves, fixtures etc.	Vendor to confirm
14.3.12	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable highlighting the specific model used in the supplied machine.	Vendor to confirm
14.3.13	Detailed specification of all rubber items, hoses, fittings, etc. List of bearings, belts used to be provided.	Vendor to confirm
14.3.14	Operating Manuals, Maintenance Manuals & Catalogues for all supplied Accessories including Voltage stabilizer, Isolation transformer, etc.	Vendor to confirm
14.3.15	Complete Master List of parts used in the equipment.	Vendor to confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
14.3.16	Complete list of spares for equipments and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished.	Vendor to confirm
14.3.17	PLC program printouts with comments in English.	Vendor to confirm
14.3.18	PLC program on CD, NC data & PLC data on CD	Vendor to confirm
14.3.19	Complete back up of hard disk on CD and clear written Instructions (3 copies) to take back up and reloading of a new hard disk.	Vendor to confirm
15.0	TRAINING:	
15.1	The Vendor shall train Two BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) of the Machine at Vendor's works for a period not exceeding 5 working days.	Vendor to confirm
15.2	Airfare, boarding & lodging for the BHEL Engineers shall be borne by BHEL.	Vendor to confirm
15.3	The Vendor shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance after the commissioning of the Machine at BHEL works for not less than 8 working days	
15.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to confirm
15.5	Vendor to quote on the basis of per man per Day for training at vendor's work	Vendor to specify
15.6	In addition to the above, the vendor shall also arrange for training for two maintenance people and two operators at SIEMENS / FANUC training centre in India for a minimum period of 5 days on CNC programming & maintenance each. The travelling, boarding and lodging charges of BHEL persons will be borne by BHEL.	Vendor to confirm.
16.0	FOUNDATION:	
16.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Purchase order. Vendor shall submit complete foundation details including static and dynamic loads within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for Voltage Stabilizer, Isolation Transformer, & any other accessories. BHEL shall construct complete foundation for the machine as per the Vendor's recommendation.	Vendor to confirm
16.2	The Vendor shall indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.	Vendor to confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
17.0	ERECTION & COMMISSIONING	
17.1	<ol style="list-style-type: none"> 1. Supplier to take full responsibility for supervision of the erection, start up, testing of machine, it's control system & all other supplied equipment, machining of test pieces etc. 2. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation or layout drawings. 3. Other requirements like crane and helping personnel will be provided by BHEL, free of cost. 	Vendor to confirm
17.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer shall also be responsibility of the vendor.	Vendor to confirm
17.3	Successful proving of components as per 6.3.0 by the supplier shall be considered as part of commissioning. All tests, mentioned under the clause " Machine Acceptance " should form part of the commissioning activity.	Vendor to confirm
17.4	Tools, Tackles, Test Mandrels, instruments and other necessary equipment including Laser equipment required to carry out all above activities should be brought by the supplier.	Vendor to confirm
17.5	Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer	Vendor to confirm and furnish list
17.6	Special equipments, like test mandrel, straight edge, dial indicators etc., should be supplied along with the machine.	Vendor to confirm
17.7	The supplier shall arrange commissioning spares required for commissioning of the machine.	Vendor to confirm
17.8	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colors of paint used.	Vendor to confirm
17.9	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm
17.10	Duration, terms & conditions for E&C should be furnished with the technical offer in detail. Charges for Erection & Commissioning shall be submitted with the commercial offer.	Vendor to confirm

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
18.0	ACCURACY TESTS:	
18.1.0	GEOMETRICAL ACCURACY:	
18.1.1	Geometrical Accuracy Tests shall be in accordance with ISO 3070 standard or equivalent applicable standard. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.	Vendor to confirm
18.1.2	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance tests at Suppliers works and during Erection & Commissioning at BHEL Works.	Vendor to confirm
18.2.0	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 - 2 (Latest Revision) using LASER INTERFEROMETER.	Vendor to confirm
18.2.1	Positioning Accuracy on traversing axes (Pa per 1000mm)	±0.016 mm
18.2.2	Positioning Accuracy Pa for B-axis	± 5 sec
18.2.3	Repeatability on traversing axes (Ps per 1000mm)	± 0.008 mm
18.2.4	Repeatability Ps for B-axis	± 5 sec
18.2.5	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works	Vendor to specify
19.0	AMBIENT CONDITIONS & THERMAL STABILITY:	
19.1	Power Supply : AC 415 V ±10% Frequency : 50 Hz ±3HZ Phases : 3 phase 3 wire system (without neutral) Compressed air supply: 60-70 psi Ambient Temperature: max 45 °C Relative Humidity = 85% (Vendor to confirm that machine is suitable for above conditions)	Vendor to confirm
19.2	Weather conditions are tropical. Atmosphere may be dust laden during some part of the year. Machine will be installed in the normal shop floor condition. (Vendor to confirm that machine is suitable for above conditions.)	Vendor to confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
19.3	Thermal Stability of the machine shall be good enough to withstand the specified ambient conditions in order to meet the accuracy requirements of BHEL components. Vendor to confirm for trouble-free operation of the machine.	Vendor to confirm
19.4	The Vendor should confirm that the machine and its accessories is suitable for continuous operation at its full capacity for 24 hours a day and 7 days a week throughout.	Vendor to confirm
20.0	PROVEOUT OF COMPONENTS: Vendor shall submit final job setting plan, machining process plan, tool layout & list with complete description, time studies etc. within two months of placement of order for the prove- out components. Vendor shall submit CNC Programs prior to start of erection of machine at BHEL Works.	Vendor to confirm
20.1	As mentioned vide 6.3.0, the Vendor shall be fully responsible for machining of prove-out components as per the drawings / sketches for proving the maximum machining capacity, accuracy, surface finish and other features of the machine.	Vendor to Confirm
20.2	For machining of prove-out components, Job setting plan, Machining process plan and Requirement of tools etc. shall be discussed and agreed mutually.	Vendor to Confirm
20.3	Using CNC programs of the vendor, Complete machining of prove-out components shall be done by vendor at BHEL works to the specified design accuracy and surface finish.	Vendor to Confirm
20.4	Vendor shall be fully responsible for machining of prove-out components as per drawing and other requirements specified by BHEL. Clarifications regarding accuracy requirements of the prove-out components, whether specified or not, should be discussed by vendor during initial technical discussions.	Vendor to Confirm
21.0	MACHINE ACCEPTANCE:	
21.1.0	Tests/Activities to be carried out at supplier's works on the machine before dispatch:	Vendor to Confirm
21.1.1	Geometrical Accuracy Tests as per test chart provided by the vendor.	Vendor to Confirm
21.1.2	Positioning Accuracy Tests as per VDI-DGQ/3441 / ISO 230 - 2	Vendor to Confirm
21.1.3	The machine shall be test run continuously for 48 hrs. If any break down occurs during this test, the test will be repeated again for 48 hrs from restarting.	Vendor to Confirm
21.1.4	Demonstration of all features of the machine, CNC system and all Accessories.	Vendor to Confirm
21.1.5	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to Confirm
21.1.6	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to Confirm

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
21.2.0	Tests/Activities to be carried out at BHEL works while commissioning the machine:	Vendor to Confirm
21.2.1	Geometrical Accuracy Tests as per test chart	Vendor to Confirm
21.2.2	Positioning Accuracy Tests as per VDI-DGQ/3441 / ISO 230 - 2	Vendor to Confirm
21.2.4	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
21.2.5	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
21.2.6	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to Confirm
21.2.7	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to Confirm
21.2..8	Prove-out of BHEL components	Vendor to Confirm
22.0	PACKAGING: Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes	Vendor to Confirm
23.0	GUARANTEE: 12 months from acceptance of the machine at BHEL or 18 months from dispatch whichever is earlier.	Vendor to Confirm
24.0	GENERAL:	
24.1	The vendor should submit the following information:	Vendor to confirm
24.2	Machine Model	Vendor to specify
24.3	Total connected load (KVA):	Vendor to specify
24.4	Floor area required (Length, Width, Height) for complete machine & accessories.	Vendor to specify
24.5	Painting of Machine/ Electrical Panels: RAL 6011 Resada Green	Vendor to Confirm
24.6	Total weight of the machine	Vendor to specify
24.7	Weight of heaviest part of machine	Vendor to specify
24.8	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to specify
24.9	Dimensions of largest part/ subassembly of the machine	Vendor to specify
24.10	Handling arrangement for the machine and its sub-assys.	Vendor to specify

Part – B

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
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ANNEXURE-XX: LIST OF SPARES TO BE INCLUDED

<u>MECHANICAL SPARES:</u>		
1	Coolant pump (High pressure & low pressure)	1- No. Each
2	Filter elements (All types including suction filters) for Coolant System	2-sets.
3	Filter elements/Cartridges (All types including suction filters) for Hydraulic Systems	2-sets.
4	Hydraulic valves (Each 1 no in all types)	1 set
5	Drive pinions for x - axis (consist of two pinions)	1-set.
6	Toothed belts 1 No. for each model	1 -complete set.
7	Belleville (disc) spring for tool clamping	1- set.
8	Seal kit for all Hydraulic Cylinders and all clamping cylinders (for each cylinder).	1 - set.
9	Drive pinion for Table Rotation	1- No.
10	Hydraulic and lubrication hoses - complete	2-sets.
11	Oil seals and O - rings for the entire machine	2- sets.
<u>ELECTRICAL SPARES:</u>		
1	X Axis drive & Z Axis drive	1 No. Each.
2	Main Spindle drive	1 No.
3	X axis motor	1 No.
4	Scanner head for linear scales - 1 No. for each type	1 set
5	Rotary encoder - 1 No. for each type	1 set
6	Axis limit switch - 1 No. for each type	1 set
7	Proximity switch - 1 no. for each type	1 set
8	Pressure switch - 1 no. for each type	1 set
9	<u>Spares for Servo Voltage stabilizer :</u> Auto Transformer (variac) - 1 No. , AC Synchronous motor - 1 No., Pinion Gear - 1 No. , Coupling gear - 1 No., Control PCB - 1 No., Volt meter - 1 No., Ammeter - 1 No.	1 set