

		BHARAT HEAVY ELECTRICAL LIMITED		Enquiry No.:	
UNIT'S ADDRESS:				Due Date:	
CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPT.).				Supplier Qtn. No.:	
Date:					
SPECIFICATION CUM COMPLIANCE CERTIFICATE FOR CNC HORIZONTAL BORING MACHINE (200 MM SPINDLE DIA.) WITH A ROTARY TABLE					
NOTE:-					
1. Vendor must submit complete information against Clause No. 23 (QUALIFYING CONDITIONS). Offers meeting these clauses would only be processed.					
2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. 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, certificates PO Copies, references etc enclosed with offer should be in English language only.					
NAME & ADDRESS OF THE SUPPLIER :					
TELEPHONE NOS.:					
FAX NOS.:					
E-MAIL ADDRESS :					
SCOPE: SUPPLY, ERECTION & COMMISSIONING OF CNC HORIZONTAL BORING MACHINE(200 MM SPINDLE DIA.)WITH A ROTARY TABLE COMPLYING WITH					
S.NO	DESCRIPTION FOR BHEL REQUIREMENTS	Required	Offered	Deviation	Remarks
1	MACHINE REQUIREMENTS AND WORK PIECE MATERIAL				
1.1	Purpose: The CNC Horizontal Boring Machine with a rotary table (Spindle Diameter MINIMUM 200 mm) is required for heavy duty machining operations like milling,drilling, tapping and boring etc. with the accuracies and finish as per Clause 18.3and for jobs as per annexure-2	Vendor to confirm			
1.2	Work piece material: Alloy Steel, Forged steel, Stainless steel AISI 304 /405 , Mild steel; Material Hardness: 150 HB to 220 HB	Vendor to confirm			
1.3	Material Removal Capacity: To be demonstrated as per the parameters mentioned below : (Clauses 1.3.1 to 1.3.4)	Vendor to confirm			
1.3.1	Cutting Speed : 175 m/min (Approx.)	Vendor to confirm			
1.3.2	Depth of Cut : 8 mm	Vendor to confirm			
1.3.3	Feed : 600 mm/min	Vendor to confirm			
1.3.4	Indexable Face milling Cutter Dia 315 mm with 100 % engagement	Vendor to confirm			
2	SPECIFICATIONS: (Minimum Requirements)				
2.1	MACHINE CONFIGURATION: The Machine shall be CNC Horizontal Boring Machine with a Rotary Table. The Spindle Axis and Ram Axis travel can be achieved by any combination of movements of spindle and Ram.	Vendor to confirm			
2.2	SPINDLE				
2.2.1	Boring spindle diameter: 200 mm	Vendor to confirm			
2.2.2	Spindle power (AC Continuous Rating - S1) : 100 KW or above, at 100% duty cycle.	Vendor to confirm			
2.2.3	Spindle speed (Infinitely variable) : 1000 rpm	Vendor to confirm			
2.2.4	No. of speed ranges : minimum 2	Vendor to specify			
2.2.5	Spindle taper : ISO 50 (DIN69871)	Vendor to confirm			
2.2.6	Spindle Motor & Drive Make: FANUC or SIEMENS spindle motor with matching spindle drive (Details to be given)	Vendor to confirm			
2.2.7	Spindle Encoder: FANUC/SIEMENS/HEIDENHAIN rotary encoders for direct reading of actual spindle rpm (Details to be given).	Vendor to confirm			
2.2.8	Oriented Spindle Stop (Any position)	Vendor to confirm			
2.2.9	Coolant through spindle as well as external coolant for cooling of cutting tool / machining zone.	Vendor to confirm			
2.2.10	Spindle lubrication system (Details with drawings to be enclosed)	Vendor to confirm			
2.3	COLUMN (X AXIS) TRAVERSE :				
2.3.1	Column longitudinal travel (X-Axis): 11000 mm	Vendor to confirm			
2.3.2	X-axis cutting feed rate (Infinitely variable) : 5000 mm/min	Vendor to confirm			
2.3.3	X-axis rapid traverse rate: 10000 mm/min	Vendor to confirm			

for civil work only

for engineer

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2.3.4	Axis Resolution: 0.001 mm			Vendor to confirm	
2.3.5	Minimum Floor Plate Dimensions (LxB): 6000mm X 5000mm			Vendor to confirm	
2.4	HEADSTOCK TRAVERSE ON COLUMN :				
2.4.1	Headstock vertical travel (Y-Axis): 4000 mm			Vendor to confirm	
2.4.2	Y-axis cutting feed rate (Infinitely variable): 5000 mm/min			Vendor to confirm	
2.4.3	Y-axis rapid traverse rate: 10000 mm/min			Vendor to confirm	
2.4.4	Axis resolution: 0.001 mm			Vendor to confirm	
2.5	RAM & SPINDLE TRAVERSE:				
2.5.1	Ram axial travel : minimum 1500mm			Vendor to specify	
2.5.2	Boring spindle travel : minimum 1200mm			Vendor to specify	
2.5.3	Total travel of Ram + Spindle travel : 2700 mm			Vendor to confirm	
2.5.4	Boring Spindle Axis cutting feed rate (Infinitely variable): 5000mm/min			Vendor to confirm	
2.5.5	Boring Spindle rapid traverse rate: 10000 mm/min			Vendor to confirm	
2.5.6	Ram and Boring Spindle Axis Resolution: 0.001mm			Vendor to confirm	
2.5.7	Ram & Spindle Axes should be independently programmable CNC Axes with individual Drives, Motors and Feed back systems.			Vendor to confirm	
2.5.8	RAM Size minimum 500mm X 500 mm			Vendor to confirm	
2.6	ROTARY TABLE: 360 Degree rotation (B Axis)				
2.6.1	Table size (LxB): (3000mm x 3000 mm) Square table			Vendor to confirm	
2.6.2	Load carrying capacity: 50 Tons			Vendor to confirm	
2.6.3	Table V Axis Movement : 2500 mm			Vendor to confirm	
2.6.4	Rotary Table shall be capable of eccentric loading of jobs . Maximum tilting moment to be specified. Chart showing relation of weight and distance of e.g. from centre of Rotary Table (loading chart of table) to be submitted.			Vendor to confirm	
2.6.5	Maximum torque on B-axis (N-m)			Vendor to specify	
2.6.6	Rapid Traverse Rate for Rotary Axis: 3 rpm			Vendor to confirm	
2.6.7	Size of T-slots - Suitable for 28 mm H12 as per DIN 650, finish to DIN 876 III			Vendor to confirm	
2.6.8	T-slots pitch : 140/160 mm as per DIN 650, finish to DIN 876 III. (Details to be given)			Vendor to confirm	
2.6.9	Central slot tolerance : H7			Vendor to confirm	
2.6.10	Perpendicular Lateral slot size and tolerance, if provided.			Vendor to specify	
2.6.11	Center bore runout: 0.01mm			Vendor to confirm	
2.6.12	B-Axes lubrication system. (Details along with drawing to be submitted)			Vendor to confirm	
2.6.13	Feed motors & drives FANUC or SIEMENS AC servo motors with matching AC servo drives (Details with trouble shooting manual and PID diagram to be given).			Vendor to confirm	
2.6.14	Axis B should be provided with a Fanuc/Siemens/Heidenhain rotary/angle encoder directly mounted on the table.			Vendor to confirm	
2.6.15	B Axis Resolution: 0.001 degrees			Vendor to confirm	
2.6.16	Type of transmission: Backlash free double pinion gearbox system with preloading mechanism or backlash free duplex worm gear system, with single motor/direct drive mechanism. Details to be provided along with the offer.			Vendor to confirm	
2.6.17	B axis locking Mechanism: Servo Lock + Hydraulic with suitable power pack with pump-motor, solenoid valve, pressure switch, accumulator, pressure gauge with isolator etc. Details to be provided along with the offer.			Vendor to confirm	
2.7	FEED AND DRIVE SYSTEMS:				
2.7.1	Feed motors & drives FANUC or SIEMENS AC servo motors with matching AC servo drives (Details to be given).			Vendor to confirm	
2.7.2	Feed back system for X, Y & V axes: Heidenhain/Siemens/FANUC/Renishaw sealed linear scales (Details to be submitted)			Vendor to confirm	
2.7.3	Feed back system for Spindle Axis (Z and W) : Heidenhain/Siemens/FANUC/Renishaw sealed linear scale (Details to be submitted by the vendor)			Vendor to confirm	
2.7.4	Type of power transmission : Backlash free re-circulating ball screw with Pre-loaded double nut of THK/NSK/Korin/Hwin/Shurin /KSK Kurim make or Rack and Pinion mechanism .			Vendor to confirm	

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Vendor to confirm

2.7.5	Complete details for "Backlash free re-circulating ball screw with Pre-loaded double nut" including diameter of Ball Screw or details of Rack and Pinion to be submitted with the offer	Vendor to confirm		
2.7.6	Mechanism for locking X & Column axis, Spindle Axis, Servo Lock	Vendor to confirm		
2.7.7	Mechanism for locking Y axis, Servo Lock + motor brake + counterbalance (dead weight/hydraulic)	Vendor to confirm		
2.7.8	Mechanism for locking Rotary Table : Servo Lock + Mechanical Lock	Vendor to confirm		
2.8	MACHINE GUIDEWAYS:			
2.8.1	Detail of Guideways for X-axis, Y-axis, Z-axis, W-axis & V-axis :			
2.8.1.1	Guideways must be hardened. Valid Hardness Certificate traceable to NMI (National measurement Institute) / Accredited lab is to be submitted.	Vendor to confirm		
2.8.1.2	If guideways are non Hydrostatic than its must be grounded.			
2.8.1.3	Details of Guideways for (W) axis and bearing details of Spindle (Z) axis are to be submitted with offer.	Vendor to confirm		
2.8.1.4	Details of Guideways for B-axis and bearing details are to be submitted with offer.	Vendor to confirm		
2.8.1.5	Metallic Telescopic covers of rust resistant material to be provided with wipers for X, Y & V axes guide ways. Joints of telescopic covers should be properly sealed in order to prevent ingress of chips, coolants & hydrostatic oils (Details to be submitted). Additionally, bellow covers should be provided under telescopic covers for additional protection of the guideways.	Vendor to confirm		
2.9	CONSTRUCTION:			
	All machine elements shall be designed and validated by using finite element analysis (FEA) to arrive at optimum construction, cross-sections and ribbings. The machine structural elements shall be designed to meet the cutting forces generated during heavy-duty machining applications including intermittent/interrupted metal cutting. Vendor should submit proof for the same through certified/accredited Lab.			
	All machine elements such as bed, column, table, spindle, headstock etc. shall be of proven design. The machine elements shall be made of highest quality, heavily ribbed, rigid grey cast iron preferably or Fabricated Steel Structure with proper stress relieving.			
	The machine elements shall be suitably stress relieved and aged to ensure dimensional stability and freedom from distortion over the entire life of the machine. The machine elements shall have suitable damping characteristics to ensure vibration free machining at full load.			
	A) For Fabricated Structure : The fabricated structure shall be subjected to double stress relieving cycle-first relieving to be done after welding, and second stress relieving to be done after rough machining and before finish machining. Details conforming to various manufacturing processes shall be provided for ensuring the same.			
2.9.1	Fabricated steel material specifications should be in compliance with S275JR as in EN 10025-2:2004 / equivalent standard or BETTER.	Vendor to confirm		
	B) For Casting Structure : Cast Iron material specifications should be in compliance with Cast Iron GGG60 as in DIN 1693 /equivalent to ISO 1083 600-3 or BETTER.			
	C) For Table Structure : The construction material must be Cast Iron ONLY in compliance to Cast Iron GG25 as in DIN 1691/equivalent to ISO 185- class 250 or EN-GJL-300 UNI EN 1561 or BETTER.			
	The details of various machine parts (Base, Column, Table, Spindle, Head Stock, Ram etc.) material shall be clearly indicated in the offer. Special design and constructional features of the machine elements (Base, Column, Table, Cross Rail, Spindle, Head Stock, Ram etc.) must be fully explained in the offer.			
	Vendor should submit proof for the material used through certified/accredited Lab.			
2.9.2	Head Stock Counter balancing System. Details of the system to be submitted with the offer.	Vendor to confirm		

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2.9.3	Vendor to furnish details of material, hardness & constructional details, including explanatory drawings of various Components/ Assemblies like Column, various guideways/slides, Head Stock, Spindle, drives, transmission, brakes etc. of the machine. (Full details to be given)	Vendor to confirm		
2.10	OPERATOR'S PLATFORM:			
2.10.1	Suitable Operator's platform with adequate load carrying capacity to be provided to suit the operation in the entire capacity of the machine. Push Button switches are to be provided on the Operator's Platform at convenient location for its movement. A 15 Amp. Plug Point with ON/ OFF switch is also to be provided on the Platform.	Vendor to confirm		
2.10.2	Weight carrying Capacity of the Platform should be Min.500 Kg.	Vendor to confirm		
2.11	OPERATION AND CONTROL SYSTEM:			
2.11.1	OPERATOR'S PANEL:			
2.11.1.1	Swiveling type air conditioned Operator's Pendant/Desktop of Rittal/Schneider/ Siemens make or equivalent make of international repute , Incorporating the CNC Operator Panel (OP) and Machine Control Panel (MCP) of required configuration shall be provided. All switches on the Operator's Pendant/Desktop should be within reach of operator of average height of 170 cm for convenient, efficient & safe operation. All displays/indications should also be conveniently placed. Layout showing complete details of the panel should be submitted.	Vendor to confirm		
2.11.2	CNC SYSTEM & FEATURES :			
2.11.2.1	Make: FANUC/SIEMENS	Vendor to confirm		
2.11.2.2	The system should have an Operator Panel(OP) full alphanumeric keyboard, TFT/LED/ LCD colour display (10" or larger), Machine Control Panel (MCP), RS232C serial interface, USB port for data input/output, network ready, graphic simulation and on-screen PLC Ladder display . All PLC input/output modules should be of FANUC/SIEMENS make matching with CNC make. Latest hardware & software versions, as available at the time of delivery, should be supplied. (Details to be submitted) CNC controller must be with OPCUA/FOCAS , complying Industry 4.0 latest norms.All the necessary formalities/licence needs to be compiled at vendor end.	Vendor to confirm		
2.11.2.3	Details of the standard features. List to be submitted.	Vendor to confirm		
2.11.2.4	Details of optional features recommended by vendor shall be given in format separately with manuals, usability and benefit to customer.	Vendor to specify		
2.11.2.5	Details of other features:			
2.11.2.6.1	Axes Interpolation: Linear, Circular, Cylindrical, Helical	Vendor to confirm		
2.11.2.6.2	Max Number of simultaneous interpolation: 3	Vendor to confirm		
2.11.2.6.3	Part Program Storage: 2 MB or more	Vendor to confirm		
2.11.2.6.4	Technology Cycles: Standard Drilling, Tapping, Milling	Vendor to confirm		
2.11.2.6.5	Graphics simulation of Part Programs	Vendor to confirm		
2.11.2.6.6	Co-ordinate Transformation: Datum shift, rotation, mirror image, scaling factor.	Vendor to confirm		
2.11.2.6.7	Pitch Error compensation	Vendor to confirm		
2.11.2.6.8	Backlash error compensation	Vendor to confirm		
2.11.2.6.9	Zero Offset for all axes	Vendor to confirm		
2.11.2.6.10	Feed override switch 0-120% for all axis	Vendor to confirm		
2.11.2.6.11	Spindle speed override switch 50-120%	Vendor to confirm		
2.12	MANUAL CONTROL:			
2.12.1	Complete manual operation of machine should be possible through Machine Control Panel (MCP). The MCP should have Spindle & Feed override switches, +/- Jog keys for individual axis, Start/Stop keys for Cycle, Spindle & Feed and additional keys/switches for auxiliary functions. Diagram of complete operator pendant with full details of all the switches/keys, Layout of panel showing requisite switches to be submitted.	Vendor to confirm		
2.13	HAND HELD UNIT, Fanuc/Siemens make only:			
2.13.1	Hand Held unit on suitable articulated arm , alongwith sufficient length of interfacing cable is to be offered for handwheel (MPC) operation of individual axis in jog & increment mode and provision for spindle inch in c.w & c.c.w directions. Details to be submitted.	Vendor to confirm		

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2.14	UPS FOR CNC SYSTEM:(Only in case of PC based CNC systems)				
2.14.1	UPS of sufficient backup for CNC system with inbuilt cooling and charge status display is to be supplied Only in case of PC based CNC systems. UPS should be of Hitachi/APC/Emerson(Liebert)/Siemens/Onnion/or Equivalent international reputed make.	Vendor to confirm			
2.15	MACHINE LIGHTS:				
2.15.1	Machine Lights for sufficient illumination of complete working area, on both sides of operator's platform, and in the enclosure cabin should be provided for clear visibility. The luminous intensity of the light should follow the latest international standards.	Vendor to confirm			
2.15.2	A magnetic base portable spot light with sufficiently long cable should also be provided.	Vendor to confirm			
2.15.3	Any lights required in the foundation/ pit area shall also be foreseen and supplied by the vendor.	Vendor to confirm			
2.15.4	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to confirm			
2.15.5	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to confirm			
2.16	REFRIGERATION UNITS / AIR CONDITIONERS				
2.16.1	Door mounted Air Conditioners for all Electrical/ Electronic Panels/ Cabinets including Operator's Panel (One no. of sufficient capacity for each cabinet/ panel considering continuous operation at ambient temperature and relative Humidity at Bhopal as follows - Ambient temperature : +5 to 45° C and RH 90% Following are to be confirmed & Details to be given by the vendor: a) Make & rating along with detailed tech. catalog b) Panel AC must have Condensation free feature. c) The blow of cool air from the air conditioners shall not fall directly on the electrical & electronic circuits/ modules. ACs must be incorporated with electrical/ refrigeration interlocks. d) Panel AC should be programmable. e) Energy-efficient latest environment friendly refrigerant in Hermetically-sealed Compressors f) OEM of the Supplied panel ACs must have established Company Service Centre and should ensure spares availability in India. Details for the same is to be provided along with contact details.	Vendor to confirm			
2.16.2	AC unit mounted on the movable pendant must be well-supported by universal-head bolt. The electrical connection of the AC unit must be with male-female connector, easily disconnected from the AC unit side. There has to be a MCB to isolate the AC unit from the electrical panel.	Vendor to confirm			
2.16.3	For the offered Oil Chiller system Following are to be confirmed & Details to be given by the vendor: a) Make & rating along with detailed tech. catalogue b) Oil chiller system should have energy-efficient, latest environment friendly-based Hermetically-sealed Compressors with independent refrigeration circuits having SS-brazed Plate-type Heat Exchanger, Air-cooled Condenser, Thermostatic Expansion Valve, HP/ LP Switch, Oil Flow/ Anti Freeze Cut-out, etc. c) The units must have In-line Multistage Pumps (with 100% standby), Valves, NRVs, Filters, Automatic Microprocessor-based Controller with LCD Display, Safety interlocks, etc. in one complete package. The unit must operate continuously with equal-run-time of Compressors. d) Oil chiller system shall have features like independent HP & LP Cut outs, Oil sight glass, EXP Valve, Filter Drier, Shut off valve, Charging Port, Antifreeze Thermostat, Solenoid valve, Required gauges, etc. e) Oil chillers should be programmable. f) OEM of the Supplied panel ACs must have established Company Service Centre and should ensure spares availability in India. Details for the same is to be provided. The Vendor has to ensure maintenance of the AC units in working condition through-out its guarantee period.	Vendor to specify			
2.16.4	Vendor to furnish the cooling capacity (KW or Kcal per Hour) of each Air Conditioners and Chiller Unit (s) used in the machine.	Vendor to specify			
2.16.5	O&M manual of the Panel A.C. / Chiller system including electrical circuit diagrams, item parts list are to be provided.	Vendor to confirm			
2.16.6	Make: Werner Finley, Rittal, Advance, Blue Star, Voltas or any Equivalent international reputed: For both chiller and air conditioners	Vendor to specify			
2.16.7	If oil chiller has PLC then ladder logic diagram shall be provided by the vendor.	Vendor to confirm			
2.17	HYDRAULIC & LUBRICATION SYSTEM : (Details should be Submitted by the Vendor)				
2.17.1	The System should be centralised. Hydraulic Oil Tank should preferably be located at Floor level.	Vendor to confirm			

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2.17.2	Make: Rexroth/Vickers Sperry/Hydac/Yuken/Hawe/Parker/Argo-Hytos Cz. Details to be submitted	Vendor to confirm		
2.17.3	Filtration System: Sufficient no. of filters (with electric clogging indicator and alarm on PLC) should be used to avoid frequent clogging and other maintenance related problems. Filter elements should be of Make: EPE / Hydac/ or any Equivalent international reputed. Details to be given.	Vendor to confirm and furnish details		
2.17.4	Failure indication	Vendor to confirm		
2.17.5	Automatic shut off provision. Details should be submitted.	Vendor to confirm		
2.17.6	Hydraulic pump capacity (flow/ pressure) to be intimated.	Vendor to specify		
2.17.7	Each pump should have an independent motor. No Tandem pumps should be used.	Vendor to confirm		
2.17.8	First filling of all required Oils & Grease etc. to be supplied by vendor. Indigenous (Indian) source or Indian equivalent and specifications of oils / greases are also to be provided by the vendor.	Vendor to specify		
2.17.9	The vendor shall incorporate such hydraulic systems which are easily serviceable in India. The vendor shall furnish contact details of Indian vendors and service providers.	Vendor to confirm		
2.17.10	LUBRICATION SYSTEM			
2.17.10.1	A suitable lubrication system for all the guideways, gearbox, headstock, bearings, ball screw & nuts, and all other parts wherever required.	Vendor to confirm		
2.17.10.2	Make : Vogel/SKF/Trabon or equivalent manufacturer of international reputed. Details to be submitted.	Vendor to confirm		
2.17.10.3	Filtration System: Sufficient no. of filters (with electric clogging indicator and alarm on PLC) should be used to avoid frequent clogging and other maintenance related problems. Filter elements should be of Make: EPE /Hydac/ or any Equivalent international reputed. Details to be given.	Vendor to confirm		
2.17.10.4	Failure indication	Vendor to confirm		
2.17.10.5	Automatic shut off provision. Details should be submitted.	Vendor to confirm		
2.17.10.6	Details of Pump, Valves, Piping circuit, lay out etc. to be submitted.	Vendor to confirm		
2.17.10.7	First filling of all required lubrication Oils & Grease etc. to be supplied by vendor. Indigenous (Indian) source or Indian equivalent and specifications of oils / greases are also to be provided by the vendor.	Vendor to confirm		
2.18	COOLANT SYSTEM:			
2.18.1	Coolant System with all accessories for following variants shall be provided. Selection of all the variants shall be through program and push buttons provided on the Operator's panel as well.	Vendor to confirm		
2.18.2	Recirculating Type Flood Coolant System with nozzles around spindle.(External Cooling)	Vendor to confirm		
2.18.3	Re-circulating High Pressure Coolant through Spindle (Internal Cooling)	Vendor to confirm		
2.18.4	All offered attachments, tool holders, boring bars, cassettes, adapters etc. shall have the provision so that coolant is available directly at the tool-cutting tip.	Vendor to confirm		
2.18.5	Coolant collection and recirculation system should be leakproof & perfect to avoid any spillage on shop floor, trenches for cables & foundation pit of the machine etc.	Vendor to confirm		
2.18.6	Coolant Filtration System: Paper filter based Recirculating type coolant system.	Vendor to confirm		
2.18.7	Coolant Flow Diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.	Vendor to confirm		
2.18.8	Pressure & rate of flow of coolant for different variants should be furnished in the offer. The Pressure should be sufficient for the coolant to reach the tool tip at full pressure.	Vendor to confirm		
2.18.9	Coolant Tank Capacity to be specified. Coolant filtration system is to be placed on the Floor Level. Coolant collection tank may be kept at a lower level. The details of the system, including requisite sump, pump etc., should be clearly indicated.	Vendor to confirm		
2.18.10	Provision for finer control of Pressure and Coolant Flow Rate should be provided. On-Off Push Buttons shall be provided on the Operator's Panel.	Vendor to confirm		
2.18.11	Coolant pump & motor details for all variants of coolant system are to be submitted with the offer.	Vendor to confirm		
2.18.12	The coolant tank should be fitted with skimmer for regular cleaning of coolant from contamination with tramp oil.	Vendor to confirm		
2.18.13	Ensure prevention of mixing of coolant and hydraulic oil.	Vendor to confirm		
2.19	ELECTRICAL SYSTEM:			
2.19.1	415V +/- 10%, 50HZ +/-3 %, 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 should be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Vendor to confirm		
2.19.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized (Ref. Clause 17)	Vendor to confirm		

2.19.3	Electrical cabinets should be of Rittal/Schneider make or equivalent manufacturer of international repute, properly air conditioned and sealed from ingress from all liquids & encroachments of rodents. All electrical & electronic control cabinets & panels should be dust and rodent proof. Safety interlock/ door switches on electrical cabinets should be provided.	Vendor to confirm		
2.19.4	All electrical components should be mounted on DIN Rail.	Vendor to confirm		
2.19.5	All electrical and electronic panels should be provided with fluorescent or LED lamps for sufficient illumination and power receptacles of 230 Volts, 5 Amp AC. All adapters/receptacles should have compatibility with Indian equivalents.	Vendor to confirm		
2.19.6	Motors should be energy efficient (IE2 or higher) and shall conform to IEC standard .	Vendor to confirm		
2.19.7	All cables outside the electrical cabinets and operator pendant must be routed through flexible conduits capable of withstanding stress, chip hazard and ingress of oil /coolant. All cable through trenches to run on cable trays. Additionally, all cables moving with transverse axis should be of trailing type and installed in caterpillar / cable drag chain.	Vendor to confirm		
2.19.8	Vendor should ensure the proper earthing (at minimum two places) for the machine and its peripherals.	Vendor to confirm		
2.20	SAFETY ARRANGEMENTS:			
2.20.1	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to confirm		
2.20.2	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator due to the malfunctioning ,human errors particularly shift change or machine restart during sudden power outages . 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		
2.20.3	A detailed list of all alarms / indications provided on machine along with cause and remedy should be submitted by the supplier.	Vendor to confirm		
2.20.4	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Vendor to confirm		
2.20.5	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to confirm		
2.20.6	Emergency Switches at suitable locations as per International Norms are to be provided.	Vendor to confirm		
2.20.7	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor to confirm		
2.20.8	Suitable machine enclosure shall be provided to prevent spillage of chips and coolant.	Vendor to confirm		
2.20.9	Splash/ Chip guards on operator platform for protection of operator, operator's panel and to avoid spillage of coolant & chips on operator's platform.	Vendor to confirm		
2.21	ENVIRONMENTAL PERFORMANCE OF THE MACHINE:			
2.21.1	The Machine shall conform to following factors related to environment:	Vendor to confirm		
2.21.2	Maximum noise level shall be less than 85 dB(A) at normal load condition, 1 meter 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 so required.	Vendor to confirm		
2.21.3	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to confirm		
2.21.4	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		
2.21.5	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to specify		
2.21.6	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to confirm		
2.21.7	The machine and its accessories should be tropicalised for efficient operation in the ambient temperature range of +5°C to +45°C.As mentioned in clause 17.	Vendor to confirm		
3	CHIP MANAGEMENT SYSTEM:			
3.1	A chip extraction system to carry both short and curly chips efficiently and effectively to the chip bin to be provided on one end of the machine.	Vendor to confirm		
3.2	Two Chippers bins of appropriate size with wheels & handle for movement, should be supplied.	Vendor to confirm		
3.3	Type of chip conveyor	Vendor to specify		
3.4	Material of chip conveyor to be rust resistant, steel belt .	Vendor to confirm		
3.5	Provision for smooth flow of chips to the conveyor.	Vendor to confirm		
3.6	Operation of chip conveyor (forward & reverse) through push buttons on operator's panel.	Vendor to confirm		
3.7	Layout showing location of chip conveyor to be submitted.	Vendor to confirm		
3.8	Drawing and catalogue of the chip management system shall be shared with BHEL.	Vendor to confirm		
4	ISOLATION TRANSFORMER			

ISOLATION TRANSFORMER

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4.1	Ultra Isolation Transformer (ITT configuration) suitable for complete machine shall be provided.				Vendor to confirm	
4.2	Make: NEEL/ AEI/ SAIGON or any other equivalent make of International repute.				Vendor to specify	
4.3	Model & Rating				Vendor to specify	
4.4	Catalogue of the Isolation Transformer shall be submitted with the offer.				Vendor to confirm	
5	PNEUMATIC SYSTEM:					
5.1	AIR COMPRESSOR:					
5.1.1	Independent Air Compressor (of reputed makes as : Elgi, Pneumatic, Atlas Copco, Ingersol Rand, or any Equivalent international repute Screw type with refrigerated type Dryer & Filter of suitable capacity for the total compressed air requirements of the machine & accessories and to suit required air quality should be supplied. The compressor unit should be suitable for continuous duty operation. Full details to be given.				Vendor to confirm	
5.1.2	Make & Model of Air Compressor and Refrigerator type Dryer ,de-humidifier.				Vendor to specify	
5.1.3	Capacity (Flow, Pressure & KW)				Vendor to specify	
5.1.4	The system should be so designed to have additional provision and required accessories before Refrigerated type Air Dryer and de-humidifier so that BHEL centralised compressed air supply having pressure 4 bar with high moisture could be used as and when required (In case of compressor failure).				Vendor to confirm	
5.2	COMPRESSED AIR POINTS:					
5.2.1	Compressed Air Point with manual ON/ OFF Valve and flexible pipe of suitable length for work piece cleaning.				Vendor to confirm	
6	Attachments and Tooling					
6.1	Auto Indexing Universal Milling head (Minimum Parameter) Spindle Power : 35 KW Spindle RPM : 2500 RPM Main Spindle Taper : ISO 50				Vendor to confirm	
6.2	90 degree Milling Head (Minimum Parameter) Spindle Power : 35 KW Spindle RPM : 2500 RPM Main Spindle Taper : ISO 50				Vendor to confirm	
6.3	Face Milling Cutter 90 degree and 45 degree , Diameter 200 mm- 3nos				Vendor to confirm	
6.4	Face Milling Cutter 90 degree and 45 degree , Diameter 250 mm - 3 nos				Vendor to confirm	
6.5	Face Milling Cutter 90 degree and 45 degree , Diameter 315 mm - 3 nos				Vendor to confirm	
6.6	Face Milling Cutter 90 degree and 45 degree , Diameter 400 mm - 3 nos				Vendor to confirm	
6.7	Micro Boring bar upto diameter 250 mm - 2 set				Vendor to confirm	
6.8	Extension Sleeve ISO 50 to MT 6 , length 500 mm- 2 nos				Vendor to confirm	
6.9	Extension Sleeve ISO 50 to MT 6 , length 1000 mm - 2 nos				Vendor to confirm	
6.10	Extension Sleeve ISO 50 to MT 6 , length 1500 mm- 2 nos				Vendor to confirm	
6.11	Reduction sleeve , MT6/MT5 , MT6 to MT4 , MT5/MT4 - 2 set				Vendor to confirm	
6.12	Back Face milling cutter- 3 nos				Vendor to confirm	
6.13	Carbide insert for all milling types cutter , total 500 inserts				Vendor to confirm	
7	FAULT DIAGNOSTIC SYSTEM:					
7.1	Individual faults & Messages should appear on the operator screen with device ID Numbers.				Vendor to confirm	
7.2	Help guide should be provided for fault diagnosis.				Vendor to confirm	
8	LEVELING & ANCHORING SYSTEM					
8.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes, shim pack etc for the machine shall be supplied by the vendor. Details to be submitted.				Vendor to confirm	
9	TOOLS FOR OPERATION & MAINTENANCE :					
9.1	Special tools and equipment required for operation and maintenance of the machine like Torque Wrench, Spanners, Keys, grease guns and 12 nos set of collets etc should be supplied by the vendor.				Vendor to confirm	
9.2	Test mandrel for checking spindle run-out & alignment should be supplied				Vendor to confirm	

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10	Automatic Head Changer : The Automatic Head Changer cycle in automatic mode shall be in the scope of the supplier. In case of failure of Head transfer due to power failure or malfunctioning, provision of manual head transfer shall be there. Procedure of head transfer shall be clearly mentioned by the vendor. All the peripherals for the same shall be in the vendor's scope.	Vendor to confirm		
11	SPARES Itemised breakup of mechanical, hydraulic, electrical and electronic spares used on the machine (as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis) should be offered by vendor. The spares will be ordered as per requirement. The list to include following spares (i.e. 11.1 and 11.2, in addition to other recommended spares: (Unit Price of each item of spare should be offered) Note: The price of the spares will not be considered for the evaluation of the machine cost (L1 criteria).	Vendor to confirm		
11.1	Mechanical & Hydraulic Spares: All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses etc.	Vendor to confirm		
11.2	Electrical / Electronic / CNC Spares: 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, CNC controller, Operator's panel with Display Unit, I/O Cards for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.	Vendor to confirm		
11.3	All types of spares for total machine and accessories should be available for atleast ten years after supply of the machine. If machine, software or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure them in advance, if required	Vendor to confirm		
11.4	List of recommended set of spares for all assemblies & sub assemblies of machine are to be offered with details.	Vendor to confirm		
11.5	Complete list of spares for machine and accessories, along with specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	Vendor to confirm		
11.6				
12	DOCUMENTATION : Three sets of following documents (Hard copies with Soft Copies wherever specified) in English language should be supplied along with the machine. All the below mentioned are to be offered.	Vendor to confirm		
12.1	Operating manuals of Machine & CNC system	Vendor to confirm		
12.2	Programming Manuals of Machine & CNC system	Vendor to confirm		
12.3	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Mechanical / Pneumatic / Coolant / Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also.	Vendor to confirm		
12.4	Maintenance, Interface & commissioning manuals for CNC system, spindle & feed drives.	Vendor to confirm		
12.5	Sketch / Layout / Drawing / Catalogue for all supplied clamping elements, cutting tools, tool holders, arbors, boring bars, coolant connections, adapters, sleeves, fixtures etc. are to be provided.	Vendor to confirm		
12.6	Catalogues, Operation & Maintenance Manuals of all bought out items including drawings, wherever applicable.	Vendor to confirm		
12.7	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to confirm		
12.8	Operating Manuals, Maintenance Manuals & Catalogues for supplied accessories viz. Isolation Transformer, Air-Compressor and all supplied Accessories.	Vendor to confirm		
12.9	User Program print-outs (hard copy) with comments in English for PLC of main machine and auxiliary systems (if used) alongwith cross reference list and Input/Output list.	Vendor to confirm		
12.10	Complete PLC program with comments in English. Machine data & PLC data on CD/USB.	Vendor to confirm		
12.11	Complete Ghost back-up of HDD in case of PC based CNC controller and clearly written Instructions to take back-up and reloading on a new hard disk.	Vendor to confirm		
12.12	Complete list of parts/items (Bill of materials) used in the machine in English language.	Vendor to confirm		
12.13	Electrical Schematic Diagrams, Wiring Diagrams, Junction Box Layouts, Connector Diagrams and Cable Layouts of the machine in English.	Vendor to confirm		
12.14	Drawings of machine assemblies/sub-assemblies/parts including Pneumatic/ Coolant / Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list marked on it in English.	Vendor to confirm		
12.15	One additional set of all the above documentation on CD ROM / USB wherever possible.	Vendor to confirm		

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13	TRAINING:					
13.1	Training should be arranged at vendor's works for each of the areas mentioned below: (a) CNC Part Programming / application of all CNC Features / Cycles for the machine & other supplied accessories - 1 person for 1 week (b) Electrical, Electronic & CNC maintenance for machine & other supplied equipments - 1 person for 1 week (c) Mechanical & Hydraulic maintenance of the machine & other supplied equipments - 1 person for 1 week (d) Operation of the machine & other supplied accessories / equipments - 1 person for 1 week	Vendor to confirm				
13.2	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	Vendor to note				
13.3	Competent, English speaking instructor shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	Vendor to confirm				
13.4	Vendor to quote for training on per man per day basis.	Vendor to confirm				
13.5	Vendor should commit to organize and quote for training of Electronics Engineer and Programmer at the CNC System Manufacturer's works for one week for advanced features and specialised training.	Vendor to confirm				
14	CIVIL FOUNDATION WORK:					
14.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within Two month from the date of Letter of Intent (LOI)/ P.O whichever is earlier. Input for foundation Design will includes all details, like static / Dynamic load details, corners, pits deep etc. and final layout drawing shall be submitted by the supplier. The Layout should consist of all requirements pertaining to complete machine and all accessories, including space requirement for voltage stabiliser, Isolation Transformer, Air Compressor, Chip Bin, coolant system & any other accessory. BHEL shall civil design and construct complete foundation for the machine as per the foundation drawing provided by supplier. The vendor shall also indicate detailed specifications of grouting compound and grouting procedure etc. for grouting of foundation bolts of the machine.	Vendor to confirm				
14.2	Vendor shall submit the preliminary broader footprint of machine, weight and required civil work for machine.	Vendor to confirm				
15	ERECTION & COMMISSIONING					
15.1	Supplier to take full responsibility for carrying out erection, start up, testing of the machine and all types of supplied equipment's, machining of test pieces etc. The machine is to be erected at the site by the supplier with their own manpower, tools & tackles etc. Other erection equipment's like mobile crane, measuring instruments & devices for testing & commissioning of machines should be brought by the supplier on returnable basis. However, EOT Crane will be provided by BHEL depends on the availability. Service requirement like air, water, electricity will be provided by BHEL at one point to be indicated by the supplier in advance. Complete commissioning & demonstration of all the features of machine/ equipment's to the entire satisfaction of BHEL is the sole responsibility of vendor at BHEL Bhopal works. Complete commissioning, testing including all the test is in the scope of supplier.	Vendor to confirm				
15.2	Erection & Commissioning of Isolation Transformer, chip conveyor, coolant system, Air Compressor & its dryer and any other accessories supplied with machine shall also be responsibility of the vendor.	Vendor to confirm				
15.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at Clause 19 (Machine Acceptance) shall form part of the commissioning activity.	Vendor to confirm				
15.4	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. Special tools and equipment required for erection of the machine shall be brought by the vendor. (On returnable basis).	Vendor to confirm				
15.5	All fixators, foundation bolts, shims, wedges etc. required for erection, anchoring and levelling of the machine and allied equipment shall be supplied by the vendor.	Vendor to confirm				
15.6	Commissioning spares and first fill coolants, oils etc required for commissioning of the machine within stipulated time, shall be brought by the supplier.	Vendor to confirm				

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15.7	All Cover Plates required for the machine and its peripherals shall be supplied by the vendor.				Vendor to confirm	
15.8	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 colours of paint used.				Vendor to confirm	
15.9	All the activities from 15.1 to 15.8 shall be logged and after completion of all activities commissioning shall be declared completed.				Vendor to confirm	
16	ACCURACY TESTS:					
16.1	GEOMETRICAL ACCURACIES :					
16.1.1	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	
16.1.2	All the accuracies are to be demonstrated to BHEL engineers during pre-acceptance tests at Suppliers works and during Erection & Commissioning at BHEL Works.				Vendor to confirm	
16.2	MACHINE POSITIONING ACCURACIES & REPEATABILITY: Should be measured as per VDI/ DQG3441/ISO 230-2 (Latest Revision) using LASER INTERFEROMETER.				Vendor to confirm	
16.2.1	Positional uncertainty (P) in X, Y, Z axes: 0.015 mm per 1000 mm				Vendor to confirm	
16.2.2	Positional uncertainty (P) in W axis: 0.030 mm per 1000 mm				Vendor to confirm	
16.2.3	Positional uncertainty (P) in B axis: 10 secs				Vendor to confirm	
16.2.4	Positional scatter (Ps) in X, Y & Z axes: 0.015 mm				Vendor to confirm	
16.2.5	Positional scatter (Ps) in W axis: 0.015 mm				Vendor to confirm	
16.2.6	Positional scatter (Ps) in B axis: 8 secs				Vendor to confirm	
16.2.7	Positional deviation (Pa) per 1000 mm for X, Y & Z axes: 0.015 mm				Vendor to confirm	
16.2.8	Positional deviation (Pa) per 1000 mm for W axis: 0.020 mm				Vendor to confirm	
16.2.9	Positional deviation (Pa) for entire travel for B axis: 8 secs				Vendor to confirm	
16.2.10	Reversal error (U) in X, Y, Z & W axes: 0.007 mm				Vendor to confirm	
16.2.11	Reversal error (U) in B axis: 6 secs				Vendor to confirm	
16.2.12	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 confirm	
16.2.13	Note 1: Least Count of scale and transmission should be selected to achieve above accuracies				Vendor to confirm	
17	AMBIENT CONDITIONS & THERMAL STABILITY :					
17.1	Ambient Operating Conditions: Temperature = +5 to 45 degree Celsius, Relative Humidity = 90% max.				Vendor to confirm	
17.2	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by vendor. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same should be furnished by Vendor)				Vendor to confirm	
17.3	Vendor to confirm that machine is suitable for successful running with guaranteed accuracies.				Vendor to confirm	
17.4	The machine should be suitable for continuous operation to its full capacity for 24 hour a day and 7 days a week. Vendor to ensure and confirm the same.				Vendor to confirm	
18	PROVEOUT OF BHEL COMPONENTS :					

18.1	Drawings for proving of components are as per annexure- 2 (1) Sketch for Top Shaft machining (2) Spider assembly (3) Bottom Shaft. Vendor to submit preliminary process & tool list recommended by them. Change in process/tools may be mutually discussed and agreed. Complete machining for prove out of two components shall be done by Vendor at BHEL works to the specified design accuracy and surface finish to prove the machine after complete erection, testing & test piece machining etc. Material (Job) for the prove out components shall be provided by BHEL. Cutting tools and necessary fixture (if required) shall be arranged by vendor. Vendor should submit the CNC programs, setting schemes, process sheets, tooling layouts, list of tools, accessories, inserts etc. for the proving out of components. Vendor shall be fully responsible for machining of proveout components as per drawing and other requirements specified by BHEL. Clarifications, if any, required by the vendor, regarding accuracy requirements of the proveout components, whether specified or not, should be discussed and cleared by vendor during initial technical discussions.	Vendor to confirm			
	Note: In case of unavailability of same components, similar type of other components/ drawings will be provided at the time of proving.				
18.2	All the BHEL norms and rules for collecting material from BHEL-Bhopal like deputation of representative for arranging material gate passes, co-ordination for dispatch, submission of Bank Guarantees shall be in the scope of vendor.	Vendor to confirm			
18.2.1	Vendor shall be responsible 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			
18.3	Accuracies required in Job Prove out on BHEL Job- Accuracy to be proveout as per the BHEL component drawing for BH operation. Refer 18.1	Vendor to confirm			
19	MACHINE ACCEPTANCE/ PDI in presence of BHEL-Rep.				
19.1	Tests/Activities to be Performed by Vendor at Vendor's work on the machine before dispatch :	Vendor to confirm			
19.1.1	Geometrical Accuracy Tests as per Clause 16.1	Vendor to confirm			
19.1.2	Positioning Accuracy & Repeatability Tests as per VDI-DGQ/3441 using Laser Interferometer in line with Clause 16.2	Vendor to confirm			
19.1.3	The machine should be tested for continuous running of 8 hrs. If any breakdown occurs during this test, the test should be repeated for the same duration from that time. On load, all the axis and motion shall be summoned, test pieces shall be used for this activity.	Vendor to confirm			
19.1.4	Checking/demonstration of the features/ratings/capacity/make/material/hardness of main assembly guideways etc of the machine, CNC system and all Accessories included in the scope of supply.	Vendor to confirm			
19.1.5	Machining of NAS Test Piece. Vendor to supply test piece, tooling for it's machining and measurements thereafter to check the machining accuracies.	Vendor to confirm			
19.1.6	Load Test of table to the specified capacity.	Vendor to confirm			
19.2	Tests/Activities to be Performed by Vendor on the machine at BHEL:	Vendor to confirm			
19.2.1	Geometrical Accuracy Tests as per Clause 16.1	Vendor to confirm			
19.2.2	Positioning Accuracy & Repeatability Tests as per Clause 16.2	Vendor to confirm			
19.2.3	Load test to demonstrate the power & cutting capacity of the machine as per Clause 1.3	Vendor to confirm			
19.2.4	The machine should be tested for continuous running of 16 hrs. If any breakdown occurs during this test, the test should be repeated for the same duration from that time.	Vendor to confirm			
19.2.5	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			
19.2.6	Demonstrate actual use of all supplied attachments and accessories to their full capacity.	Vendor to confirm			
19.2.7	Machining of NAS Test Piece. BHEL to supply test piece. The tooling for machining of NAS test piece shall be supplied by the vendor.	Vendor to confirm			
19.2.8	Prove out of BHEL component as per Clause no. 18 at BHEL works.	Vendor to confirm			
19.2.9	Two weeks of independent operation of machine by BHEL (after job proveout) under the supervision of the supplier.	Vendor to confirm			
19.2.10	Training of BHEL machine operators for one week in operation of complete machine & accessories etc. after successful proving of job by the supplier's experts / engineers during their stay at BHEL works.	Vendor to confirm			
19.2.11	Cost of training shall be borne by the vendor.	Vendor to confirm			

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20	PACKING: 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 despatched in containers, all small loose items shall be suitably packed in boxes. If any damage in transit is witnessed, vendor shall be rectifying the same.					
20.1		Vendor to confirm				
21	GUARANTEE: Machine along with all its accessories must be Guaranteed for 24 months from date of acceptance of item at BHEL Bhopal which is same as date of commissioning. Date of acceptance shall be considered as date of proving and final commissioning of item.					
21.1		Vendor to confirm				
22	GENERAL : The vendor should submit the following information:					
22.1	Machine Model					
22.2	Total connected load (KVA)	Vendor to specify				
22.3	Floor area required Foot print (Length, Width, Height) for complete machine & accessories.	Vendor to specify				
22.4	Painting of Machine/ Electrical Panels; preferably RAL 6011 Apple Green (Polyurethane Paint)	Vendor to confirm				
22.5	Total weight of the machine	Vendor to specify				
22.6	We are having EOT crane of maximum 80 T capacity, beyond which supplier has to make arrangements for lifting at his risk and cost.	Vendor to confirm				
22.7	Vendor to submit, along with offer, the reference list of customers where similar machines have been supplied mentioning the customer, Machine Model, major specifications of the supplied machine, CNC System, Year of Supply etc.	Vendor to confirm				
22.8	Detailed catalogues, sketch/ photographs of the m/c and accessories/ attachments and Layout of the machine should be submitted with the offer.	Vendor to confirm				
22.9	Hydraulic, Pneumatic & oil pipings should be preferably metallic except places where flexible pipings are essential. The pipes required for the same shall be included in the standard scope of the machine	Vendor to confirm				
22.10	Ladder, at suitable location, is to be provided to access the machine elements located at the top of the column as well as movement of operator from/ to Operator's platform in case of power failure or any other emergency.	Vendor to confirm				
23	QUALIFYING CONDITIONS :					
23.1	The vendor must be an Original Equipment Manufacturer (OEM) for offered equipment. a) Only those vendors (OEMs) should quote who have supplied and commissioned in the past Ten years (on the	Vendor to confirm and furnish details and proof.				

23.2	date of opening of Tender) at least One CNC Horizontal Boring Machine of same or higher sizes for the parameters mentioned here with { Spindle diameter 200 mm, X axis traverse 11000 mm, Y axis traverse 4000 mm & total spindle + Ram traverse 2700 mm } either (i) in at least one country other than the country of origin or (ii) in India. The referred machine should be presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender) . Vendor should submit proof of the same (Unpriced PO Copy of supplied machine) . b) Indian machine tool vendors(OEMs) should quote who have supplied and commissioned in the past Ten years (on the date of opening of Tender) at least One CNC Horizontal Boring Machine of same or higher sizes for the parameters mentioned here with { Spindle diameter 200 mm, X axis traverse 11000 mm, Y axis traverse 4000 mm & total spindle + Ram traverse 2700 mm } .The referred machine should be presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender) . Vendor should submit proof of the same (Unpriced PO Copy of supplied machine) . c) However, such Indian machine tool vendors (OEMs), who do not meet specified qualifying conditions [clause 23.1 (b)] , can quote if they have running Collaboration/ Joint Venture/ Joint Working Arrangement for manufacture of CNC Horizontal Boring Machine of same or higher sizes { Spindle diameter 200 mm, X axis traverse 11000 mm, Y axis traverse 4000 mm & total spindle + Ram traverse 2700 mm } , with foreign machine tool manufacturer, who meets qualifying conditions as specified in clause 23.1 (a) above. Vendor should submit proof of the same . Such Indian machine tool vendors (OEMs) shall have to submit from their foreign partner a back to back guarantee for satisfactory performance of the offered machine in compliance to all specified tender requirements. Vendor should submit proof of the same. NOTE : Copy of purchase order in the name of OEM for machine mentioned in sl No 23.2 to be submitted alongwith the offer. Note : Machine, type, make and model number should be clearly mentioned in the unpriced PO copy. Including other details. reserves the rights to enquire the credentials of the company directly from the customer on the address supplied by the vendor or available on the internet.				Vendor to confirm	
23.3					Vendor to confirm	
23.4	Performance certificate of the machine whose PO submitted in clause 23.3 from the customers regarding satisfactory performance of machine supplied to them (Original Certificate or through Email directly from the customer (end user)). The original performance certificate may be returned after verification by BHEL , if required. The performance certificate should mandatorily include PO number, make, model, date of commissioning of machine .				Vendor to confirm	
23.5	The following information should be submitted by the vendor about the companies where same or higher sizes machine(s) as per clause 23.2 have been supplied. This is required from all the vendors for qualification of their offer.				Vendor to confirm	
23.5.1	Name of the customer(s)/company(s) where referred machine is installed.				Vendor to specify	
23.5.2	Complete postal address of the customer(s).				Vendor to specify	
23.5.3	Month & Year of commissioning				Vendor to specify	
23.5.4	Model of the machine				Vendor to specify	
23.5.5	Name and designation of the contact person of the customer/s.				Vendor to specify	
23.5.6	Phone, E-mail address of the contact person of the customer/s.				Vendor to specify	

23.6	Financial PQC: Indian Bidder: Vendor should have average annual financial turnover of Bidder, during the last three financial years FY 2023-24, 2024-25 & 2025-26 shall be atleast INR Rs 1400 lakhs. <u>Documents required in support:</u> Any document certified by a Chartered Accountant / Cost Accountant indicating the turnover for the relevant period shall be submitted along with the bid. Such documents must be duly signed by the Chartered Accountant / Cost Accountant and shall bear his/her seal, name, firm name, Membership Number, FRN Number, UDIN, the capacity in which he/she is signing (Proprietor/Partner), along with the date and place of signing. In case the bidder submits Audited Balance Sheet and Profit & Loss Account statements for the relevant financial year(s), the same must be signed by the owner and should be accompanied by the corresponding Audit Report with valid UDIN mentioned on it. (For Indian Micro and Small enterprises in line with GOI circular 1(2)(1)/2016 - M.A dated 10/03/2016 & Ministry of finance circular no. F.20/2014- PPD(Pt) dated 20/09/2016 relaxation permitted for prior turnover criteria only. However prior experience is mandatory and no relaxation this regard shall be given.) Foreign Bidders: In case of bidders from outside India, should have average annual financial turnover of Bidder, during the last three financial years FY 2023-24, 2024-25 & 2025-26 shall be atleast INR Rs 1400 lakhs. <u>Documents required in support:</u> Business Information Report (BIR) by D&B, CRIF, Coface, Creditsafe, and Experian Business, turnover for the relevant period (to be given in English Language). Or Any documents certified and duly signed and sealed by a certified Professional Accountant / Chartered Accountant / Cost Accountant indicating the turnover for the relevant period shall be submitted along with the bid and bearing his/her name, the capacity in which he/she is signing (Proprietor/Partner), Membership Number of the concerned professional body, firm name (with registration number), along with the date and place of signing. Note: Exchange rate for conversion of equivalent INR -Exchange rate (TT selling rate of State Bank of India) applicable on the date of Techno-commercial Bid opening shall be considered for conversion of financial data of BIRs. If the relevant day happens to be a bank holiday in India, then the FOREX rate as on the previous bank working day shall be taken for evaluation.	Vendor to specify			
23.7	BHEL reserves the right to verify the information provided by vendor at their referred customer's works including machining accuracies. It shall be the responsibility of the vendor to co-ordinate the visit of BHEL's team at their referred customer's works. In case the information provided by vendor is found to be false / incorrect, the offer shall be rejected. The cost of visit shall be borne by BHEL.	Vendor to confirm			
24	MACHINE MONITORING INFORMATION SYSTEM (MMIS) SIGNALS				
24.1	Following MMIS signals would be made available on a specifically earmarked terminal strip. These MMIS signals should be sourced from a PLC output card separately.	Vendor to confirm			
24.1.1	Control ON	Vendor to confirm			
24.1.2	Program running	Vendor to confirm			
24.1.3	Table running	Vendor to confirm			
24.1.4	Axes moving	Vendor to confirm			
24.1.5	M30 (Program Stop)	Vendor to confirm			
24.1.6	Alarm Active	Vendor to confirm			
25	NETWORKING:				
25.1	Machine control should have necessary hardware and software for interfacing with gigabit Ethernet Local Area Network with 100 MB/sec through UTP cables for NC program and other related data transfer for Industry 4.0 application. The networking should have following capabilities.	Vendor to confirm			
25.1.1	The machine shall appear as a node in the Entire Network. (Network Neighborhood)	Vendor to confirm			
25.1.2	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			
26	POINTWISE CONFIRMATION:				
26.1	Vendor should confirm/clarify pointwise (all the points) as per specification and provide original technical leaflet, technical details, photographs, scope of supply etc. at the first instance.	Vendor to confirm			

ANNEXURE 2

Subject: The drawings / sketches of the jobs / components to be machined on the proposed CNC Horizontal Boring Machine

Reference: BHEL Technical Specification for Horizontal Boring Machine Spindle Dia 200 mm , Ref REF : HBM200/HGM/2023/01

Contents: Drawings / Sketches as given below

- Top Shaft M/c
- Base Plate
- Spider Assy
- Bottom Bracket
- Bottom Shaft



TECHNICAL REQUIREMENTS:

1. SURF TYPING LIFTING ARRANGEMENT REF: D300 1 254 51 RM004
2. BOTH ENDS OF SHARP BORE D300 TO BE SKIMMED TRUE TO 3"
3. REMOVE ALL SHARP CORNERS TO R15.
4. THE SURFACE FINISH OF THE BORE SHALL BE 32 RMS
5. HOOKS OF BETTER UELLES OTHERWISE STATED.
6. THE SURFACE FINISH OF THE BORE SHALL BE AT 32 TO SHARP FINISH WITHIN 0.02 INCH CONVEXITY IS PERMITTED.
7. THE CONTOUR OF THE MARKING SHALL BE TO THE DISCREET MARKING (F, NO. ETC)
8. DIMENSIONS MARKED THIS ARE FOR INFO. REF. REQUIRED.
9. DIMENSIONS MARKED WITH PROTECTIVE COATING BY TRIP TO BE 0800094.
10. DIMENSIONS MARKED WITH ARE CRITICAL & MUST BE MAINTAINED.
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<u>TOOL LIST</u>		
<u>SL. NO.</u>	<u>TOOL NO.</u>	<u>DESCRIPTION</u>
01	1598477 (EXISTING)	DRILL JIG FOR 12 HOLES Ø72 & 2 HOLES Ø25 ON PCD Ø100. (COMMON WITH SPIDER ASST.)
02	1598487 (EXISTING)	DRILL JIG FOR 6 HOLES Ø30 ON PCD 720. (COMMON WITH TUBULAR SHAW)
03	1598483 (EXISTING)	DRILL Ø72.
04	98167/72 (EXISTING)	BACK SPOT FACE CUTTER Ø130 WITH Ø72 PILOT.
05	1598707 (EXISTING)	DRILL Ø11.8x150 LONG CUTTING FLUTE.
06	1598480 (EXISTING)	SHALL END MILL CUTTER Ø128 (ROUGHER)
07	1598481 (EXISTING)	SHALL END MILL CUTTER Ø130 (FINISHER)

CLOCK GAUGE TOLERANCE TABLE	
POSITION	MAXIMUM RUNOUT IN MM
A	0.025
B	0.025
C	0.05
D	0.05
E	0.05
F	0.02
G	0.025
B1	0.05
B2	0.05

[illegible]







