

Material Management
CFFP , BHEL / Hardwar

Ref: FF/PPX/3025/COR

Dt .03.11.08.

Sub: Corrigendum in open tender for 200 mm spindle dia ,CNC Horizontal Borer.

Tender Enquiry No. 3025/P/950/8/5531P/2 dated 30.09.08 due on 14.11.2008.

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Following corrigendum are issued in above tender.

- 1) Please neglect our earlier specification FF07011 R00 and submit offer as per revised Specification no. **FF07011 R01**, dt 21.10.08 attached herewith..

- 2) Please neglect our earlier Drgs of likely jobs **04-HB-02 R00 & 04-HB-05R00** and submit offer as per revised Drgs of likely jobs 04-HB-02R01& 04-HB-05R01 along with other drawings enclosed (04-HB-01R00, 04-HB-03R00, 04-HB-04R00 & 04-HB-06R00) attached herewith..

- 3) Please neglect our earlier due date 14/11/2008 and submit offer (as per revised Specification and drawing) as per extended due date 25/11/2008.

- 4) BHEL reserves the right to negotiate with L-1 vendor, even after reverse auction.

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(Shyam Babu)
DGM (Purchase & MPIC)
CFFP/BHEL

		Spec. No. : FF07011R01	DATE : 21/10/08
	<u>BHARAT HEAVY ELECTRICALS LIMITED</u>	Enquiry No.:	
	UNIT'S ADDRESS:	Due Date:	
	CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPTT.)	Supplier Qtn No.:	
		Date:	
SPECIFICATION CUM COMPLIANCE CERTIFICATE OF FLOOR TYPE CNC HORIZONTAL BORING MACHINE			
	NOTE:-		
1. Vendor (OEM) must submit complete information against clause no. 22 (Qualifying condition). The offer meeting this clause would only be processed (OEM : Original Equipment Manufacturer).			
2. The following format must be completely filled and deviations mentioned in the appropriate columns. Inadequate /incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.			
3. The offer and all documents enclosed with offer should be in English language only.			
	NAME & ADDRESS OF THE SUPPLIER :		
	TELEPHONE NOS.:		
	FAX NOS.:		
	E-MAIL ADDRESS :		
SCOPE: SUPPLY, ERECTION & COMMISSIONING OF FLOOR TYPE CNC HORIZONTAL BORING MACHINE COMPLYING WITH SPECIFICATIONS AS BELOW			
SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
1	PURPOSE & WORKPIECE MATERIAL		
1.1	Purpose : The Machine is required for machining of Steel Castings and Forgings (in black condition) The Machine should be suitable for heavy duty Milling, heavy Drilling, Boring, Milling, Reverse Counter Boring, Core Drilling, Reaming, etc. on high alloy steel castings. Machine should be suitably designed to withstand toughest conditions as our castings & forgings generally have black spots, hard spots, sand inclusion, bend, cracks, etc. Machine shall be utilized for bulk material removal. Intermittent cutting shall also be there.	Vendor to Confirm	
1.2	Work Piece Material: Castings of High Alloy Steel, like GS17CrMoV511, The components to be machined will be mainly high temperature & creep resistant alloy steel castings and forgings of Mat. grade 17CrMoV511, X22CrMoV121 having tensile strength 40-95 Kg/mm ² , %Elongation 15-22% & Hardness up to 350BHN.	Vendor to Confirm	
1.3	Drawings of likely jobs (04-HB-01R00, 04-HB-02R01,04-HB-03R00,04-HB-04R00,04-HB-05R01 and 04-HB-06R00 i.e. 06 nos.drgs),which shall be machined on Horizontal Boring Machine, are enclosed. The Suitable attachments,required for complete machining of these jobs, to be recommended by the vendor . These drawings are being provided to give an idea of type of operations carried out on our jobs and the accuracy & finish required in our jobs. These indicative jobs should not be the sole basis of the design of the machine.	Vendor to inform	
2.0	SPECIFICATION:		
2.1	MACHINE CONFIGURATION: The Machine shall be Floor Type CNC Horizontal Boring Machine with a Rotary Table.Looking from spindle side, AAC is to be on Right side of Rotary Table. Linear movement of Table is to be perpendicular to X-axis.	Vendor to Confirm	
2.2	HEAD STOCK		
2.2.1	Boring spindle diameter	200mm	
2.2.2	Milling spindle diameter	vendor to inform	
2.2.3	Ram Cross section (LxB)	450 x 500mm or more	
2.2.4	Spindle drive power (AC Continuous Rating - S1)	75 KW or more	

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2.2.5	Spindle speed (Infinitely variable)	1 to 1000 RPM or more	
2.2.6	No. of speed ranges	Vendor to inform	
2.2.7	Torque on the boring spindle (N-m)	4000Nm (min.)	
2.2.8	Torque on the milling spindle (N-m)	4000Nm (min.)	
2.2.9	Spindle taper	Vendor to submit	
2.2.10	Torque-Power-Speed characteristics of the spindle system to be submitted by the vendor.	Vendor to submit	
2.2.11	Oriented Spindle Stop (Any position)	Vendor to offer	
2.2.12	Spindle Cooling System (Details to be submitted)	Vendor to offer	
2.3	COLUMN:		
2.3.1	Column longitudinal travel (X-Axis)	10000 mm	
2.3.2	X-axis feed rate (Infinitely variable)	1 to 2000 mm /min or more	
2.3.3	X-axis rapid traverse rate	2000mm/ Min. or more	
2.3.4	Axis Resolution	0.01 or less	
2.4	HEADSTOCK TRAVERSE ON COLUMN:		
2.4.1	Headstock vertical travel (Y-Axis)	3150 mm (min.)	
2.4.2	Traverse Range (wrt Table top)	Vendor to specify	
2.4.3	Y-axis feed rate (Infinitely variable)	1 to 2000 mmpm or more	
2.4.4	Y-axis rapid traverse rate	2000 mm/ Min. or more	
2.4.5	Axis Resolution	0.01 or less	
2.5	RAM/ SPINDLE TRAVERSE:		
2.5.1	Boring spindle axial travel (W-Axis)	1000 mm or more	
2.5.2	Ram axial travel (Z-Axis)	1000 mm or more	
2.5.3	Spindle + Ram travel (W+Z)	2000 mm or more	
2.5.4	Lowest spindle position from Table Top (zero level at Table top).	Vendor to confirm and submit details	
2.5.5	Boring Spindle axis feed rate (Infinitely variable)	1 to 2000 mmpm or more	
2.5.6	Boring Spindle axis rapid traverse rate	2000mm / Min. or more	
2.5.7	Ram axis feed rate (Infinitely variable)	1 to 2000mmpm or more	
2.5.8	Ram axis rapid traverse rate	2000mm / Min. or more	
2.5.9	Axis Resolution	0.01 or less	
2.5.10	Spindle & Ram Axes should be independently programmable with Independent Drives and Feed back system.	Vendor to offer	
2.6	FEED AND DRIVE SYSTEM:		
2.6.1	Feed drives/ motors for X,Y,Z & W axes [AC servo motors] shall be digital type of either Siemens or Fanuc make (Details of model, make, type etc. to be submitted)	Vendor to offer	
2.6.2	Maximum feed force for all axes	Vendor to inform	
2.6.3	Feed back system for X, Y & Ram (Z) axes: Heidenhain linear scales with pressurised compressed air cleaning (Details to be submitted by the vendor)	Vendor to offer	
2.6.4	Feed back system for Spindle (W) Axis: Heidenhain Rotary Encoders (Details to be submitted by the vendor)	Vendor to offer	
2.6.5	Type of power transmission: 1. Pre-loaded backlash free Hydrostatic worm OR Pre-loaded backlash free double pinion & rack drive for X-axis. 2. Backlash free re-circulating ball screw with Pre-loaded double nut for all other axes. (Complete description of the aforesaid including diameter of Ball Screw for each axis. to be submitted with the offer)	Vendor to offer	
2.6.6	Mechanism for locking X, Y & Z axis	Vendor to offer	
2.6.7	Maximum thrust rating of all axes.	Vendor to offer	
2.7	MACHINE GUIDEWAYS:		
2.7.1	Width of bed guideways, X-axis	Vendor to inform	
2.7.2	Width of column guideways, Y-axis	Vendor to inform	
2.7.3	Details of Guide ways for Ram axis and bearing details of Spindle axis are to be submitted with offer.	Vendor to inform	
2.7.4	Guide ways for X-axis, Y-axis & Z-axis: Hydrostatic (Details to be submitted). Details of lubrication system provided on Spindle axis are also to be submitted with the offer.	Vendor to inform	

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2.7.5	Hardness of guideways	Vendor to inform	
2.7.6	Metallic Telescopic Covers: Slanting type, waterproof Telescopic Covers of rust resistant steel should be provided with pads/wipers for X & Y axes guide ways. Joints of telescopic covers should be sealed.	Vendor to inform	
2.8	ROTARY TABLE :		
2.8.1	Table size (LxB)	3000x3500 mm	
2.8.2	Maximum load carrying capacity (Tons)	50 Ton or more	
2.8.3	Table rotation (B-axis)	3600 indexing positions	
2.8.4	Accuracy of Rotary axis:	Vendor to inform	
2.8.5	Maximum machining torque on B-axis (N-m)	Vendor to inform	
2.8.6	Maximum clamping torque on B-axis (N-m)	Vendor to inform	
2.8.7	Feed rate for Table Rotary Axis. Infinitely variable (Deg/min or rpm)	Vendor to inform	
2.8.8	Rapid Traverse Rate for Rotary Axis (Deg / min. or rpm)	Vendor to inform	
2.8.9	Size of T-slots	Vendor to inform	
2.8.10	T-slots pitch (as per DIN standard)	Vendor to inform	
2.8.11	Central slot size & tolerance	Vendor to inform	
2.8.12	Perpendicular Lateral slot size/ tolerance	Vendor to inform	
2.8.13	Size of bore at the center.	Vendor to inform	
2.8.14	Linear traverse	2500 mm	
2.8.15	Feed Force on Linear Axis	Vendor to inform	
2.8.16	Feed Rate for Linear axis (mm/min Infinitely variable)	Vendor to offer	
2.8.17	Rapid Traverse rate for Linear axis (mm/ min)	Vendor to offer	
2.8.18	Minimum distance between ram face and table face.	Vendor to inform	
2.8.19	Metallic Telescopic Covers: Slanting type, waterproof Telescopic Covers of rust resistant steel should be provided with pads/wipers for V axis guide way. Joints of telescopic covers should be sealed.	Vendor to offer	
2.8.20	Rotary Table shall be capable of eccentric loading of jobs up to 25T. Loading Chart of Table showing relation of weight and distance of c.g. from centre of Rotary Table to be submitted.	Vendor to confirm & submit.	
2.8.21	Feed back devices :		
	a) Heidenhain rotary encoder for B-Axis	Vendor to offer	
	b) Heidenhain Linear Scale with pressurised compressed air cleaning system for linear (V)-Axis	Vendor to offer	
2.8.22	Feed drives : Fancu/Siemens digital AC Servo drives. Details of Make, Model, Type etc. to be submitted by Vendor.	Vendor to offer	
2.8.23	Mechanism for locking/ clamping of Table axes	Vendor to offer	
2.8.24	Location of the Table	On extreme Left side of X-traverse looking from Spindle side.	
2.8.25	Spindle should reach 500 mm beyond extreme end of rotary table.	Vendor to specify	
2.8.26	Hydrostatic Guideways for Table Rotation. Details to be submitted	Vendor to confirm & specify	
2.8.27	Hydrostaic Guideways for Table Linear Traverse Details to be submitted	Vendor to confirm	
2.8.28	Backlash free re-circulating ball screw with Pre-loaded double nut for Table Linear axis. Complete description of the same including diameter of Ball Screw, to be submitted with the offer	Vendor to submit.	
2.9	CONSTRUCTION:		
2.9.1	Vendor to furnish details of material, hardness & constructional details, including explanatory drawings, of various components/assemblies like Column, bed, head stock, ram, spindle, table etc. of the machine.	Vendor to submit.	
2.9.2	Video images on CD including hard copy explaining the technical features/ Literature with photographs, drawings explaining the technical features should be enclosed with the offer	Vendor to submit.	
2.9.3	Automatic deflection compensation for ram effective at any extension of the ram plus spindle is to be provided taking into consideration weight of all possible cutters/ attachments offered. Details of the offered system should be submitted with offer.	Vendor to submit.	
2.9.4	Head Stock and Column Counterbalancing System.Details of the offered system to be submitted.	Vendor to submit.	
2.10	OPERATION AND CONTROL SYSTEM:		
2.10.1	OPERATOR'S PANEL:		

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2.10.1.1	Swiveling type operator's panel having complete CNC and machine control system with CRT of required configuration shall be provided on the operators platform. All switches on the Operator's panel including that for table rotation should be within reach of operator of average height (Indian, 5'6" approx.) for convenient, efficient & safe operation. All displays/indications should also be conveniently placed accordingly. Layout showing complete details of the panel should be submitted.	Vendor to offer	
2.10.1.2	An auxiliary pendant, which can be taken to the table for job setting and similar other purposes, should be provided.	Vendor to offer	
2.10.2	CNC SYSTEM & FEATURES :		
2.10.2.1	Make : Fanuc / Siemens.	Vendor to confirm	
2.10.2.2	Type : PC based latest version	Vendor to confirm	
2.10.2.3	Model: Sinumerik 840D with PC Version PCU 50, NCU 573.5 or higher with Intel Pentium III, 1GHz, 512 MB SDRAM (or higher), Windows XP Operating System or equivalent Fanuc system. (Latest version, as available at the time of ordering, should be supplied).	Vendor to offer and submit details	
2.10.2.4	The system should, preferably, have OP 15 Operator's Panel with TFT colour display (15 inch or more), 19 Inch Machine Control Panel , Full CNC Keyboard with Qwerty keys and Mouse/Trackball or equivalent for Fanuc system, RS232-C interface for I/O devices, COM1(V.24), COM (V.24), LPT1 Parrallel Interface for Printer, VGA, MPI interface & USB, 2 Channels and Expansion slots. The operator Panel configuration will be as per Rittal VIP6000 or equivalent. The CNC System shall also have Electronic hand wheels selectable for all axes, USB Port with 1 GB Pen drive (for each machine) for data input/output, Hard disk of 10 GB or higher (Largest size available at the time of order shall be supplied), Graphic Simulation, COM port for telediagnosics, Network ready with LAN and preinstalled system software & other required softwares etc. (Details should be submitted by Vendor)	Vendor to offer and submit details	
2.10.2.5	The CNC System should necessarily have the following features: Access locks on the operator panel, Coordinate System Rotation, Look Ahead of Minimum 70 blocks, Helical Interpolation, Scaling, Programmable mirror image machining, Process oriented Canned Cycles for Drilling, Milling & Turning operations, Rigid Tapping and Tool Management. The system shall also have automatic unattended shutdown of the system in case of power failure or even in normal machine shutdown, Display of PLC ladder on 840D monitor & Simatic S-7 loaded on the hard disk and Display of servo-waveforms on 840D monitor or equivalent features in Fanuc system.	Vendor to offer and confirm	
2.10.2.6	Details of Standard features. List to be submitted.	Vendor to specify	
2.10.2.7	Features of CNC System required for identified jobs or foreseen by the vendor as required.	Vendor to specify	
2.10.3	MANUAL CONTROL :		
2.10.3.1	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, 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 operators pendant to be submitted.	Vendor to cofirm. Layout of panel showing requisite switches to be submitted.	
2.10.4	HAND HELD UNIT:		
2.10.4.1	Hand Held unit, Type B-MPI of Siemens make or equivalent alongwith sufficient length of interfacing cable is to be offered with complete details.	Vendor to offer	
2.10.5	UPS FOR CNC SYSTEM:		
2.10.5.1	SITOP Power, DC-UPS Module 15 with AKKU module for CNC system only with inbuilt cooling and charge status display.	Vendor to offer	
2.11	MACHINE LIGHTS:		
2.11.1	Machine Lights for sufficient illumination of complete working area on both sides of operator's platform should be provided for clear visibility.	Vendor to offer and submit details	

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2.11.2	A magnetic base portable spot light with sufficiently long cable should also be provided.	Vendor to offer and submit details	
2.11.3	Any lights required in the foundation/ pit area shall also be foreseen and supplied by the vendor.	Vendor to offer and submit details	
2.11.4	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to offer and submit details	
2.11.5	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to offer and submit details	
2.12	AIR CONDITIONERS:		
2.12.1	Air Conditioners with Dehumidifiers of suitable / sufficient capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Detailed specifications of the same are to be submitted.	Vendor to offer	
2.12.2	In case of order, vendor shall confirm to supply the following information about Air Conditioners and Chiller Unit (s) used in the machine: Type of Refrigeration/ Chiller unit. Capacity of the chiller unit. Type of compressor with complete specifications. Type of Thermostatic Expansion Valve with complete specifications. Fan size and flow in CFM (cubic feet meter) of the Condenser unit. Specifications of the Evaporator Unit (Width Plate type/ Coil type) Functional requirement of temperature of Cooling Oil to be maintained between range T1 to T2. Type of temperature indicator/ controller used in the chiller unit with complete specifications.	Vendor to confirm	
2.13	HYDRAULIC SYSTEM : Details should be Submitted by the Vendor		
2.13.1	The Hydraulic System shall be of Re-circulating Type centralised system. Hydraulic Tank should be preferably placed at shop floor.	Vendor to offer and confirm	
2.13.2	System's make Rexroth / Vickers / Vogel / Parker or equivalent International reputed manufacturer.	Vendor to offer and confirm	
2.13.3	Filtration System, Details should be submitted.(Filters should be used of EPE / Hydac / equivalent International reputed make)	Vendor to offer and confirm	
2.13.4	Failure indication	Vendor to offer	
2.13.5	Automatic shut off provision, Details should be submitted.	Vendor to offer	
2.13.6	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, hydrostatic oil and gearbox oil, etc. keeping in view the specified ambient conditions to be offered with complete details. The temperature of Hydraulic Oil should not go beyond 40 deg. C.	Vendor to offer & submit	
2.13.7	Hydraulic pump capacity (flow/ pressure) to be intimated.	Vendor to inform	
2.13.8	No Tandem pumps should be used. Maximum desired permissible pressure is 100 Kg/sqcm. If anywhere, more than 100 Kg/sqcm pressure is used, then one set of such hose pipes and seal kit of such Hydraulic cylinder should be supplied in spare in addition to other spares.	Vendor to confirm & offer	
2.13.9	First filling of all required Oils & Grease etc. for the machine, voltage stabilizer, isolation transformer & air-compressor etc. to be supplied by vendor. Indigenous (Indian) source or Indian equivalent and specifications of oils/ greases are also to be submitted. For hydraulic oils, IOC make is preferable from Indian make.	Vendor to offer	
2.13.10	Charging Kit of accumulator should be provided.	Vendor to confirm	
2.13.11	All the hoses used should have metric end connections.	Vendor to offer	
2.14	ELECTRICAL SYSTEM :		
2.14.1	415V with + 10% / -10% fluctuation, 50HZ with fluctuation of +/-3 HZ, 3 Phase AC (3 wire system with out neutral) Power Supply Source 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 same could be incorporated during construction of foundation.	Vendor to comply	
2.14.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized	Vendor to comply	

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2.14.2.1	Complete panels to be fuseless except Thyristor drives, where thyristor protection fuses are to be used. In all other cases MCCBs/ MPCBs etc. to be used.	Vendor to confirm & specify	
2.14.2.2	Preferred make for PLCs, Drives & basic electrical equipments like contactors, MPCBs, MCCBs ACBs etc. to be Siemens make.	Vendor to confirm & specify	
2.14.2.3	PLCs & drives to have profibus communication capability. PLC programming unit with all necessary hardware and software to be provided with machine. All the softwares including operating system, other system software, programming software and user software for machine must be duly licensed to CFFP, BHEL.	Vendor to confirm & specify	
2.14.2.4	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor to comply	
2.14.2.5	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to comply	
2.14.2.6	All electrical and electronic panels including operator's panel 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 comply	
2.14.2.7	Motors shall conform to IEC or Indian Standards	Vendor to comply	
2.14.2.8	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain mounted vertically. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to confirm	
2.14.2.9	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to comply	
2.14.2.10	In-cycle hour counter with reset facility is to be included in the offer.	Vendor to comply	
2.15	SAFETY ARRANGEMENTS:		
	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to comply	
2.15.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece 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 comply	
2.15.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to comply	
2.15.3	All the pipes, cables etc. on the machine should be well supported and protected.	Vendor to comply	
2.15.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to comply	
2.15.5	Emergency Switches at suitable locations as per International Norms are to be provided.	Vendor to comply	
2.15.6	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor to comply	
2.15.7	Safety Lights at both ends of moving column (preferably Flashing during X-travel).	Vendor to comply	
2.16	ENVIRONMENTAL PERFORMANCE OF THE MACHINE :		
	The Machine shall conform to following factors related to environment :	Vendor to comply	
2.16.1	Maximum noise level shall be 85 dB(A) at normal load condition, 1 M 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 comply	
2.16.2	There shall not be any emissions from the machine.	Vendor to comply	
2.16.3	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 comply	
2.16.4	No hazardous chemicals shall be required to be used in the machine.	Vendor to comply	
2.16.5	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to comply	

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2.16.6	Paint of the machine should be oil resistant and should not peel off and mix up.	Vendor to comply	
2.16.7	There should not be any oil leakage from the machine. Proper oil collectors should be provided for collection of seepage oil at specified pit.	Vendor to comply	
3.0	CHIP CONVEYOR :		
3.1	A chip conveyor to carry both short and curly chips efficiently and effectively to the chip bin to be provided on one end of the machine . Two Chips bins of appropriate size of Indian make, with wheels & handle for movement, should also be supplied.	Vendor to confirm	
3.2	Type of chip conveyor	Vendor to confirm	
3.3	Width of conveyor	Vendor to inform	
3.4	Elevation of chip conveyor for chip bin	Vendor to inform	
3.5	Material of chip conveyor (to be rust resistant)	Vendor to inform	
3.6	Provision for smooth flow of chips to the conveyor.	Vendor to inform	
3.7	Operation of chip conveyor (forward & reverse) through push buttons on operator's panel and at Chip Conveyor	Vendor to inform	
3.8	Layout showing location of chip conveyor to be submitted.	Vendor to inform	
3.9	There should be replacable grill/mesh covers over entire length of chip conveyor to eliminate jamming of conveyor.	Vendor to confirm	
4.0	SERVO VOLTAGE STABILIZER:		
4.1	Indian make Oil/ Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc. with no undesirable Harmonics in the stabiliser output.	Vendor to offer with details	
4.2	Make	NEEL, Aplab or Auto Electric	
4.3	Model & Rating	Vendor to specify	
4.4	Spares (Control card, monitoring pcb and servo motor)for the Voltage Stabiliser for 2 years trouble free working should also be offered with item wise list.	Vendor to specify	
4.5	Catalogue of the Voltage Stabiliser shall be submitted with the offer.	Vendor to submit	
5.0	ULTRA ISOLATION TRANSFORMER		
5.1	Indian make Ultra Isolation Transformer suitable for complete machine , its drives, controls, PLC etc. shall be offered with complete details.	Vendor to offer	
5.2	Make	NEEL, Aplab or Auto Electric	
5.3	Model and Rating	Vendor to specify	
5.4	Catalogue of the Isolation Transformer shall be submitted with the offer.	Vendor to submit	
6.0	PNEUMATIC SYSTEM:		
6.1	AIR COMPRESSOR:		
6.1.1	Vendor to specify any requirement of compressed air supply for the operation of the machine.If so, then the system should be so designed to have additional provision and required accessories with Refrigerated type Air Dryer so that BHEL compressed air supply having pressure 5 Kg/sq.cm with high moisture could be used as and when required. The compressor unit should be suitable for continuous duty operation.	Vendor to offer with details.	
6.1.2	Make & Model of Air Compressor and Refrigerator type Dryer.	Vendor to specify	
6.1.3	Capacity (Flow, Pressure & KW)	Vendor to specify	
6.1.4	Following Spares for the compressor for 2 years trouble free working should also be offered. 1. Air Filter 06 nos. 2. Oil Filter 15 nos.3. Oil 50 Litres. 4. Air-oil separator element 06 nos. 5. Belts 4 nos. 6. Flexible hose kit 1 set.	Vendor to specify	
6.1.5	All other elements except compressor should be of FESTO / NORGEN / equivalent international make	Vendor to offer	
6.2	COMPRESSED AIR POINTS:		
6.2.1	Compressed Air Point with manual ON/ OFF Valve and flexible pipe of suitable length for work piece cleaning.	Vendor to offer	
7.0	TOOLINGS:		
7.1	Complete Description of offered Tooling System	Vendor to offer	
7.2	All cutting tools, tool holders, arbors, boring bars, clamping elements etc., recommended for machining of proveout component shall be offered by the vendor.	Vendor to offer	
7.3	Vendor shall be responsible, financially or otherwise, for any deviation/ rejection in proveout component due to wrong machining or malfunctioning of the machine during proveout machining and also for the delay in machining due to improper recommended tooling etc..	Vendor to comply	

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8.0	DIAGNOSTIC SYSTEM:		
8.1	FAULT DIAGNOSTIC SYSTEM:		
8.1.1	Supplier's own diagnostic system with required Software and Hardware installed on the CNC system, which shows detailed cause and remedy for the fault on the CNC system display with full video diagnostics indicating the element /device causing the fault. Vendor should also offer a PC note book along with Simatic S7 software (licensed copy), necessary cables, PCMCIA card / Adaptor (for Communication with MPI port) for diagnostic purpose. The Note Book PC should be loaded with complete Electrical Schemes, Mechanical Assembly drawings, Hydraulic Circuit Diagrams, Operation and Maintenance Manuals, Machine Alarm list along with Help text wiring diagram, On-Line display of PLC user should be available on the note book PC.	Vendor to offer & submit	
8.1.2	Provision of OEM Screen with soft keys enabling the service personnel to bring back the tool carriers of the AAC to its initial/nearest position in case of interruption of tool carrier's positioning cycle due to alarm on the machine or power failure. With this OEM screen, service personnel should be able to perform individual steps of Tool carriers positioning cycle manually. Separate Hand Held Pendant should also be provided to retrieve the tool carrier to it's initial position.	Vendor to offer	
8.1.3	Machine should have provision to switchover from position feedback system -2 (direct) to Position feed back system-1 (Motor encoder) through PLC program (for service personnel only).	Vendor to offer	
8.1.4	Help guide should be provided to use diagnostic system.	Vendor to confirm	
9.0	LEVELING & ANCHORING SYSTEM	Required.	
9.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the Machine and Rotary Table.	Vendor to offer and submit details.	
10.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE:		
10.1	Special tools and equipment required for erection of the machine shall be brought by the vendor. 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 offer	
10.2	Test mandrel & measuring instruments for checking spindle run-out & alignment & accuracies of the machine should be supplied	Vendor to offer	
11.00	OPTIONAL ACCESSORIES:		
11.1	AUTOMATIC ATTACHMENT CHANGER (AAC)(OPTIONAL):		
11.1.1	All attachments shall be suitable for loading / unloading through AAC	Vendor to offer	
11.1.2	No. of storage positions	Vendor to inform	
11.1.3	Location of the attachment changer	On RHS of X- Traverse.	
11.1.4	Mounting plates as required for attachments should be supplied	Vendor to offer and submit	
11.1.5	Maximum Permissible Weight on each Position.	Vendor to offer and submit	
11.1.6	Maximum Permissible Weight on Complete AAC.	Vendor to offer and submit	
11.1.7	Additional Longitudinal Traverse of X-axis required to accommodate and use of AAC beyond the specified X-axis traverse shall be separately offered by the vendor.	Vendor to offer and submit	
11.1.8	Suitable Software based and manual key based arrangement should be provided to extract an Attachment trapped in the AAC cycle. Details of both the system to be provided along with the offer.	Vendor to offer and submit	
11.2	UNIVERSAL MILLING HEAD (OPTIONAL):		
11.2.1	Power	40 KW or more	
11.2.2	Max torque	Vendor to inform	
11.2.3	Speed Range	Vendor to inform	
11.2.4	Speed ratio	Same as spindle	
11.2.5	Spindle taper	Vendor to inform	
11.2.6	Traverse Range of A-axis in deg.	(+/-) 95	
11.2.7	Resolution of A-axis	0.01 deg.	
11.2.8	Rotation of C-axis (Any number of rotation)	360 deg	
11.2.9	Resolution of C-axis	0.01 deg.	
11.2.10	Torque-Power-Speed characteristic diagram to be submitted.	Vendor to submit	
11.2.11	Weight of the head	Vendor to inform	

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11.2.12	Pull Stud for mounting the Head and for mounting the Tools in the taper of the Head shall be supplied by the vendor.	Vendor to offer.	
11.3	BORING & FACING HEAD(OPTIONAL) :		
11.3.1	Model No.	Vendor to inform	
11.3.2	Head body diameter	Vendor to inform	
11.3.3	Speed Range	0-250 rpm	
11.3.4	Radial axis independent positioning	Vendor to inform	
11.3.5	Slide stroke	200 mm	
11.3.6	Slide feed rate	1-400 mmpm	
11.3.7	Machining range in Boring for internal diameter	1250 mm Max.	
11.3.8	Accuracy of Bore Size (Bore Tolerance), Surface Finish of bores and Facial and Radial Run outs (Requirement to be specified by Indentor.)	H7, Ra 1.6 Micron, 0.03	
11.3.9	Diameter range for machining external diameter indicating max. depth	Vendor to inform	
11.3.10	Machining range in facing indicating maximum depth.	Vendor to inform	
11.3.11	Maximum boring depth without entry of Boring Head.	Vendor to inform	
11.3.12	Maximum torque	Vendor to inform	
11.3.13	Maximum cutting force in boring	Vendor to inform	
11.3.14	Maximum cutting force in facing	Vendor to inform	
11.3.15	Slide Counter Balance mechanism	Vendor to inform	
11.3.16	Item wise details of complete set of standard Tool Holders and Tools, available with the offered Head, are to be submitted with the offer. Complete details of any special arrangement offered to meet the specified requirement of Boring range are also to be submitted.	Vendor to inform	
11.3.17	Tool Holder with matching taper for presetting of the Tools for offered Boring and Facing Head is to be offered with complete details.	Vendor to offer.	
11.3.18	Catalogue of the offered Head is to be submitted with the offer.	Vendor to offer and submit	
11.4	JIB CRANE (OPTIONAL)		
11.4.1	Capacity	1.5 Ton	
11.4.2	Mounted on top of column with all power operated movements (including swivel motion) through push buttons	Vendor to offer and submit	
11.4.3	Swivelling range and speed	Vendor to submit	
11.4.4	Crane reach should cover the rotary table when fully drawn towards machine spindle.	Vendor to confirm	
11.5	SPARES (OPTIONAL):		
11.5.1	Itemwise breakup of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered)	Vendor to confirm	
11.5.1.1	Mechanical & Hydraulic Spares(OPTIONAL): The following spares are to be included.		
11.5.1.2	Mechanical, Hydraulic, Pneumatics Spares:(One no. of each type of elements used in .Hydraulic, Pneumatic, lubrication and oil cooling system of machine)	Vendor to offer	
11.5.1.3	All types/varieties of pumps used on machines	Vendor to offer	
11.5.1.4	All types of D.C. Control valves (2 no. each type)	Vendor to offer	
11.5.1.5	All types of flow control, pressure regulators, pressure reducer valves used on m/c. (1 no. each type)	Vendor to offer	
11.5.1.6	All types of pressure switches, flow switches and float switches (2no. each type)	Vendor to offer	
11.5.1.7	All types of filter inserts (5 nos. each of regenerative type & 20 nos. each of disposable type)	Vendor to offer	
11.5.1.8	Shaft seals (2 nos. each type)	Vendor to offer	
11.5.1.9	O-Rings and Piston rings (5nos. of each type)	Vendor to offer	
11.5.1.10	Accumulator with charging kit (1 no each type)	Vendor to offer	
11.5.1.11	All pneumatic pipes with end connection (complete one set of pneumatic pipes used)	Vendor to offer	
11.5.1.12	All Hydraulic/Lubrication Hoses with end connections of m/c (complete one set of hoses used)	Vendor to offer	
11.5.1.13	One set of oil collection pipes	Vendor to offer	
11.5.1.14	All types of Pressure Gauges	Vendor to offer	
11.5.1.15	Set of belts (including timing belts) with item wise list.	Vendor to offer	
11.5.1.16	All couplings including hydraulic pump couplings, pressure sleeves etc.	Vendor to offer	

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11.5.1.17	One no. each type of Clutch used in the Machine.	Vendor to offer	
11.5.2	Electrical /Electronic / CNC Spares(OPTIONAL) : Following Spares are to be offered.	Vendor to offer	
11.5.2.1	Limit Switches/ Micro Switches (2 Nos each type)	Vendor to offer	
11.5.2.2	Relays (2 Nos each type)	Vendor to offer	
11.5.2.3	Contactors (2 Nos each type)	Vendor to offer	
11.5.2.4	RTD temperature transmitter (1 No each type)	Vendor to offer	
11.5.2.5	Proximity Switches (5 Nos each type)	Vendor to offer	
11.5.2.6	Push Buttons (5 Nos each type)	Vendor to offer	
11.5.2.7	Indicating Lamps (10 Nos each type)	Vendor to offer	
11.5.2.8	Semiconductor Fuses (5 Nos each type)	Vendor to offer	
11.5.2.9	Special Fuses (5 Nos each type)	Vendor to offer	
11.5.2.10	Circuit Breakers (1 No each type)	Vendor to offer	
11.5.2.11	Main Power Switch (1 No each type)	Vendor to offer	
11.5.2.12	Encoders (1 No each type)	Vendor to offer	
11.5.2.13	Scanning Heads for Linear Scales (1 No each type)	Vendor to offer	
11.5.2.14	Wave shape unit/ EXE unit (1 No each type)		
11.5.2.15	PCU module (Hard disk loaded with Ghost of the machine after final commissioning)	Vendor to offer	
11.5.2.16	NCU module	Vendor to offer	
11.5.2.17	Operator's panel with Display Unit	Vendor to offer	
11.5.2.18	I/O Cards for PLC (1 No each type)	Vendor to offer	
11.5.2.19	Servo Motors for Feed Drives (1 No each type)	Vendor to offer	
11.5.2.20	Power Module & Control Cards for Main Drive as well as Feed Drives (1 Nos each type)	Vendor to offer	
11.5.2.21	One each of the following items : CNC Power Supply, I/R Module, NCU BOX, Machine Control Panel, Hand Held Unit/ B-MPI, Any other auxiliary drive , if used, Complete Proportional Valve Controller, if used.	Vendor to offer	
11.5.3	All types of spares for total machine and accessories should be available for atleast ten years after supply of the machine. If machine 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 these in advance, if required.	Vendor to offer	
11.5.4	Recommended set of spares for all attachments, viz.: Milling Head, and Boring Heads are to be offered with details. The spares are to include Motors, Set of Gears, Encoders, Limit/ Cam Switch Connectors with item wise details.	Vendor to offer	
11.5.5	Recommended set of spares for Job and Tool Measuring Systems are to be offered with details.	Vendor to offer	
11.5.6	Vendor to confirm that 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	
12.0	DOCUMENTATION : Three sets of following documents (Hard copies with Soft Copies wherever specified) in English language should be supplied along with the machine	Vendor to offer	
12.1	Operating manuals of Machine & CNC system	Vendor to offer	
12.2	Programming Manuals of Machine & CNC system	Vendor to offer	
12.3	Detailed Maintenance manual of machine and supplied systems.	Vendor to offer	
12.4	Maintenance, Interface & commissioning manuals, PLC programming manual for CNC system, Interface & commissioning manuals for spindle ,feed drives and auxiliary drive.	Vendor to offer	
12.5	Manufacturing drawings for all supplied clamping elements, cutting tools, tool holders, arbors, boring bars, adapters, sleeves, fixtures etc.	Vendor to offer	
12.6	Catalogues, Operation & Maintenance Manuals of all bought out items including drawings, wherever applicable.	Vendor to offer	
12.7	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to offer	
12.8	Operating Manuals, Maintenance Manuals & Catalogues for supplied accessories viz. Voltage Stabilizer, Isolation Transformer, Air-Compressor, Boring Attachments, Automatic Tool and Job Measurement system etc.	Vendor to offer	
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 offer	
12.10	PLC program, NC data & PLC data on CD.	Vendor to offer	

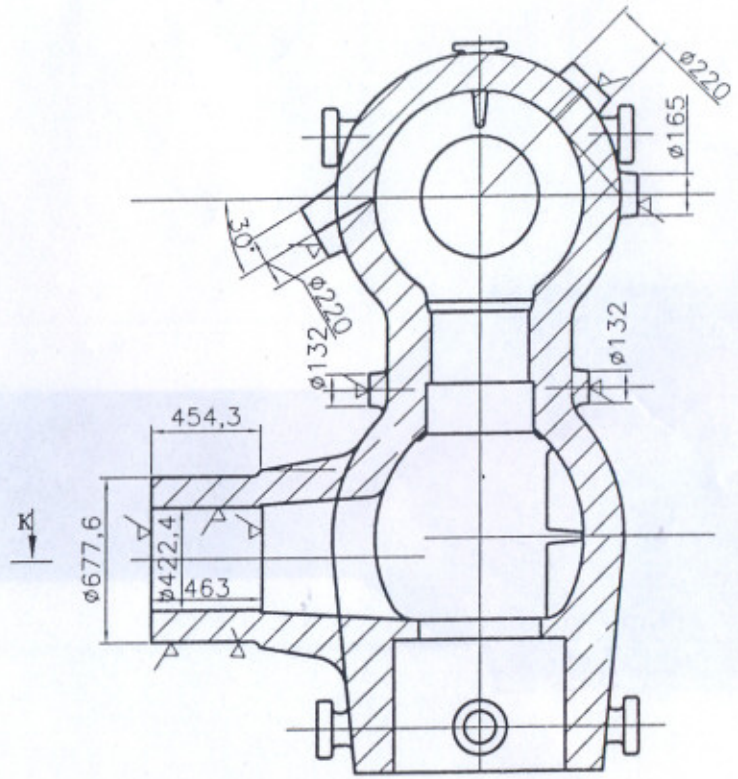
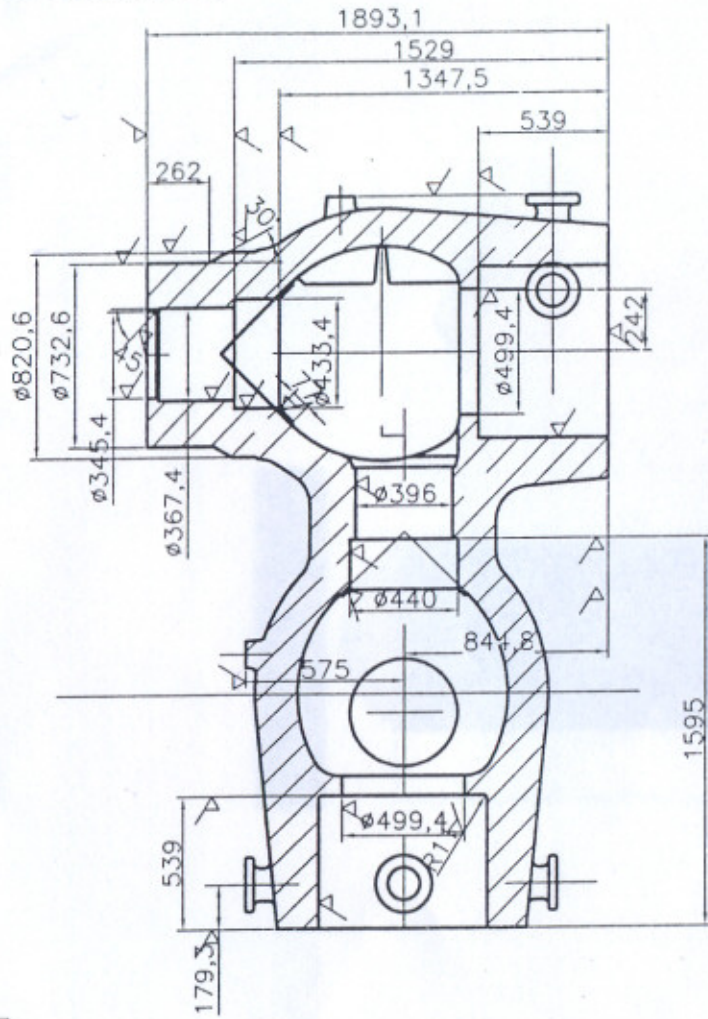
SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
12.11	Detailed assembly drawings of all units of the machine showing component/part name & their description.	Vendor to offer	
12.12	Detailed drawings showing for all Hydraulic, pneumatic showing components/parts and their descriptions.	Vendor to offer	
12.13	Complete back-up of PCU-50 or equivalent (in case of Fanuc) hard disk on <u>GHOST CD</u> and clearly written Instructions to take back-up and reloading on a new hard disk.	Vendor to offer	
12.14	Complete list of parts/items(Bill of materials) used in the machine in English language.	Vendor to offer	
12.15	Electrical Schematic Diagrams, Wiring Diagrams, Junction Box Layouts, Connector Diagrams and Cable Layouts of the machine in English.	Vendor to offer	
12.16	Drawings of machine assemblies/sub-assemblies/parts including Pneumatic/ Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list marked on it in English.	Vendor to offer	
12.17	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to offer	
13.0	TRAINING:		
13.1	Four BHEL Persons should be trained at vendor's works for each machine for the area & period given below: (a) CNC Part Programming for the machine, application of all CNC Features, Programming for Measuring Systems & supplied accessories etc. (Period 3 Weeks) (b) Electrical, Electronic & CNC maintenance for machine & other supplied equipments (Period 2 weeks) (c) Mechanical & Hydraulic maintenance of the machine & other supplied equipments (Period 2 weeks) (d) Operation of the machine & other supplied equipments (Period 2 weeks) Pre-dispatch inspection (ref. Sl.No. 19.1) of the machine shall also be carried out by the team during their stay at vendor's works for the training. Vendor may specify days required for pre-dispatch inspection. BHEL reserves the right to choose no. of persons, field & period of training, out of above, while deputing their engineers for training.	Vendor to offer	
13.2	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	Vendor to confirm	
13.3	Competent, English speaking experts 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 week basis	Vendor to quote	
13.5	Vendor should commit to organize and quote for training of Electronics Engineer and Programmer at the CNC System Manufacturer's works for advanced features and specialised training if so required by BHEL.	Vendor to confirm	
14.0	FOUNDATION:		
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. Complete Foundation Design including details, like Static/ Dynamic load details etc. and final Layout Drawings shall be submitted by the supplier within three months after getting BHEL's approval. 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 & any other accessory. BHEL shall construct complete foundation for the machine under supervision of supplier and at supplier's responsibility. Vendor should arrange equipment required for the testing of foundation, if required by the vendor. 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	

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14.2	Dynamic soil parameters are as follows: (i) Cu = 4.937 kg/cm ³ (for block size of 1.5mx1mx1m) For foundation size of 10m ² or more, Cu = 1.667 kg/cm ² (ii) CΦ = 9.70 kg/cm ³ (iii) CΨ = 4.20 kg/cm ³ Bearing Capacity: Depth : 5 M From Shear consideration : 39 T/M SQ. Fom Settelement consideration : 9-10 T/M SQ. Recommended B.Capacity : 9 T/M SQ.	For vendor's information.	
15.0	ERECTION & COMMISSIONING		
15.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control system & all types of other supplied equipment, machining of test pieces etc. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance. The available crane capacity at the proposed location of the machine will be 75Ton. The vendor will ensure to make requisite arrangement for lifting of heavier consignment/ items/ assembly of the machine not getting covered by this capacity.	Vendor to confirm	
15.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer & Air Compressor shall also be responsibility of the vendor.	Vendor to offer and submit details	
15.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at clause 19.0 (Machine Acceptance) shall form part of the commissioning activity.	Vendor to offer and submit details	
15.4	Test mandrel for checking run-out/taper & alignment should be supplied	Vendor to offer and submit details	
15.5	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 offer and submit details	
15.6	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to offer and submit details	
15.7	All Cover Plates required for the machine and its peripherals including pits, if any, shall be supplied and installed by the vendor. The plates should be sourced from India	Vendor to offer and submit details	
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 offer and submit details	
15.9	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to offer and submit details	
15.10	Charges, duration, terms & conditions for E&C should be furnished in detail separately by vendor along with offer.	Vendor to offer and submit details	
16.0	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 offer and submit details	
16.1.2	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 demonstrate	
16.2	MACHINE POSITIONING ACCURACIES & REPEATABILITY:Should be measured as per VDI/DGQ 3441(Latest Revision) using LASER INTERFEROMETER.		

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16.2.1	Positioning uncertainty (Pa per 1000mm) for X,Y,Z axes	0.015 mm	
16.2.2	Positioning uncertainty (Pa per 1000mm) for W & V axes	Vendor to inform	
16.2.3	Positioning uncertainty Pa for B-axis	6 sec	
16.2.4	Positional scatter (Ps per 1000mm) for X,Y,Z axes	0.008mm	
16.2.5	Positional scatter (Ps per 1000mm) for W & V axes	Vendor to inform	
16.2.6	Positional scatter Ps for B-axis	6 sec	
16.2.7	Total positioning error P for entire travel for X,Y,Z,W & V axes	Vendor to specify	
16.2.8	Total positioning error P for B-axis	Vendor to specify	
16.2.9	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	
17.0	OPERATING CONDITIONS & THERMAL STABILITY :		
17.1	Power Supply (AC): Voltage = 415V +10% / -10% of fluctuations , Frequency= 50Hz +3 / -3 , No. of phases = 3 phase without neutral. Ambient Operating Conditions: Temperature = 2 to 45 degree Celsius , Relative Humidity = 95% max.	Vendor to accept & confirm	
17.2	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 20 deg Celsius in 24 hours. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)	Vendor to accept & confirm	
17.3	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 accept & confirm	
17.4	The machine, including attachments and accessories, should be suitable for 24 hrs. continuous operation to its full capacity for 24 hour a day and 7 days a week throughout. Vendor to ensure and confirm the same.	Vendor to accept & confirm	
18.0	PROVEOUT OF BHEL COMPONENTS :		
18.1	Casting as per Drg. no. 04-HB-01R00 will be likely proveout component.Job setting plan, Machining process plan & Requirement of Tools etc. for machining of proveout components shall be discussed and mutually agreed with vendor. Complete machining of prove out components shall be done by Vendor at BHEL works to the specified design accuracy and surface finish, using cutting tools and CNC programs to be provided by the vendor to prove the machine after complete erection, tests & test piece machining etc. Vendor shall submit final job setting plan, machining process plan, tool layout & list with complete description, time study etc. for the proveout machining within two months of placement of order	Vendor to accept and offer.	
18.2	Vendor shall submit CNC programs prior to start of erection of Machine at BHEL works.Vendor shall be fully responsible for machining of proveout components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by 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	
18.3	During proveout, Vendor shall be responsible, financially or otherwise, for any deviation/ rejection in proveout component to the extent of cost of Casting/Forging, 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..The cost of such deviation / rejection, if any, shall be refunded by the vendor to BHEL.	Vendor to confirm	
19.0	MACHINE ACCEPTANCE: (Tests/Activities TO be Performed by Vendor)	Should be accepted & confirmed by Vendor	
19.1	Tests/Activities should be carried out at supplier's works on the machine before dispatch :		
19.1.1	Geometrical Accuracy Tests as per test chart.	Vendor to offer and submit details	
19.1.2	Positioning Accuracy Tests as per VDI-DGQ/3441 or equivalent.	Vendor to offer and submit details	

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19.1.3	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 offer and submit details	
19.1.4	Demonstration of all features of the machine, CNC system and all Accessories.	Vendor to offer and submit details	
19.1.5	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to offer and submit details	
19.1.6	Test to be carried out at BHEL works while commissioning the machine :		
19.1.7	Geometrical Accuracy Tests as per test chart.	Vendor to offer and submit details	
19.1.8	Positioning Accuracy Tests as per VDI-DGQ/3441 or equivalent.	Vendor to offer and submit details	
19.1.9	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to offer and submit details	
19.1.10	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 offer and submit details	
19.1.11	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to offer and submit details	
19.1.12	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to offer and submit details	
19.1.13	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to offer and submit details	
19.1.14	Job prove out.	Vendor to offer and submit details	
19.1.15	Two weeks supervision of independent operation of machine by BHEL after job proveout.	Vendor to offer and submit details	
19.1.16	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works	Vendor to offer and submit details	
20.0	PACKING:		
20.1	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	Vendor to confirm	
21.0	GENERAL : The vendor should submit the following information:		
21.1	Machine Model	Vendor to inform	
21.2	Total connected load (KVA):	Vendor to inform	
21.3	Floor area required (Length, Width, Height) for complete machine & accessories. The Layout of the machine may be planned so that the Rotary Table shall be at the Left Hand side of the X-Traversal while looking from the Spindle.	Vendor to inform	
21.4	Painting of Machine/ Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to inform	
21.5	Total weight of the machine	Vendor to inform	
21.6	Weight of heaviest part of machine	Vendor to inform	
21.7	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to inform	
21.8	Dimensions of largest part/ subassembly/ assembly of the machine	Vendor to inform	
21.9	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 submit	
21.10	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to submit	
21.11	Hydraulic, Pneumatic & oil pipings should be preferably metallic except places where flexible pipings are essential.All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to submit	
21.12	Ladder is to be provided to access the machine elements located at the top of the column.	Vendor to offer & confirm	

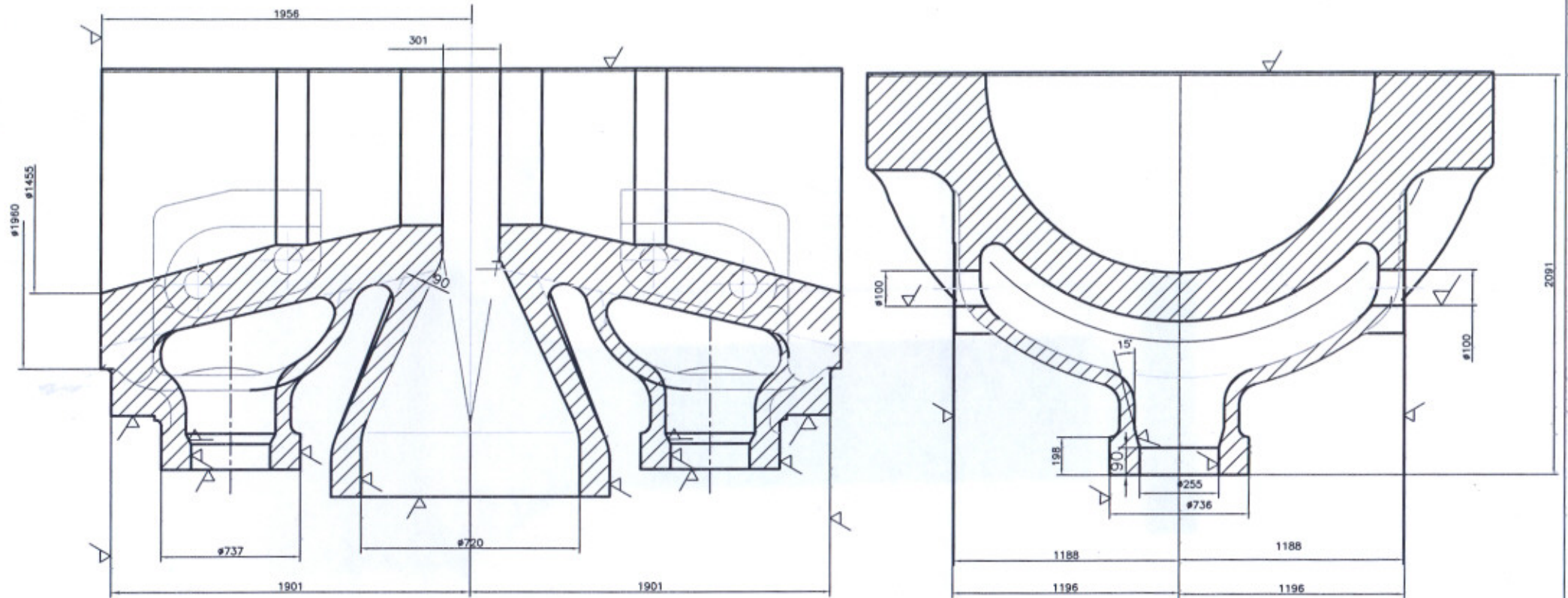
SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
21.13	All items of the equipment in this specification shall be complete in all respects and any equipment not covered in the specification, but is considered essential for proper design and operation of the machine shall be included by the supplier. If the supplier feels that in his opinion, by his experience and in accordance with the modern practice any of the item specified, he is in apposition to submit a better/ more suitable offer. He shall indicate them and submit the offer on the basis of the specifications he considers more suitable and capable of meeting the duty requirements and should clearly states its merits.	Vendor to offer & submit	
22.0	QUALIFYING CONDITIONS :		
22.1	Only those vendors (OEMs) should quote, who have supplied and commissioned at least one number CNC Horizontal Boring Machine of Spindle diameter 180mm & above and Ram + Spindle Travel 1500mm or higher sizes in the past ten years (on the date of opening of Tender) and referred machine is presently working satisfactorily for more than one year (on the date of opening of tender) after commissioning. However, if referred machine has been supplied to BHEL, then the machine should be presently working satisfactorily for more than six months (on the date of opening of tender) after its commissioning and acceptance in BHEL. Supply details are required for qualification.	Vendor to accept & confirm	
22.2	Name of the customer/ company where referred machine is installed.	Vendor to inform	
22.3	Complete postal address of the customer.	Vendor to inform	
22.4	Month & Year of commissioning.	Vendor to inform	
22.5	Parameters of machine(s) supplied (Spindle Diameter, Ram+Spindle Travel, Y-traverse) and application for which the machine is supplied.	Vendor to inform	
22.6	Name and designation of the contact person of the customer.	Vendor to inform	
22.7	Phone, FAX no. and e-mail address of the contact person of the customer.	Vendor to inform	
22.8	Performance certificate from the customers regarding satisfactory performance of machine supplied to them (Original Certificate or Through E-mail directly from the customer). The original performance certificate may be returned after verification by BHEL, if required.	Vendor to submit	
22.9	BHEL reserves the right to verify information submitted by vendor including visit to the vendor's works and witnessing the manufacturing & operational procedures. In case the information is found to be false/incorrect, the offer shall be rejected.	Vendor to accept & confirm	



NOTE:

1. Surface Finish 3.2 microns on machined surfaces.
2. Tolerance : Outside dimensions +0.5,-0
: Inside dimensions +0, -0.5
3. Runout of all diameters to be within 0.1 mm
4. Perpendicularity of surfaces to be within 0.1mm

CASTING	DLY.WT 14500 KG
DRG. NO. 04-HB-01R00	
SHEET NO.	NO. OF SHEETS



NOTE:

1. Surface Finish 3.2 microns on machined surfaces.
2. Tolerance : Outside dimensions +0.5,-0
: Inside dimensions +0, -0.5
3. Runout of all diameters to be within 0.1 mm
4. Perpendicularity of surfaces to be within 0.1mm

CASTING

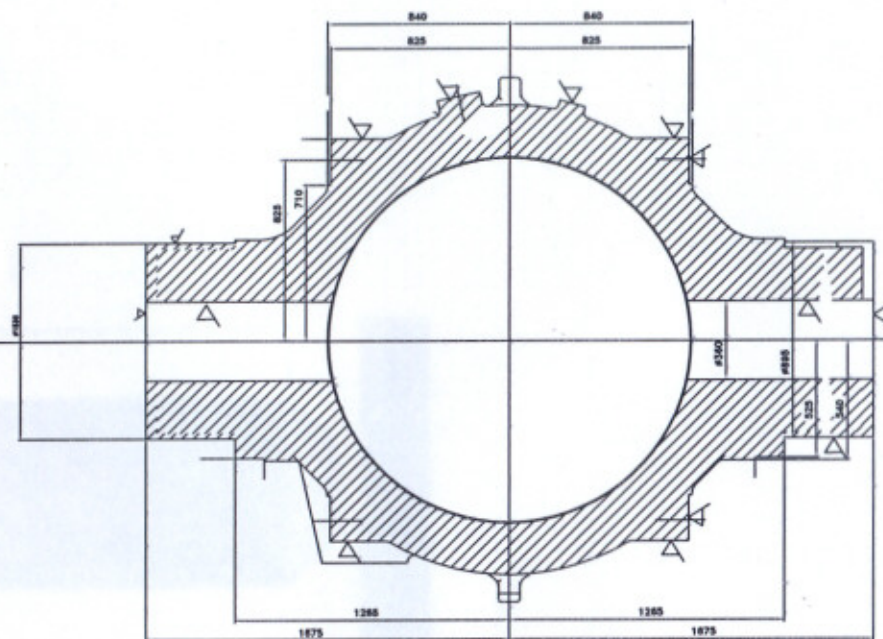
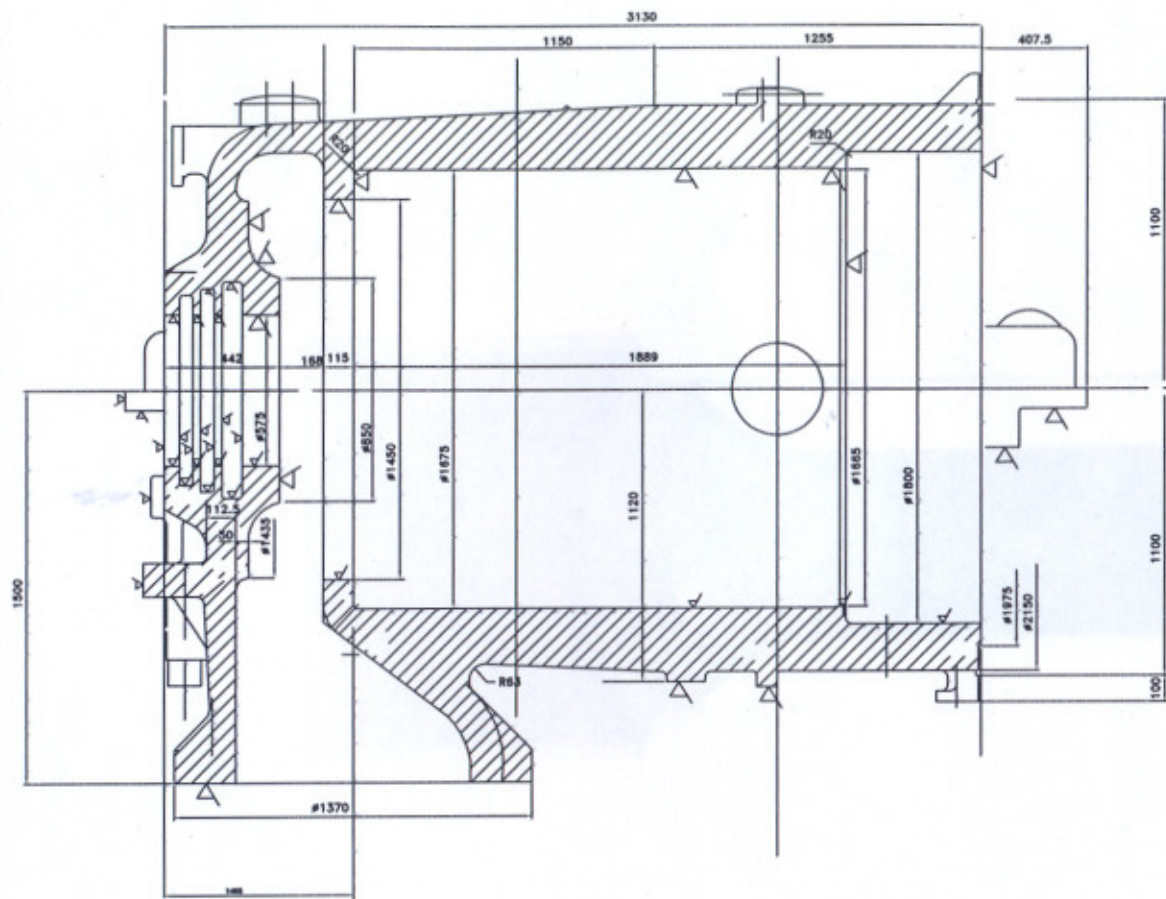
DLY.WT16500KG

DRG. NO.

04-HB-02R01

SHEET NO.

NO. OF SHEETS



NOTE:

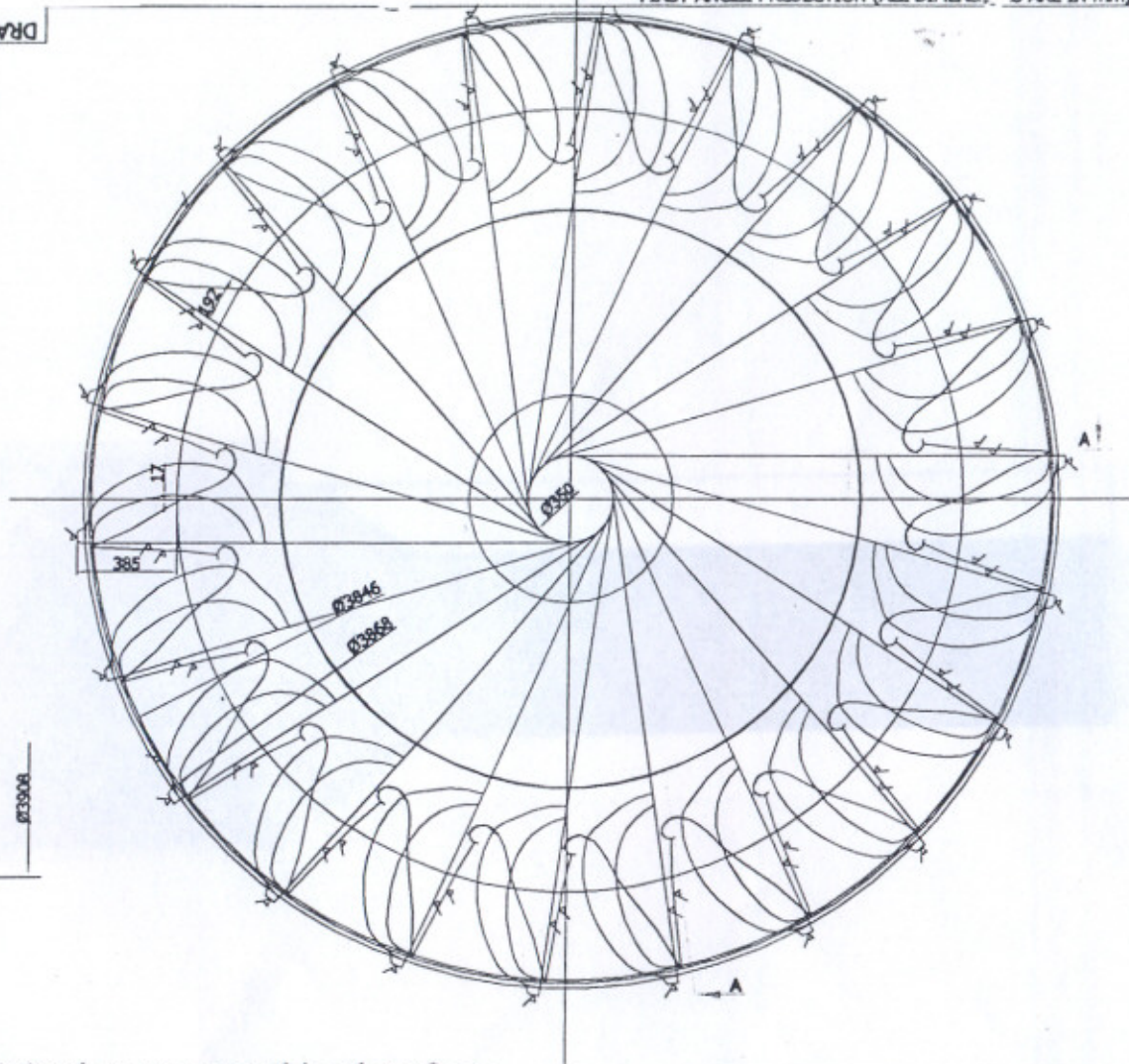
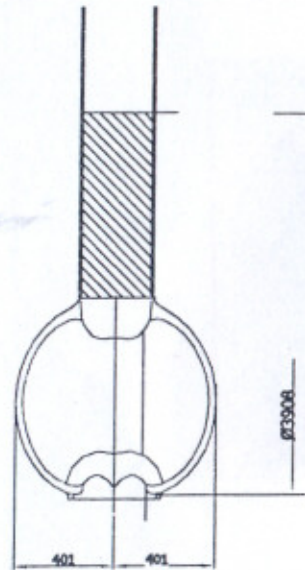
1. Surface Finish 3.2 microns on machined surfaces.
2. Tolerance : Outside dimensions +0.5,-0
: Inside dimensions +0, -0.5
3. Runout of all diameters to be within 0.1 mm
4. Perpendicularity of surfaces to be within 0.1mm

CASTING

DLY.WT46000KG

DRG. NO.

04-HB-05R01



NOTE:

1. Surface Finish 3.2 microns on machined surfaces.
2. Tolerance : Outside dimensions +0.5,-0
: Inside dimensions +0, -0.5
3. Runout of all diameters to be within 0.1 mm
4. Perpendicularity of surfaces to be within 0.1mm

CASTING

DLY.WT.12700KG

DRG. NO.
04-HB-06R00

SHEET NO. | NO. OF SHEETS



ISO 9001:2000
&14001:2004
NAVARATNA
COMPANY

सामग्री प्रबन्धन (क्रय विभाग)

MATERIAL MANAGEMENT (PURCHASE)

सेन्ट्रल फाउन्ड्री फोर्ज प्लान्ट, भारत हेवी इलेक्ट्रिकल्स लिमिटेड

CENTRAL FOUNDRY FORGE PLANT, BHEL HARDWAR

रानीपुर, हरिद्वार (भारत)

RANIPUR, HARIDWAR (INDIA) – 249403

Phone No. +91-1334-285326/284548, FAX No. 225892

e-mail : manoj26@bhelhwr.co.in

M/S

Sub: Tender Enquiry No: 3025/P/950/8/5531P/2 dated 30/09/2008 due on 14 Nov'2008.

Dear Sir,

We are pleased to invite offer as per enclosed specifications, drawings with terms and conditions in sealed covers for the under mentioned items.

SI No	Tender No	Description of Material	Qty	Date & Time of Opening
01	3025/P/950/8/5531P/2	CNC Horizontal Borer Spindle dia 200 mm	01 No.	14 Nov'2008

KINDLY READ TERMS AND CONDITIONS. OFFER NOT IN ACCORDANCE WITH THE INSTRUCTIONS IS LIABLE TO BE DISQUALIFIED AND OR IGNORED.

PLEASE VISIT www.bhel.com or www.bhelhwr.co.in for more details and tender documents.

Please also down load Vendor Registration Form and submit same dully filled.

Thanking You,

Yours Faithfully,

For & On behalf of CFFP BHEL Hardwar

(Manoj Kumar)
Engineer (Pur)

Note: Corrigendum if any shall not be published, kindly refer web for any changes.



GENERAL TERMS AND CONDITIONS OF TENDER ENQUIRY ANNEXURE-A

1. Submit the tender in two parts i.e.

Part-I Techno-Commercial Bid

Part-II Price Bid

Techno-Commercial (part one) & Price Bid (part two) should be put in separate sealed envelopes. Both envelopes should be super scribed with **Tender Number, Date of Opening & Technical / Commercial Bid** and **Price Bid** respectively along with name of firm.

Both the envelopes i.e. containing Techno-Commercial Bid and Price Bid should again be kept in one envelope super scribed again with Tender No. and Date of Opening and the name of firm submitting the tender and sent by Registered A/D post to **SDGM(MM),Purchase Department ,CFFP ,BHEL Hardwar,Ranipur ,Hardwar 249403.Uttarakhand ,India**

Part-I Envelopes super scribed with **Techno-Commercial Bid** must contain all information especially:-

(a) Specification of the material offered should be strictly as per CFFP/BHEL specifications of Enquired material in tender documents. **Deviations if any must be indicated clearly in the offer . Rates to be quoted as For Destination Basis.**

(b) All commercial terms i.e. packing, forwarding, Custom Duty ,Additional Duty ,ST/STT/VAT/CST, Excise duty/CVD , Bank Charges, payment terms & Insurance etc as applicable should be clearly mentioned **except Price** .Also mention present rate of applicable taxes & duties even if inclusive in rates.

(c) Confirm to submit all required commercial documents (tax invoice, CENVATable duplicate copy of invoice, packing list, transit sale agreement etc.)& technical documents (TC/GC/QP etc.)

(d) Registration Numbers of SSI, Central Excise, Sales tax, Income tax, DGS & D, ECC etc.

(e) **Un-priced copy of Price Bid.**

Part-II Envelopes super scribed with **Price Bid** should contain **priced copy of Price Bid**. The price should be mentioned both **in figures and words**.

2. Authorized Signatory should authenticate all tender documents.

3. **Techno-commercial bid (Part-I)** will be opened on the due date at 2.00 PM. In the presence of participating vendors or authorized representatives, who may wish to be present. Representative deputed to witness tender opening must produce an authority letter from the signatory of offer. After evaluation of technical bids & finalization of technical, commercial terms & condition, price bid of only successful vendors will be opened. Priced bid opening date will be intimated separately.

4. The material offered must conform to the required BHEL specifications and drawings as well as instructions and details made available .

5. Eligibility :

a) The Vendor must submit the annual reports giving the audited profit or loss account and balance sheet for last three financial years with year ending 31.03.07.

b) The Vendor have to submit the details of recent orders of similar material (not earlier than 31.03.05) executed mentioning the Name and address of Customers with technical details preferably in India .

The Vendors who are registered with any unit of BHEL ,India, in related category are exempted of above two . They should however give details of their registration.



6. Original Test Certificate & other related Documents from the Manufacturers or Government or Recognized Houses shall have to be produced as applicable without any extra cost. This may please be clearly confirmed in the quotation without which the offer may not be considered.

7. Validity of offers should be minimum of **180 working days** from the date of Tender (Techno-Commercial Bid) opening.

8. Delivery in the promised period is the essence of contract. Confirm to supply according to delivery schedule mentioned.

9. Payment Term preferably should be within 30 days after receipt and acceptance of material through e-payment (Except Capital items where payment terms shall be as per annexure-I Rev.02).

10. CFFP/BHEL Hardwar reserves the right to accept or reject any or all tenders without assigning any reason there of.

11. Tenders not submitted in the prescribed manner are likely to be ignored/ rejected.

12. Agent /Agency Commission: Payment of any kind at any stage will not be made to Agent on account of agent commission or otherwise by CFFP BHEL Hardwar.

13CFFP, BHEL, HARIDWAR may opt for **E-auction/Reverse auction** for obtaining best prices for part or full Tendered Quantity.

14.Please do intimate the personal contact details like Mobile Number, Email–Id, etc of authorized executive for correspondence.

15. Penalty : Orders placed against this Enquiry will be subject to normal clauses for imposing Penalty, Liquidated Damages, Risk purchases, cancellation ,arbitration as per terms and conditions of Purchase Orders in case of delay in effecting supply and or other defaults .

16. Inspection :CFFP BHEL Hardwar inspection after receipt shall be final and binding . BHEL may inspect at Vendor's work also. BHEL may nominate any testing house for inspection .The report shall be final and binding to both concerned .In case store is found defective during warranty period ,the same will be returned for repair (if not possible in India by Vendor) and or replacement .For this Vendor has to bear all the charges such as Freight ,i.e. to and fro ,insurance etc .Bank Guarantee for the equal amount to the cost of the item is to be furnished by Vendor. In case the repair is done at CFFP/BHEL the amount on actual shall have to be reimbursed by the Vendor and or adjusted on actual from their Bill.

17. Security Deposit and Performance Bank Guarantee is must .The percentage of both proposed (Annexure B) if decreased the % of decrement than that proposed shall be loaded on Landed Cost Calculation .The minimum % acceptable shall be decided by CFFP/BHEL beyond which offer may be rejected .

18. Disputes : In event of any dispute arising out of Contractual obligation ,the order being finalized at Hardwar ,India will be subject to Indian Laws and falls under jurisdiction of the Court of Law at New Delhi ,India .The overseas supplier hereafter referred to as "Vendor" shall therefore ,abide by the verdict of Court of Law at Hardwar ,India as may occur .

-OR-

All disputes arising out of or in connection with the present contract ,if any ,shall be finally settled under the rules of arbitration of International Chamber of commerce by one or more arbitrator appointed in accordance with the said Rules in India .

ANNEXURE II

LIST OF CONSORTIUM BANKS:

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

**PROFORMA FOR SECURITY DEPOSIT
(TO BE STAMPED IN ACCORDANCE WITH STAMP ACT)**

This deed of guarantee made thisday ofTwo Thousand.....by (bank) hereinafter called 'the Guarantor') which expression shall unless repugnant to the context or meaning thereof be deemed to include its successors and assigns)IN FAVOUR OF M/s Bharat Heavy Electricals Limited (A Government of India Undertaking) a Company incorporated under the Companies Act, 1956 having its registered office at "BHEL House" Siri Fort, New Delhi 110 049 , through its Unit/Division at Hardwar (Central Foundry Forge Plant) hereinafter called "the Company" (which expression shall unless repugnant to the context of meaning thereof be deemed to include its successors and assigns).

WHEREAS M/s..... (hereinafter referred to as the vendor) have entered into a contract bearing no.....Dated.....(Hereinafter referred to as "the Contract") for the supply ofWith the Company.

AND WHEREAS the Contract interalia provides that the vendor shall furnish Security Money to the Company in the form a Bank Guarantee for a sum of Rs.....(Rs.....only) as Security for due and faithful execution of deliveries within specified period in the contract.

AND WHEREAS THE VENDOR has approached the Guarantor and in consideration of the arrangement arrived at between the Vendor and Guarantor; the Guarantor has agreed to give the guarantee as hereinafter mentioned in favour of the Company.

NOW THIS DEED WITNESS AS FOLLOWS:-

- (1) The Guarantor do hereby guarantee to the Company the due and faithful performance, observance or discharge of the Contract by the Vendor and further unconditionally and irrevocable undertake to pay the Company without demur and merely on demand to the extent of Any claim made by the Company on them for any loss, damage, costs charges and expenses caused to or suffered by the company by reason of the vendor making any default in the performance, observance or discharge of the terms , conditions stipulations or undertakings or any one of them gas contained in the Contract.
- (2) The decision of the Company whether any default has occurred or has been committed by the Vendor in the execution of the supplies, observance or discharge of any of the terms, conditions stipulations or undertakings or any one of them as contained in the Contract and or as to the extent of loss, damage, costs ,charges and expenses caused to or suffered by the Company by reason of the vendor making any default in the performance, observance or discharge of any of the terms, conditions, stipulations or undertakings or any one of them shall be conclusive and binding on the Guarantor irrespective of the fact whether the vendor admits or denies the default or questions the correctness of any demand made by the company in any Court, Tribunal or Arbitration Proceedings or before any other authority.
- (3) The Company shall have fullest liberty without affecting in any way the liability of the Guarantor under this guarantee, from time to time to enforce or forbear from enforcing any of the terms and conditions governing the contract or securities available to the Company and the Guarantor shall not be released from its liability under these presents by any exercise by the Company of the liberty with reference to the matters aforesaid or by reason of time being given to the vendor or any other forbearance, act or commission of the part of the company or any indulgence by the company to the vendor or of any other matter or thing whatsoever which under the law relating to sureties, would but for this provision have the effect of so releasing the Guarantor from its liability under this Guarantee.

- (4) The Guarantor further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken to the performance of the Contract and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged and till the Company certifies that the terms and conditions of the Contract have been fully and properly carried out by the Vendor and accordingly discharges this Guarantee, subject, however, that this Guarantee is only valid for written demands by the Company on or before.....(specify date).

The Guarantor undertake not to revoke this Guarantee during the period it is in force except wit the previous consent of the Company in writing and agree that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the Vendor or the Guarantor shall not discharge the Guarantor's liability hereunder:

It shall not be necessary for the Company to proceed against the Vendor before proceeding against he Guarantor and the Guarantee herein contained shall be enforceable against them notwithstanding any security which the Company may have obtained or obtain from the Vendor shall at the time where proceedings are taken against he Guarantor hereunder by outstanding or unrealized.

The Guarantor hereby declares that it has power to execute this guarantee under it is Memorandum and Articles of association and the executants has full powers to do so on its behalf under the Power of Attorney dated.....granted to him by the proper authorities of the Guarantor..

IN WITNESS whereof the (Bank) have caused this deed to be signed hereunder or their behalf on the date first above mentioned.

Signed for and on behalf of the (Bank)

Name:

Designation:

Address:

Fax No. (With country code):

E-mail address:

NOTE: IN CAE A BANK IN INDIA IS GIVING THIS BANK GUARANTEE; IT WILL BE EXECUTED ON A STAMP PAPER OF RS. 62.50 BUT IF IT WILL BE FROM AN OVERSEAS BANK, IT WILL HAVE TO BE EXECUTED AS PER LAWS OF THAT COUNTRY.

		Spec. No. : FF07011R00	DATE : 29/09/08
	BHARAT HEAVY ELECTRICAL LIMITED	Enquiry No.:	
	UNIT'S ADDRESS:	Due Date:	
	CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPTT.)	Supplier Qtn No.:	
		Date:	
SPECIFICATION CUM COMPLIANCE CERTIFICATE OF FLOOR TYPE CNC HORIZONTAL BORING MACHINE			
	NOTE:-		
1. Vendor (OEM) must submit complete information against clause no. 23 (Qualifying condition). The offer meeting this clause would only be processed (OEM : Original Equipment Manufacturer).			
2. The following format must be completely filled and deviations mentioned in the appropriate columns. Inadequate /incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.			
3. The offer and all documents enclosed with offer should be in English language only.			
NAME & ADDRESS OF THE SUPPLIER :			
TELEPHONE NOS.:			
FAX NOS.:			
E-MAIL ADDRESS :			
SCOPE: SUPPLY, ERECTION & COMMISSIONING OF FLOOR TYPE CNC HORIZONTAL BORING MACHINE COMPLYING WITH SPECIFICATIONS AS BELOW			
SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
1	PURPOSE & WORKPIECE MATERIAL		
1.1	Purpose : The Machine is required for machining of Steel Castings and Forgings (in black condition) The Machine should be suitable for heavy duty Milling, heavy Drilling, Boring, Milling, Reverse Counter Boring, Core Drilling, Reaming, etc. on high alloy steel castings. Machine should be suitably designed to withstand toughest conditions as our castings & forgings generally have black spots, hard spots, sand inclusion, bend, cracks, etc. Machine shall be utilized for bulk material removal. Intermittent cutting shall also be there.		
1.2	Work Piece Material: Castings of High Alloy Steel, like GS17CrMoV511, The components to be machined will be mainly high temperature & creep resistant alloy steel castings and forgings of Mat. grade 17CrMoV511, X22CrMoV121 having tensile strength 40-95 Kg/mm ² , %Elongation 15-22% & Hardness up to 350BHN.		
1.3	Drawings of likely jobs (04-HB-01R00 TO 04-HB-06R00 i.e. 06 nos.drgs),which shall be machined on Horizontal Boring Machine, are enclosed. The Suitable attachments,required for complete machining of these jobs, to be recommended by the vendor .	Vendor to inform	
2.0	SPECIFICATION:		
2.1	MACHINE CONFIGURATION: The Machine shall be Floor Type CNC Horizontal Boring Machine with a Rotary Table.Looking from spindle side, AAC is to be on Right side of Rotary Table. Linear movement of Table is to be perpendicular to X-axis.		
2.2	HEAD STOCK		
2.2.1	Boring spindle diameter	200mm	
2.2.2	Milling spindle diameter	vendor to inform	
2.2.3	Ram Cross section (LxB)	450 x 500mm or more	
2.2.4	Spindle drive power (AC Continuous Rating - S1)	75 KW or more	
2.2.5	Spindle speed (Infinitely variable)	1 to 1000 RPM or more	
2.2.6	No. of speed ranges	vendor to inform	
2.2.7	Torque on the boring spindle (N-m)	4000Nm (min.)	
2.2.8	Torque on the milling spindle (N-m)	4000Nm (min.)	

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
2.2.9	Spindle taper	Vendor to submit	
2.2.10	Torque-Power-Speed characteristics of the spindle system to be submitted by the vendor.	Vendor to submit	
2.2.11	Oriented Spindle Stop (Any position)	Vendor to offer	
2.2.12	Spindle Cooling System (Details to be submitted)	Vendor to offer	
2.3	COLUMN:		
2.3.1	Column longitudinal travel (X-Axis)	10000 mm	
2.3.2	X-axis feed rate (Infinitely variable)	1 to 2000 mm /min or more	
2.3.3	X-axis rapid traverse rate	2000mm/ Min. or more	
2.3.4	Axis Resolution	0.01 or less	
2.4	HEADSTOCK TRAVERSE ON COLUMN:		
2.4.1	Headstock vertical travel (Y-Axis)	3150 mm (min.)	
2.4.2	Traverse Range (wrt Table top)	Vendor to specify	
2.4.3	Y-axis feed rate (Infinitely variable)	1 to 2000 mmpm or more	
2.4.4	Y-axis rapid traverse rate	2000 mm/ Min. or more	
2.4.5	Axis Resolution	0.01 or less	
2.5	RAM/ SPINDLE TRAVERSE:		
2.5.1	Boring spindle axial travel (W-Axis)	1000 mm or more	
2.5.2	Ram axial travel (Z-Axis)	1000 mm or more	
2.5.3	Spindle + Ram travel (W+Z)	2000 mm or more	
2.5.4	Lowest spindle position from Table Top (zero level at Table top).	Vendor to confirm and submit details	
2.5.5	Boring Spindle axis feed rate (Infinitely variable)	1 to 2000 mmpm or more	
2.5.6	Boring Spindle axis rapid traverse rate	2000mm / Min. or more	
2.5.7	Ram axis feed rate (Infinitely variable)	1 to 2000mmpm or more	
2.5.8	Ram axis rapid traverse rate	2000mm / Min. or more	
2.5.9	Axis Resolution	0.01 or less	
2.5.10	Spindle & Ram Axes should be independently programmable with Independent Drives and Feed back system.	Vendor to offer	
2.6	FEED AND DRIVE SYSTEM:		
2.6.1	Feed drives/ motors for X,Y,Z & W axes [AC servo motors] shall be digital type of either Siemens or Fanuc make (Details of model, make, type etc. to be submitted)	Vendor to offer	
2.6.2	Maximum feed force for all axes	Vendor to inform	
2.6.3	Feed back system for X, Y & Ram (Z) axes: Heidenhain linear scales with pressurised compressed air cleaning (Details to be submitted by the vendor)	Vendor to offer	
2.6.4	Feed back system for Spindle (W) Axis: Heidenhain Rotary Encoders (Details to be submitted by the vendor)	Vendor to offer	
2.6.5	Type of power transmission: 1. Pre-loaded backlash free Hydrostatic worm OR Pre-loaded backlash free double pinion & rack drive for X-axis. 2. Backlash free recirculating ball screw with Pre-loaded double nut for all other axes. (Complete description of the aforesaid including diameter of Ball Screw for each axis, to be submitted with the offer)	Vendor to offer	
2.6.6	Mechanism for locking X, Y & Z axis	Vendor to offer	
2.6.7	Maximum thrust rating of all axes.	Vendor to offer	
2.7	MACHINE GUIDEWAYS:		
2.7.1	Width of bed guideways, X-axis	Vendor to inform	
2.7.2	Width of column guideways, Y-axis	Vendor to inform	
2.7.3	Details of Guide ways for Ram axis and bearing details of Spindle axis are to be submitted with offer.	Vendor to inform	
2.7.4	Guide ways for X-axis, Y-axis & Z-axis: Hydrostatic (Details to be submitted). Details of lubrication system provided on Spindle axis are also to be submitted with the offer.	Vendor to inform	
2.7.5	Hardness of guideways	Vendor to inform	

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
2.7.6	Metallic Telescopic Covers: Slanting type, waterproof Telescopic Covers of rust resistant steel should be provided with pads/wipers for X & Y axes guide ways. Joints of telescopic covers should be sealed to avoid entry of chips/swarf/grinding.	Vendor to inform	
2.8	ROTARY TABLE :		
2.8.1	Table size (LxB)	3000x3500 mm	
2.8.2	Maximum load carrying capacity (Tons)	50 Ton or more	
2.8.4	Table rotation (B-axis)	3600 indexing positions	
2.8.5	Accuracy of Rotary axis:	Vendor to inform	
2.8.6	Maximum machining torque on B-axis (N-m)	Vendor to inform	
2.8.7	Maximum clamping torque on B-axis (N-m)	Vendor to inform	
2.8.8	Feed rate for Table Rotary Axis. Infinitely variable (Deg/min or rpm)	Vendor to inform	
2.8.9	Rapid Traverse Rate for Rotary Axis (Deg / min. or rpm)	Vendor to inform	
2.8.10	Size of T-slots	Vendor to inform	
2.8.11	T-slots pitch (as per DIN standard)	Vendor to inform	
2.8.12	Central slot size & tolerance	Vendor to inform	
2.8.13	Perpendicular Lateral slot size/ tolerance	Vendor to inform	
2.8.14	Size of bore at the center.	Vendor to inform	
2.8.15	Linear traverse	2500 mm	
2.8.16	Feed Force on Linear Axis	Vendor to inform	
2.8.17	Feed Rate for Linear axis (mm/min Infinitely variable)	Vendor to offer	
2.8.18	Rapid Traverse rate for Linear axis (mm/ min)	Vendor to offer	
2.8.19	Minimum distance between ram face and table face.	Vendor to inform	
2.8.20	Metallic Telescopic Covers: Slanting type, waterproof Telescopic Covers of rust resistant steel should be provided with pads/wipers for V axis guide way. Joints of telescopic covers should be sealed	Vendor to offer	
2.8.21	Rotary Table shall be capable of eccentric loading of jobs up to 25T. Loading Chart of Table showing relation of weight and distance of c.g. from centre of Rotary Table to be submitted.	Vendor to confirm & submit.	
2.8.22	Feed back devices :		
	a) Heidenhain rotary encoder for B-Axis	Vendor to offer	
	b) Heidenhain Linear Scale with pressurised compressed air cleaning system for linear (V)-Axis	Vendor to offer	
2.8.23	Feed drives : Fanuc/Siemens digital AC Servo drives. Details of Make, Model, Type etc. to be submitted by Vendor.	Vendor to offer	
2.8.25	Mechanism for locking/ clamping of Table axes	Vendor to offer	
2.8.26	Location of the Table	On extreme Left side of X-traverse looking from Spindle side.	
2.8.27	Spindle should reach 500 mm beyond extreme end of rotary table	Vendor to specify	
2.8.28	Hydrostatic Guideways for Table Rotation. Details to be submitted	Vendor to confirm & specify	
2.8.29	Hydrostaic Guideways for Table Linear Traverse Details to be submitter	Vendor to confirm	
2.8.30	4 x 90 deg Precision Positioning .	Vendor to confirm and submit load chart	
2.8.31	Backlash free re-circulating ball screw with Pre-loaded double nut for Table Linear axis. Complete description of the same including diameter of Ball Screw, to be submitted with the offer	Vendor to submit.	
2.9	CONSTRUCTION:		
2.9.1	Vendor to furnish details of material, hardness & constructional details, including explanatory drawings, of various components/assemblies like Column, bed, head stock, ram, spindle, table etc. of the machine.	Vendor to submit.	
2.9.2	Video images on CD including hard copy explaining the technical features/ Literature with photographs, drawings explaining the technical features should be enclosed with the offer	Vendor to submit.	
2.9.3	Automatic deflection compensation for ram and column effective at any extension of the ram plus spindle is to be provided taking into consideration weight of all possible cutters/ attachments offered. Details of the offered system should be submitted with offer.	Vendor to submit.	

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2.9.4	Head Stock and Column Counterbalancing System.Details of the offered system to be submitted.	Vendor to submit.	
2.10	OPERATOR'S PLATFORM:		
2.10.1	Operator's platform of sufficient load carrying capacity to be provided. The platform shall be Headstock Mounted Type	Vendor to offer	
2.10.2	Weight carrying Capacity of the Platform should be Min. 300 Kg.	Vendor to inform	
2.10.3	Minimum Height of Platform from Shop Floor.	Vendor to inform	
2.10.4	Chip guards on operator platform for protection of operator, operator's panel and to avoid spillage of chips on operator's platform	Vendor to offer	
2.11	OPERATION AND CONTROL SYSTEM:		
2.11.1	OPERATOR'S PANEL:		
2.11.1.1	Swiveling type operator's panel having complete CNC and machine control system with CRT of required configuration shall be provided on the operators platform. All switches on the Operator's panel including that for table rotation should be within reach of operator of average height (Indian, 5'6" approx.) for convenient, efficient & safe operation. All displays/indications should also be conveniently placed accordingly. Layout showing complete details of the panel should be submitted.	Vendor to offer	
2.11.1.2	An auxiliary pendant, which can be taken to the table for job setting and similar other purposes, should be provided.	Vendor to offer	
2.11.2	CNC SYSTEM & FEATURES :		
2.11.2.1	Make : Fanuc / Siemens.	Vendor to confirm	
2.11.2.2	Type : PC based latest version	Vendor to confirm	
2.11.2.3	Model: Sinumerik 840D with PC Version PCU 50, NCU 573.5 or higher with Intel Pentium III, 1GHz, 512 MB SDRAM (or higher), Windows XP Operating System or equivalent Fanuc system. (Latest version, as available at the time of ordering, should be supplied)	Vendor to offer and submit details	
2.11.2.4	The system should, preferably, have OP 15 Operator's Panel with TFT colour display (15 inch or more), 19 Inch Machine Control Panel , Full CNC Keyboard with Qwerty keys and Mouse/Trackball or equivalent for Fanuc system, RS232-C interface for I/O devices, COM1(V.24), COM (V.24), LPT1 Parrallel Interface for Printer, VGA, MPI interface & USB, 2 Channels and Expansion slots. The operator Panel configuration will be as per Rittal VIP6000 or equivalent. The CNC System shall also have Electronic hand wheels selectable for all axes, USB Port with 1 GB Pen drive (for each machine) for data input/output, Hard disk of 10 GB or higher (Largest size available at the time of order shall be supplied), Graphic Simulation, COM port for telediagnosics, Network ready with LAN and preinstalled system software & other required softwares etc. (Details should be submitted by Vendor)	Vendor to offer and submit details	
2.11.2.5	The CNC System should necessarily have the following features: Access locks on the operator panel, Coordinate System Rotation, Coordinate System Transformation, Look Ahead of Minimum 70 blocks, Helical Interpolation, Scaling, Programmable mirror image machining, Process oriented Canned Cycles for Drilling, Milling & Turning operations, Rigid Tapping and Tool Management. The system shall also have SITOP Power, DC-UPS Module 15 with AKKU module to ensure automatic unattended shutdown of the system in case of power failure or even in normal machine shutdown, Display of PLC ladder on 840D monitor & Simatic S-7 loaded on the hard disk and Display of servo-waveforms on 840D monitor or equivalent features in Fanuc system.	Vendor to offer and confirm	
2.11.2.6	Details of Standard features. List to be submitted.	Vendor to specify	

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2.11.2.7	Features of CNC System required for identified jobs or foreseen by the vendor as required.	Vendor to specify	
2.11.3	MANUAL CONTROL :		
2.11.3.1	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, 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 operators pendant to be submitted.	Vendor to confirm. Layout of panel showing requisite switches to be submitted.	
2.11.4	HAND HELD UNIT:		
2.11.4.1	Hand Held unit, Type B-MPI of Siemens make or equivalent alongwith sufficient length of interfacing cable is to be offered with complete details	Vendor to offer	
2.11.5	UPS FOR CNC SYSTEM:		
2.11.5.1	UPS of 30 minutes for CNC system with inbuilt cooling and charge status display. (Battery charging /discharging time should be specified by vendor	Vendor to offer	
2.11.6	PORTABLE DRIVE UNIT (I/O DEVICE):		
2.11.6.1	Note Book PC with pen drive for bi-directional transfer of program and data between the offered unit and supplied CNC system as well as any standard PC shall be supplied with all required interfaces, cables and software	Vendor to offer and submit details	
2.12	MACHINE LIGHTS:		
2.12.1	Machine Lights for sufficient illumination of complete working area on both sides of operator's platform should be provided for clear visibility.	Vendor to offer and submit details	
2.12.2	A magnetic base portable spot light with sufficiently long cable should also be provided.	Vendor to offer and submit details	
2.12.3	Any lights required in the foundation/ pit area shall also be foreseen and supplied by the vendor.	Vendor to offer and submit details	
2.12.4	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to offer and submit details	
2.12.5	Flashing / rotary type End of Cutting and Program Stop Light	Vendor to offer and submit details	
2.13	AIR CONDITIONERS:		
2.13.1	Air Conditioners with Dehumidifiers of suitable / sufficient capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Detailed specifications of the same are to be submitted.	Vendor to offer	
2.13.2	In case of order, vendor shall confirm to supply the following information about Air Conditioners and Chiller Unit (s) used in the machine: Type of Refrigeration/ Chiller unit. Capacity of the chiller unit. Type of compressor with complete specifications. Type of Thermostatic Expansion Valve with complete specifications. Fan size and flow in CFM (cubic feet meter) of the Condenser unit. Specifications of the Evaporator Unit (Width Plate type/ Coil type) Functional requirement of temperature of Cooling Oil to be maintained between range T1 to T2. Type of temperature indicator/ controller used in the chiller unit with complete specifications.	Vendor to confirm	
2.14	HYDRAULIC SYSTEM : Details should be Submitted by the Vendor		
2.14.1	The Hydraulic System shall be of Re-circulating Type centralised system. Hydraulic Tank should be preferably placed at shop floor	Vendor to offer and confirm	
2.14.2	System's make Rexroth / Vickers / Vogel / Parker or equivalent International reputed manufacturer.	Vendor to offer and confirm	

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2.14.3	Filtration System, Details should be submitted.(Filters should be used of EPE / Hyda / equivalent International reputed make)	Vendor to offer and confirm	
2.14.4	Failure indication	Vendor to offer	
2.14.5	Automatic shut off provision, Details should be submitted.	Vendor to offer	
2.14.6	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, hydrostatic oil and gearbox oil, etc. keeping in view the specified ambient conditions to be offered with complete details. The temperature of Hydraulic Oil should not go beyond 40 deg. C.	Vendor to offer & submit	
2.14.7	Hydraulic pump capacity (flow/ pressure) to be intimated.	Vendor to inform	
2.14.8	No Tandem pumps should be used. Maximum desired permissible pressure is 100 Kg/sqcm. If anywhere, more than 100 Kg/sqcm pressure is used, then one set of such hose pipes and seal kit of such Hydraulic cylinder should be supplied in spare in addition to other spares.	Vendor to confirm & offer	
2.14.9	First filling of all required Oils & Grease etc. for the machine, voltage stabilizer, isolation transformer & air-compressor etc. to be supplied by vendor. Indigenous (Indian) source or Indian equivalent and specifications of oils/ greases are also to be submitted. For hydraulic oils, IOC make is preferable from Indian make.	Vendor to offer	
2.14.10	Charging Kit of accumulator should be provided	Vendor to confirm	
2.14.11	Filtration System, Details should be submitted.(Filters should be used of EPE / Hyda / equivalent International reputed make)	Vendor to submit	
2.14.12	All the hoses used should have metric end connections	Vendor to offer	
2.15	ELECTRICAL SYSTEM :		
2.15.1	415V with + 10% / -10% fluctuation, 50HZ with fluctuation of +/-3 HZ, 3 Phase AC (3 wire system with out neutral) Power Supply Source 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 same could be incorporated during construction of foundation.	Vendor to comply	
2.15.2	Tropicalisation: All electrical / electronic equipment shall be tropicalize	Vendor to comply	
2.15.2.1	Complete panels to be fuseless except Thyristor drives, where thyristor protection fuses are to be used. In all other cases MCCBs/ MPCBs etc. to be used.	Vendor to confirm & specify	
2.15.2.2	Preferred make for PLCs, Drives & basic electrical equipments like contactors, MPCBs,MCCBs ACBs etc. to be Siemens make.	Vendor to confirm & specify	
2.15.2.3	PLCs & drives to have profibus / Ethernet communication capability. PLC programming unit with all necessary hardware and software to be provided with machine. All the softwares including operating system, other system software, programming software and user software for machine must be duly licensed to CFFP,BHEL.	Vendor to confirm & specify	
2.15.2.4	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor to comply	
2.15.2.5	All electrical components in the cabinets should be mounted on DIN Rai	Vendor to comply	
2.15.2.6	All electrical and electronic panels including operator's panel 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 comply	
2.15.2.7	Motors shall conform to IEC or Indian Standards	Vendor to comply	
2.15.2.8	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain mounted vertically. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to confirm	
2.15.2.9	Vendor should ensure the proper earthing for the machine and its peripherals	Vendor to comply	
2.15.2.10	In-cycle hour counter with reset facility is to be included in the offer.	Vendor to comply	

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2.16	SAFETY ARRANGEMENTS:		
	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to comply	
2.16.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece 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 comply	
2.16.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to comply	
2.16.3	All the pipes, cables etc. on the machine should be well supported and protected.	Vendor to comply	
2.16.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to comply	
2.16.5	Emergency Switches at suitable locations as per International Norms are to be provided.	Vendor to comply	
2.16.6	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor to comply	
2.16.7	Safety Lights at both ends of moving column (preferably Flashing during X-travel).	Vendor to comply	
2.17	ENVIRONMENTAL PERFORMANCE OF THE MACHINE :		
	The Machine shall conform to following factors related to environment	Vendor to comply	
2.17.1	(a) Maximum noise level shall be 85 dB(A) at normal load condition, 1 M 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 comply	
2.17.2	(b) There shall not be any emissions from the machine.	Vendor to comply	
2.17.3	(c) There should not be any effluent from the machine. In case there are any effluents from the machine, requisite effluent treatment plant or pollution control device should be built into the machine by the supplier	Vendor to comply	
2.17.4	(d) No hazardous chemicals shall be required to be used in the machine.	Vendor to comply	
2.17.5	(e) If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to comply	
2.17.6	(f) Paint of the machine should be oil resistant and should not peel off and mix up.	Vendor to comply	
2.17.7	There should not be any oil leakage from the machine. Proper oil collectors should be provided for collection of seepage oil at specified pit.	Vendor to comply	
3.0	CHIP CONVEYOR :		
3.1	A chip conveyor to carry both short and curly chips efficiently and effectively to the chip bin to be provided on one end of the machine . Two Chips bins of appropriate size of Indian make, with wheels & handle for movement,should also be supplied.	Vendor to confirm	
3.2	Type of chip conveyor	Vendor to confirm	
3.3	Width of conveyor	Vendor to inform	
3.4	Elevation of chip conveyor for chip bin	Vendor to inform	
3.5	Material of chip conveyor (to be rust resistant)	Vendor to inform	
3.6	Provision for smooth flow of chips to the conveyor	Vendor to inform	
3.7	Operation of chip conveyor (forward & reverse) through push buttons on operator's panel and at Chip Conveyor	Vendor to inform	
3.8	Layout showing location of chip conveyor to be submitted	Vendor to inform	
3.9	There should be replacable grill/mesh covers over entire length of chip conveyer to eliminate jamming of conveyer.	Vendor to confirm	
4.0	SERVO VOLTAGE STABILIZER:		
4.1	Indian make Oil/ Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc. with no undesirable Harmonics in the stabiliser output.	Vendor to offer with details	
4.2	Make	NEEL, Aplab or Auto Electric	
4.3	Model & Rating	Vendor to specify	
4.4	Spares (Control card, monitoring pcb and servo motor)for the Voltage Stabiliser for 2 years trouble free working should also be offered with item wise list.	Vendor to specify	
4.5	Catalogue of the Voltage Stabiliser shall be submitted with the offer	Vendor to submit	

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5.0	ULTRA ISOLATION TRANSFORMER		
5.1	Indian make Ultra Isolation Transformer suitable for complete machine , its drives, controls, PLC etc. shall be offered with complete details	Vendor to offer	
5.2	Make	NEEL, Aplab or Auto Electric	
5.3	Model and Rating	Vendor to specify	
5.4	Catalogue of the Isolation Transformer shall be submitted with the offer	Vendor to submit	
6.0	PNEUMATIC SYSTEM:		
6.1	AIR COMPRESSOR:		
6.1.1	Vendor to specify any requirement of compressed air supply for the operation of the machine.If so, then the system should be so designed to have additional provision and required accessories with Refrigerated type Air Dryer so that BHEL compressed air supply having pressure 5 Kg/sq.cm with high moisture could be used as and when required. The compressor unit should be suitable for continuous duty operation.	Vendor to offer with details.	
6.1.2	Make & Model of Air Compressor and Refrigerator type Dryer	Vendor to specify	
6.1.3	Capacity (Flow, Pressure & KW)	Vendor to specify	
6.1.4	Following Spares for the compressor for 2 years trouble free working should also be offered. 1. Air Filter 06 nos. 2. Oil Filter 15 nos.3. Oil 50 Litres. 4. Air-oil separator element 06 nos. 5. Belts 4 nos. 6. Flexible hose kit 1 set	Vendor to specify	
6.1.5	All other elements except compressor should be of FESTO / NORGEN / equivalent international make	Vendor to offer	
6.2	COMPRESSED AIR POINTS:		
6.2.1	Compressed Air Point with manual ON/ OFF Valve and flexible pipe of suitable length for work piece cleaning.	Vendor to offer	
7.0	TOOLINGS:		
7.1	Complete Description of offered Tooling System	Vendor to offer	
7.2	All cutting tools, tool holders, arbors, boring bars, clamping elements etc., recommended for machining of proveout component shall be offered by the vendor. Consummables for offered Tools, like inserts,screws etc., should be quoted for machining of prove-out job.	Vendor to offer	
7.3	Vendor shall be responsible, financially or otherwise, for any deviation/ rejection in proveout component due to wrong machining or malfunctioning of the machine during proveout machining and also for the delay in machining due to improper recommended tooling etc..	Vendor to comply	
8.0	DIAGNOSTIC SYSTEM:		
8.1	TELE-DIAGNOSTIC SERVICE :		
8.1.1	Tele diagnostic service package consisting of Modem and other hardware with all necessary software package for remote diagnosis and resolution of faults of CNC System and PLC of the machine should be offered. With this facility, complete Graphic User Interface of CNC system can be looked at and operated from remote controlled PC of supplier so that errors can be recognized and changes or correction can be made from supplier's end. Tele-diagnostic service should be provided through International telephone lines. This should be provided free of charge for the guarantee period. Terms and conditions for the service after guarantee period should be informed by vendor. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.	Vendor to offer and submit details.	

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8.2	FAULT DIAGNOSTIC SYSTEM:		
8.2.1	Supplier's own diagnostic system with required Software and Hardware installed on the CNC system, which shows detailed cause and remedy for the fault on the CNC system display with full video diagnostics indicating the element /device causing the fault. Vendor should also offer a PC note book along with Simatic S7 software (licensed copy), necessary cables, PCMCIA card / Adaptor (for Communication with MPI port) for diagnostic purpose. The Note Book PC should be loaded with complete Electrical Schemes, Mechanical Assembly drawings, Hydraulic Circuit Diagrams, Operation and Maintenance Manuals, Machine Alarm list along with Help text wiring diagram, On-Line display of PLC user should be available on the note book PC.	Vendor to offer & submit	
8.2.2	Provision of OEM Screen with soft keys enabling the service personnel to bring back the tool carriers of the AAC to its initial/nearest position in case of interruption of tool carrier's positioning cycle due to alarm on the machine or power failure. With this OEM screen, service personnel should be able to perform individual steps of Tool carriers positioning cycle manually. Separate Hand Held Pendant should also be provided to retrieve the tool carrier to it's initial position.	Vendor to offer	
8.2.3	Machine should have provision to switchover from position feedback system -2 (direct) to Position feed back system-1 (Motor encoder) through PLC program (for service personnel only)	Vendor to offer	
8.2.4	Help guide should be provided to use both diagnostic systems shall be provided.	Vendor to confirm	
9.0	LEVELING & ANCHORING SYSTEM	Required.	
9.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the Machine and Rotary Table.	Vendor to offer and submit details.	
10.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE:		
10.1	Special tools and equipment required for erection of the machine shall be brought by the vendor. 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 offer	
10.2	Test mandrel & measuring instruments for checking spindle run-out & alignment & accuracies of the machine should be supplied	Vendor to offer	
11.0	ESSENTIAL ACCESSORIES:		
11.1	AUTOMATIC ATTACHMENT CHANGER (AAC):		
11.1.1	All attachments shall be suitable for loading / unloading through AAC	Vendor to offer	
11.1.2	No. of storage positions	Vendor to inform	
11.1.3	Location of the attachment changer	On RHS of X- Traverse.	
11.1.4	Mounting plates as required for attachments should be supplied	Vendor to offer and submit	
11.1.5	Maximum Permissible Weight on each Position	Vendor to offer and submit	
11.1.6	Maximum Permissible Weight on Complete AAC	Vendor to offer and submit	
11.1.7	Additional Longitudinal Traverse of X-axis required to accommodate and use of AAC beyond the specified X-axis traverse shall be separately offered by the vendor.	Vendor to offer and submit	
11.1.8	Suitable Software based and manual key based arrangement should be provided to extract an Attachment trapped in the AAC cycle. Details of both the system to be provided along with the offer.	Vendor to offer and submit	
12.0	OPTIONAL ACCESSORIES:		
12.1	UNIVERSAL MILLING HEAD (OPTIONAL):		
12.1.1	Power	40 KW or more	
12.1.2	Max torque	Vendor to inform	
12.1.3	Speed Range	Vendor to inform	
12.1.4	Speed ratio	Same as spindle	
12.1.5	Spindle taper	Vendor to inform	
12.1.6	Traverse Range of A-axis in deg.	(+ / -) 95	
12.1.7	Resolution of A-axis	0.01 deg.	
12.1.8	Rotation of C-axis (Any number of rotation)	360 deg	
12.1.9	Resolution of C-axis	0.01 deg.	
12.1.10	Torque-Power-Speed characteristic diagram to be submitted	Vendor to submit	
12.1.11	Weight of the head	Vendor to inform	

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12.1.12	Pull Stud for mounting the Head and for mounting the Tools in the taper of the Head shall be supplied by the vendor.	Vendor to offer.	
12.2	BORING & FACING HEAD(OPTIONAL) :		
12.2.1	Model No.	Vendor to inform	
12.2.2	Head body diameter	Vendor to inform	
12.2.3	Speed Range	0-250 rpm	
12.2.4	Radial axis independent positioning	Vendor to inform	
12.2.5	Slide stroke	200 mm	
12.2.6	Slide feed rate	1-400 mmpm	
12.2.7	Machining range in Boring for internal diameter	1250 mm Max.	
12.2.8	Accuracy of Bore Size (Bore Tolerance), Surface Finish of bores and Facial and Radial Run outs (Requirement to be specified by Indentor.)	H7, Ra 1.6 Micron, 0.03	
12.2.9	Diameter range for machining external diameter indicating max. dept	Vendor to inform	
12.2.10	Machining range in facing indicating maximum depth.	Vendor to inform	
12.2.11	Maximum boring depth without entry of Boring Head.	Vendor to inform	
12.2.12	Maximum torque	Vendor to inform	
12.2.13	Maximum cutting force in boring	Vendor to inform	
12.2.14	Maximum cutting force in facing	Vendor to inform	
12.2.15	Slide Counter Balance mechanism	Vendor to inform	
12.2.16	Item wise details of complete set of standard Tool Holders and Tools, available with the offered Head, are to be submitted with the offer. Complete details of any special arrangement offered to meet the specified requirement of Boring range are also to be submitted.	Vendor to inform	
12.2.17	Tool Holder with matching taper for presetting of the Tools for offered Boring and Facing Head is to be offered with complete details.	Vendor to offer.	
12.2.18	Catalogue of the offered Head is to be submitted with the offer	Vendor to offer and submit	
12.3	JIB CRANE (OPTIONAL)		
12.3.1	Capacity	1 Ton	
12.3.2	Mounted on top of column with all power operated movements (including swivel motion) through push buttons	Vendor to offer and submit	
12.3.3	Swivelling range and speed	Vendor to submit	
12.3.4	Crane reach should cover the rotary table when fully drawn towards machine spindle.	Vendor to confirm	
12.4	SPARES (OPTIONAL):		
12.4.1	Itemwise breakup of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares:(Unit Price of each item of spare should be offered)	Vendor to confirm	
12.4.1.1	Mechanical & Hydraulic Spares(OPTIONAL): The following spares are to be included.		
12.4.1.1	Mechanical, Hydraulic, Pneumatics Spares:(One no. of each type of elements used in Hydraulic, Pneumatic, lubrication and oil cooling system of machine	Vendor to offer	
12.4.1.2	All types/varieties of pumps used on machines	Vendor to offer	
12.4.1.3	All types of D.C. Control valves (2 no. each type)	Vendor to offer	
12.4.1.4	All types of flow control, pressure regulators, pressure reducer valves used on m/c. (1 no. each type)	Vendor to offer	
12.4.1.5	All types of pressure switches, flow switches and float switches (2no. each type)	Vendor to offer	
12.4.1.6	All types of filter inserts (5 nos. each of regenerative type & 20 nos. each of disposable type)	Vendor to offer	
12.4.1.7	Shaft seals (2 nos. each type)	Vendor to offer	
12.4.1.8	O-Rings and Piston rings (5nos. of each type)	Vendor to offer	
12.4.1.9	Accumulator with charging kit (1 no each type)	Vendor to offer	
12.4.1.10	All pneumatic pipes with end connection (complete one set of pneumatic pipes used)	Vendor to offer	
12.4.1.11	All Hydraulic/Lubrication Hoses with end connections of m/c (complete one set of hoses used)	Vendor to offer	
12.4.1.12	One set of oil collection pipes	Vendor to offer	
12.4.1.13	All types of Pressure Gauges	Vendor to offer	
12.4.1.14	Set of belts (including timing belts) with item wise list	Vendor to offer	

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12.4.1.15	All couplings including hydraulic pump couplings, pressure sleeves etc	Vendor to offer	
12.4.1.16	One no. each type of Clutch used in the Machine.	Vendor to offer	
12.4.2	Electrical /Electronic / CNC Spares(OPTIONAL) : Following Spares are to be offered.	Vendor to offer	
12.4.2.1	Limit Switches/ Micro Switches (2 Nos each type)	Vendor to offer	
12.4.2.2	Relays (2 Nos each type)	Vendor to offer	
12.4.2.3	Contactors (2 Nos each type)	Vendor to offer	
12.4.2.4	RTD temperature transmitter (1 No each type)	Vendor to offer	
12.4.2.5	Proximity Switches (5 Nos each type)	Vendor to offer	
12.4.2.6	Push Buttons (5 Nos each type)	Vendor to offer	
12.4.2.7	Indicating Lamps (10 Nos each type)	Vendor to offer	
12.4.2.8	Semiconductor Fuses (5 Nos each type)	Vendor to offer	
12.4.2.9	Special Fuses (5 Nos each type)	Vendor to offer	
12.4.2.10	Circuit Breakers (1 No each type)	Vendor to offer	
12.4.2.11	Main Power Switch (1 No each type)	Vendor to offer	
12.4.2.12	Encoders (1 No each type)	Vendor to offer	
12.4.2.13	Scanning Heads for Linear Scales (1 No each type)	Vendor to offer	
12.4.2.14	Wave shape unit/ EXE unit (1 No each type)		
12.4.2.15	PCU module (Hard disk loaded with Ghost of the machine after final commissioning)	Vendor to offer	
12.4.2.16	NCU module	Vendor to offer	
12.4.2.17	Operator's panel with Display Unit	Vendor to offer	
12.4.2.18	I/O Cards for PLC (1 No each type)	Vendor to offer	
12.4.2.19	Servo Motors for Feed Drives (1 No each type)	Vendor to offer	
12.4.2.20	Power Module & Control Cards for Main Drive as well as Feed Drives (1 Nos each type)	Vendor to offer	
12.4.2.21	One each of the following items : CNC Power Supply, I/R Module, NCU BOX, Machine Control Panel, Hand Held Unit/ B-MPI, Any other auxiliary drive , if used, Complete Proportional Valve Controller, if used.	Vendor to offer	
12.4.3	All types of spares for total machine and accessories should be available for atleast ten years after supply of the machine. If machine 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 these in advance, if required.	Vendor to offer	
12.4.4	Recommended set of spares for all attachments, viz.: Milling Head, and Boring Heads are to be offered with details. The spares are to include Motors, Set of Gears, Encoders, Limit/ Cam Switch Connectors with item wise details	Vendor to offer	
12.4.5	Recommended set of spares for Job and Tool Measuring Systems are to be offered with details.	Vendor to offer	
12.4.6	Vendor to confirm that 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	
13.0	DOCUMENTATION : Three sets of following documents (Hard copies with Soft Copies wherever specified) in English language should be supplied along with the machine	Vendor to offer	
13.1	Operating manuals of Machine & CNC system	Vendor to offer	
13.2	Programming Manuals of Machine & CNC system	Vendor to offer	
13.3	Detailed Maintenance manual of machine and supplied systems	Vendor to offer	
13.4	Maintenance, Interface & commissioning manuals, PLC programming manual for CNC system, Interface & commissioning manuals for spindle ,feed drives and auxiliary drive.	Vendor to offer	
13.5	Manufacturing drawings for all supplied clamping elements, cutting tools, tool holders, arbors, boring bars, adapters, sleeves, fixtures etc	Vendor to offer	
13.6	Catalogues, Operation & Maintenance Manuals of all bought out items including drawings, wherever applicable.	Vendor to offer	
13.7	Detailed specification of all rubber items and hydraulic/lube fitting:	Vendor to offer	
13.8	Operating Manuals, Maintenance Manuals & Catalogues for supplied accessories viz Voltage Stabilizer, Isolation Transformer, Air-Compressor, Boring Attachments, Automatic Tool and Job Measurement system etc	Vendor to offer	
13.9	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 offer	

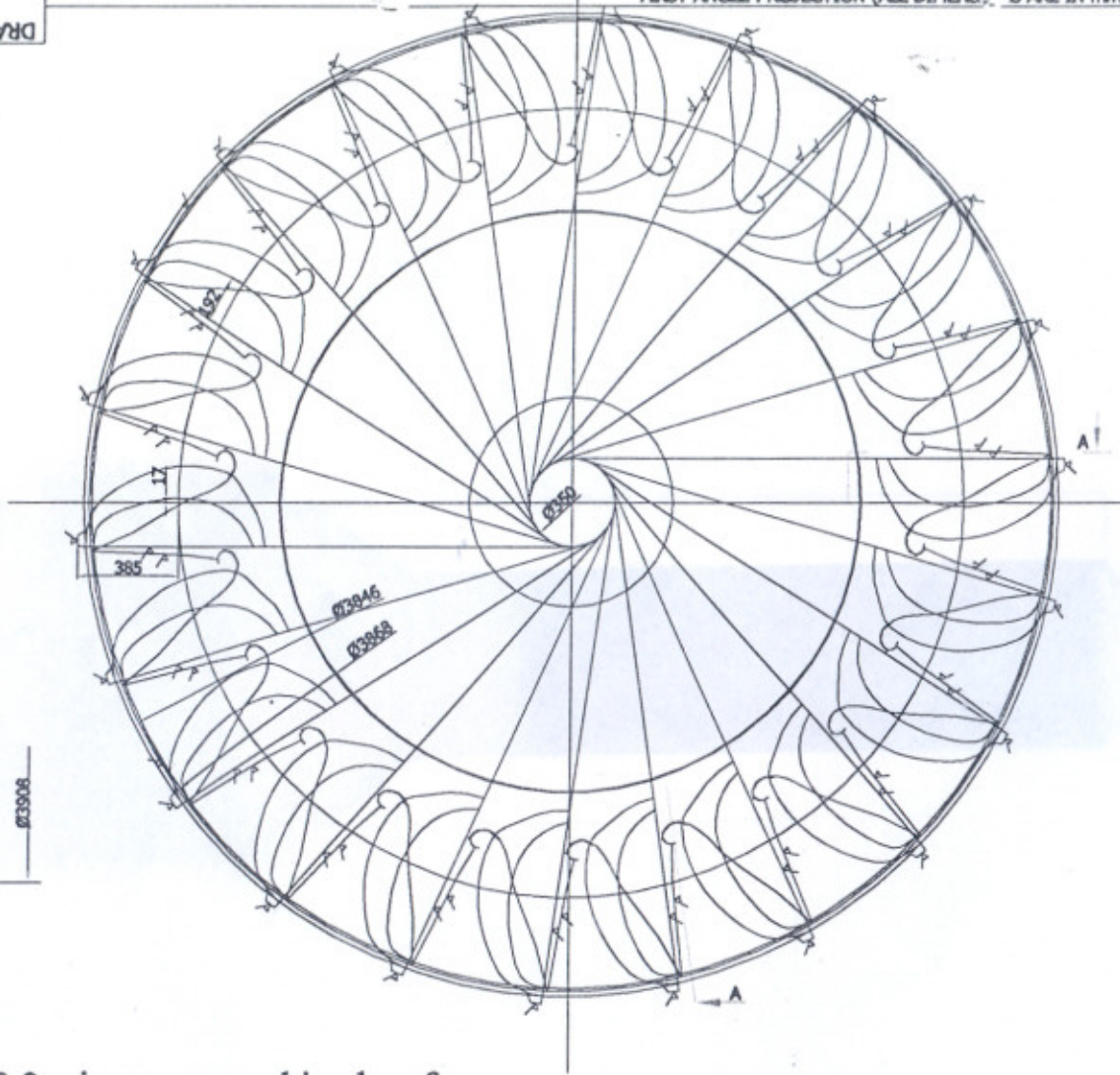
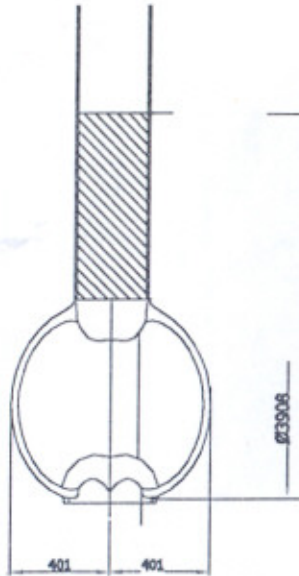
SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
13.10	PLC program, NC data & PLC data on CD.	Vendor to offer	
13.11	Detailed assembly drawings of all units of the machine showing component/part name & their description.	Vendor to offer	
13.12	Detailed drawings showing for all Hydraulic, pneumatic showing components/parts and their descriptions.	Vendor to offer	
13.13	Complete back-up of PCU-50 or equivalent (in case of Fanuc) hard disk on <u>GHOST CD</u> and clearly written Instructions to take back-up and reloading on a new hard disk.	Vendor to offer	
13.14	Complete list of parts/items(Bill of materials) used in the machine in English language.	Vendor to offer	
13.15	Electrical Schematic Diagrams, Wiring Diagrams, Junction Box Layouts, Connector Diagrams and Cable Layouts of the machine in English.	Vendor to offer	
13.16	Drawings of machine assemblies/sub-assemblies/parts including Pneumatic/ Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list marked on it in English.	Vendor to offer	
13.17	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to offer	
14.0	TRAINING:		
14.1	Four BHEL Persons should be trained at vendor's works for each machine for the area & period given below: (a) CNC Part Programming for the machine, application of all CNC Features, Programming for Measuring Systems & supplied accessories etc. (Period 3 Weeks) (b) Electrical, Electronic & CNC maintenance for machine & other supplied equipments (Period 2 weeks) (c) Mechanical & Hydraulic maintenance of the machine & other supplied equipments (Period 2 weeks) (d) Operation of the machine & other supplied equipments (Period 2 weeks) Pre-dispatch inspection (ref. SI.No. 21.1) of the machine shall also be carried out by the team during their stay at vendor's works for the training. Vendor may specify days required for pre-dispatch inspection. BHEL reserves the right to choose no. of persons, field & period of training, out of above, while deputing their engineers for training.	Vendor to offer	
14.2	Air-fare, boarding & lodging for the trainees shall be borne by BHEL	Vendor to confirm	
14.3	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to confirm	
14.4	Vendor to quote for training on per man week basis	Vendor to quote	
14.5	Vendor should commit to organize and quote for training of Electronics Engineer and Programmer at the CNC System Manufacturer's works for advanced features and specialised training if so required by BHEL.	Vendor to confirm	
15.0	FOUNDATION:		
15.1	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. Complete Foundation Design including details, like Static/ Dynamic load details etc. and final Layout Drawings shall be submitted by the supplier within three months after getting BHEL's approval. 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 & any other accessory. BHEL shall construct complete foundation for the machine under supervision of supplier and at supplier's responsibility. Vendor should arrange equipment required for the testing of foundation, if required by the vendor. 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	

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15.2	Dynamic soil parameters are as follows: (i) Cu = 4.937 kg/cm ³ (for block size of 1.5mx1mx1m) For foundation size of 10m ² or more, Cu = 1.667 kg/cm ² (ii) CΦ = 9.70 kg/cm ³ (iii) CΨ = 4.20 kg/cm ³ Bearing Capacity: Depth : 5 M From Shear consideration : 39 T/M SQ. Fom Settelement consideration : 9-10 T/M SQ. Recommended B.Capacity : 9 T/M SQ.	For vendor's information.	
16.0	ERECTION & COMMISSIONING		
16.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control system & all types of other supplied equipment, machining of test pieces etc. Service requirement like power, air & water shall be provided by BHEL at only one point to be indicated by supplier in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance. The available crane capacity at the proposed location of the machine will be 75Ton. The vendor will ensure to make requisite arrangement for lifting of heavier consignment/ items/ assembly of the machine not getting covered by this capacity.	Vendor to confirm	
16.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer & Air Compressor shall also be responsibility of the vendor	Vendor to offer and submit details	
16.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at clause 20 (Machine Acceptance) shall form part of the commissioning activity.	Vendor to offer and submit details	
16.4	Test mandrel for checking run-out/taper & alignment should be supplied	Vendor to offer and submit details	
16.5	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 offer and submit details	
16.6	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis	Vendor to offer and submit details	
16.7	All Cover Plates required for the machine and its peripherals including pits, if any, shall be supplied and installed by the vendor. The plates should be sourced from India	Vendor to offer and submit details	
16.8	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 offer and submit details	
16.9	Schedule of Erection and Commissioning shall be submitted with the offer	Vendor to offer and submit details	
16.10	Charges, duration, terms & conditions for E&C should be furnished in detail separately by vendor along with offer	Vendor to offer and submit details	
17.0	ACCURACY TESTS:		
17.1	GEOMETRICAL ACCURACIES :		
17.1.1	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 offer and submit details	
17.1.2	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 demonstrate	
17.2	MACHINE POSITIONING ACCURACIES & REPEATABILITY:Should be measured as per VDI/DGQ 3441(Latest Revision) using LASER INTERFEROMETER.		
17.2.1	Positioning uncertainty (Pa per 1000mm) for X,Y,Z axes	0.015 mm	
17.2.2	Positioning uncertainty (Pa per 1000mm) for W & V axes	Vendor to inform	

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
17.2.3	Positioning uncertainty Pa for B-axis	6 sec	
17.2.4	Positional scatter (Ps per 1000mm) for X,Y,Z axes	0.008mm	
17.2.5	Positional scatter (Ps per 1000mm) for W & V axes	Vendor to inform	
17.2.6	Positional scatter Ps for B-axis	6 sec	
17.2.7	Total positioning error P for entire travel for X,Y,Z,W & V axes	Vendor to specify	
17.2.8	Total positioning error P for B-axis	Vendor to specify	
17.2.9	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	
18.0	OPERATING CONDITIONS & THERMAL STABILITY :		
18.1	Power Supply (AC): Voltage = 415V +10% / -10% of fluctuations , Frequency= 50Hz +3 / -3 , No. of phases = 3 phase without neutral. Ambient Operating Conditions: Temperature = 2 to 45 degree Celsius , Relative Humidity = 95% max	Vendor to accept & confirm	
18.2	Weather conditions are tropical. Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 20 deg Celsius in 24 hours. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)	Vendor to accept & confirm	
18.3	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 accept & confirm	
18.4	The machine, including attachments and accessories, should be suitable for 24 hrs. continuous operation to its full capacity for 24 hour a day and 7 days a week throughout. Vendor to ensure and confirm the same.	Vendor to accept & confirm	
19.0	PROVEOUT OF BHEL COMPONENTS :		
19.1	Vendor shall be fully responsible for machining of proveout component as per drawing, specified accuracy and surface finish and other requirements specified by BHEL to the full satisfaction of BHEL using cutting tools and CNC programs to be provided by the vendor to prove the machine after complete erection, tests & test piece machining etc Any additional item required for completion of prove out components shall be supplied by the vendor in the specified quantity without any implications to BHEL. Clarifications, if any required by vendor, regarding accuracy requirements of the proveout components, whether specified or not, should be discussed and cleared by vendor during initial technical discussions. Job setting plan, Machining process plan & Requirement of Tools etc. for machining of proveout components shall be discussed and mutually agreed with vendor . Likely jobs which are generally machined on this type of machine are as follows:- Drg no. 04-HB-01R00 TO 04-HB-06R00. However, Drg. 04-HB-01R00 shall be used for proveout machining. Material for the proveout components shall be provided by BHEL. Vendor shall submit final job setting plan, machining process plan, tool layout & list with complete description, time study etc. for the proveout machining within two months of placement of order.	Vendor to accept and offer.	**
19.2	Vendor shall submit CNC programs prior to start of erection of Machine at BHEL works. Vendor shall be fully responsible for machining of proveout components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by 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	
19.30	During proveout, all tools should be preset by using supplied Tool offset Measuring System and measurement of machined dimensions of the job shall be done by supplied Job Measuring System. Vendor shall be responsible, financially or otherwise for any deviation/ rejection in proveout component to the extent of cost of Casting/Forging, 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. The cost of such deviation / rejection, if any, shall be refunded by the vendor to BHEL.	Vendor to confirm	

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
20.0	MACHINE ACCEPTANCE: (Tests/Activities TO be Performed by Vendor)	Should be accepted & confirmed by Vendor	
20.1	Tests/Activities should be carried out at supplier's works on the machine before dispatch :		
20.1.1	Geometrical Accuracy Tests as per test chart	Vendor to offer and submit details	
20.1.2	Positioning Accuracy Tests as per VDI-DGQ/3441 or equivalent	Vendor to offer and submit details	
20.1.3	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 offer and submit details	
20.1.4	Demonstration of all features of the machine, CNC system and all Accessories.	Vendor to offer and submit details	
20.1.5	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to offer and submit details	
20.1.6	Test to be carried out at BHEL works while commissioning the machine :		
20.1.7	Geometrical Accuracy Tests as per test chart.	Vendor to offer and submit details	
20.1.8	Positioning Accuracy Tests as per VDI-DGQ/3441 or equivalent.	Vendor to offer and submit details	
20.1.9	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to offer and submit details	
20.1.10	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 offer and submit details	
20.1.11	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to offer and submit details	
20.1.12	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to offer and submit details	
20.1.13	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to offer and submit details	
20.1.14	Job prove out.	Vendor to offer and submit details	
20.1.15	Two weeks supervision of independent operation of machine by BHEL after job proveout.	Vendor to offer and submit details	
20.1.16	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works	Vendor to offer and submit details	
21.0	PACKING:		
21.1	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	Vendor to confirm	
22.0	GENERAL : The vendor should submit the following information:		
22.1	Machine Model	Vendor to inform	
22.2	Total connected load (KVA):	Vendor to inform	
22.3	Floor area required (Length, Width, Height) for complete machine & accessories. The Layout of the machine may be planned so that the Rotary Table shall be at the Left Hand side of the X-Traversal while looking from the Spindle.	Vendor to inform	
22.4	Painting of Machine/ Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to inform	
22.5	Total weight of the machine	Vendor to inform	
22.6	Weight of heaviest part of machine	Vendor to inform	
22.7	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to inform	
22.8	Dimensions of largest part/ subassembly/ assembly of the machine	Vendor to inform	
22.9	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 submit	
22.10	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to submit	

SNO	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	DEVIATION S/REMARKS
22.11	Hydraulic, Pneumatic & oil pipings should be preferably metallic except places where flexible pipings are essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor to submit	
22.12	Ladder is to be provided to access the machine elements located at the top of the column.	Vendor to offer & confirm	
22.13	All items of the equipment in this specification shall be complete in all respects and any equipment not covered in the specification, but is considered essential for proper design and operation of the machine shall be included by the supplier. If the supplier feels that in his opinion, by his experience and in accordance with the modern practice any of the item specified, he is in apposition to submit a better/ more suitable offer. He shall indicate them and submit the offer on the basis of the specifications he considers more suitable and capable of meeting the duty requirements and should clearly states its merits.	Vendor to offer & submit	
23.0	QUALIFYING CONDITIONS :		
23.1	Only those vendors (OEMs) should quote, who have supplied and commissioned at least one number CNC Horizontal Boring Machine of Spindle diameter 180mm & above and Ram + Spindle Travel 1500mm or higher sizes in the past ten years (on the date of opening of Tender) and referred machine is presently working satisfactorily for more than one year (on the date of opening of tender) after commissioning. However, if referred machine has been supplied to BHEL, then the machine should be presently working satisfactorily for more than six months (on the date of opening of tender) after its commissioning and acceptance in BHEL. Supply details are required for qualification.	Vendor to accept & confirm	
23.2	Name of the customer/ company where referred machine is installed.	Vendor to inform	
23.3	Complete postal address of the customer	Vendor to inform	
23.4	Month & Year of commissioning.	Vendor to inform	
23.5	Parameters of machine(s) supplied (Spindle Diameter, Ram+Spindle Travel, Y-traverse) and application for which the machine is supplied	Vendor to inform	
23.6	Name and designation of the contact person of the customer	Vendor to inform	
23.7	Phone, FAX no. and e-mail address of the contact person of the customer	Vendor to inform	
23.8	Performance certificate from the customers regarding satisfactory performance of machine supplied to them (Original Certificate or Through E-mail directly from the customer). The original performance certificate may be returned after verification by BHEL, if required.	Vendor to submit	
23.9	BHEL reserves the right to verify information submitted by vendor including visit to the vendor's works and witnessing the manufacturing & operational procedures. In case the information is found to be false/incorrect, the offer shall be rejected.	Vendor to accept & confirm	
24.0	OTHER FEATURES:	Vendor to confirm	
24.1	NETWORKING:		
24.1.1	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. This network to be connected to wide area network/Internet. The networking should have following capabilities.	Vendor to confirm	
	a) The machine shall appear as a node in the Entire Network. (Network Neighborhood)	Vendor to confirm	
	b) The program transfer shall be by simple copy and paste method provided sharing access is allowed between any PC and the machine across the network.	Vendor to confirm	
	c) The program transfer between CNC system and network should also be possible in CNC Mode.	Vendor to confirm	



NOTE:

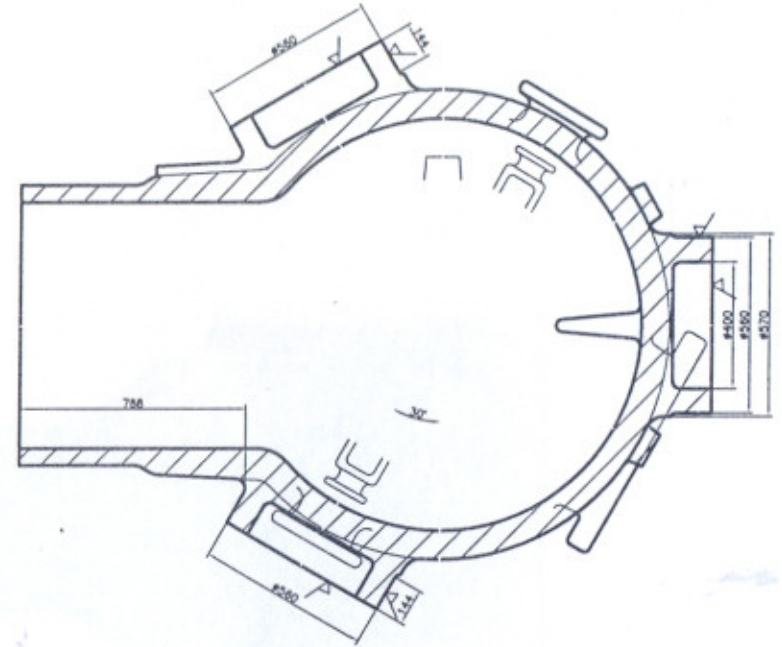
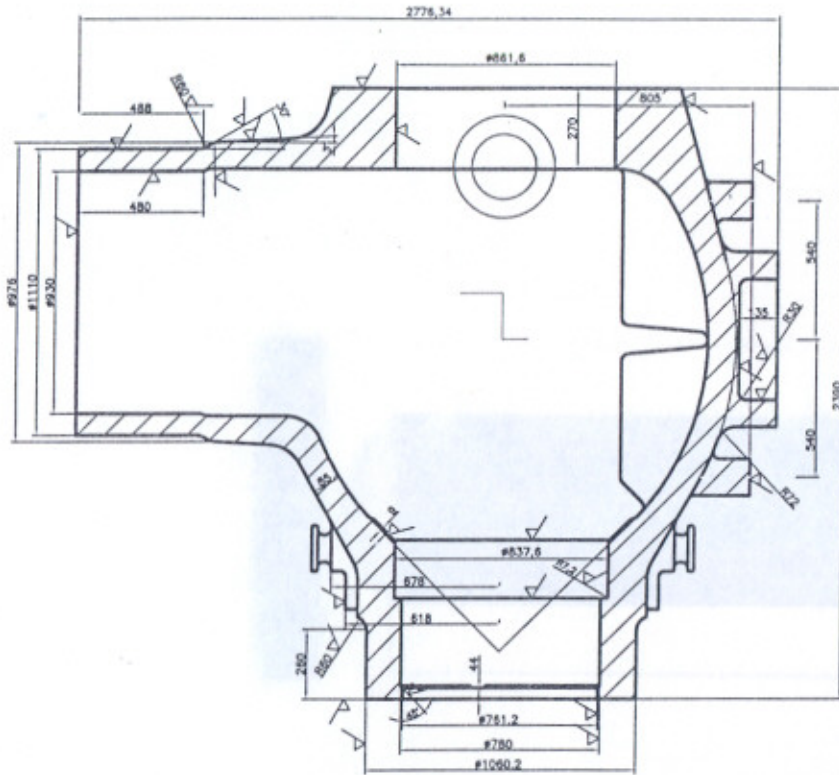
1. Surface Finish 3.2 microns on machined surfaces.
2. Tolerance : Outside dimensions +0.5,-0
: Inside dimensions +0, -0.5
3. Runout of all diameters to be within 0.1 mm
4. Perpendicularity of surfaces to be within 0.1mm

CASTING

DLY.WT.12700KG

DRG. NO.
04-HB-06R00

SHEET NO. NO. OF SHEETS



NOTE:

1. Surface Finish 3.2 microns on machined surfaces.
2. Tolerance : Outside dimensions +0.5,-0
: Inside dimensions +0, -0.5
3. Runout of all diameters to be within 0.1 mm
4. Perpendicularity of surfaces to be within 0.1mm

TITLE

CASTING

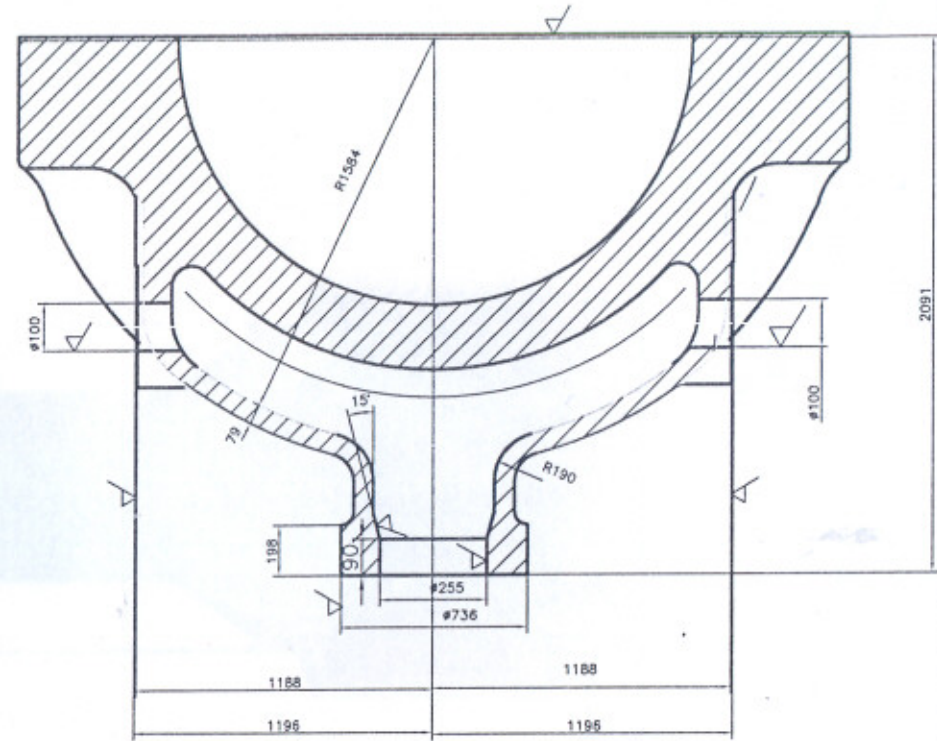
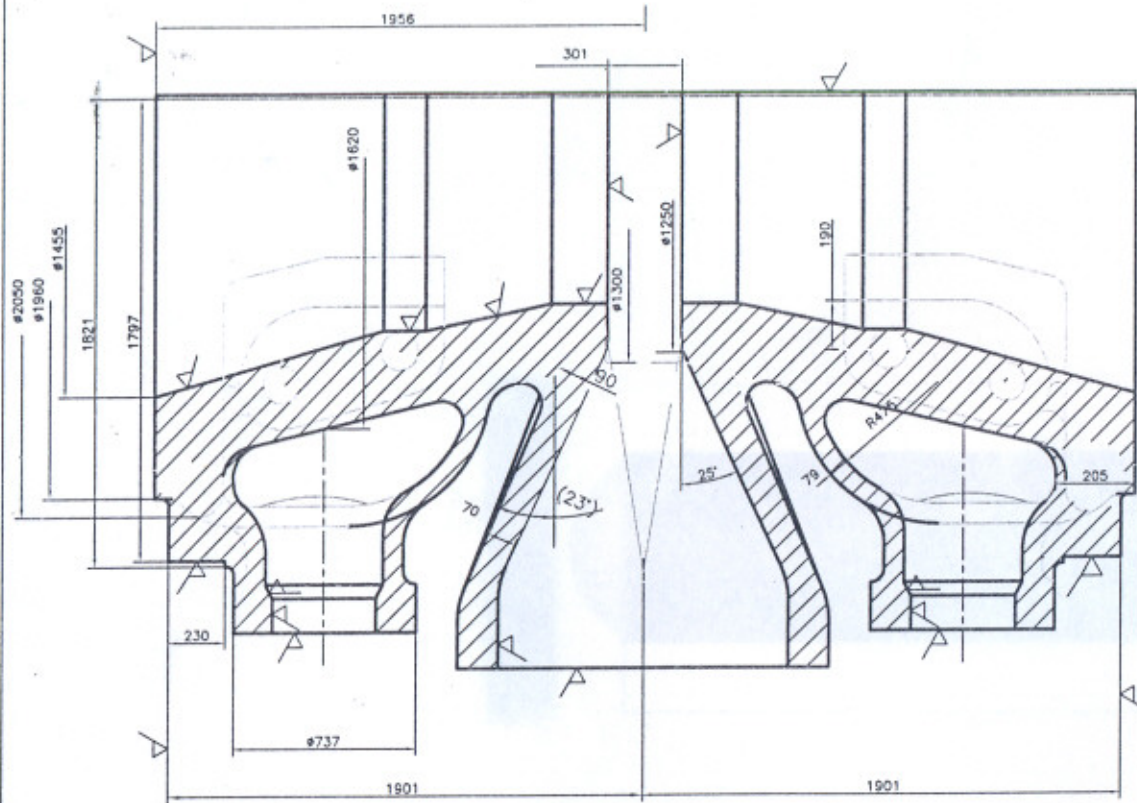
DLY.WT 9000KG

DRG. NO.

04-HB-03R00

SHEET NO.

NO. OF SHEETS



NOTE:

1. Surface Finish 3.2 microns all over.
2. Tolerance outside +0.5, inside -0.5 (Excepted stated)
3. Permissible runout of all diameters within 0.1 mm
4. Perpendicularity of surfaces within 0.1

CASTING

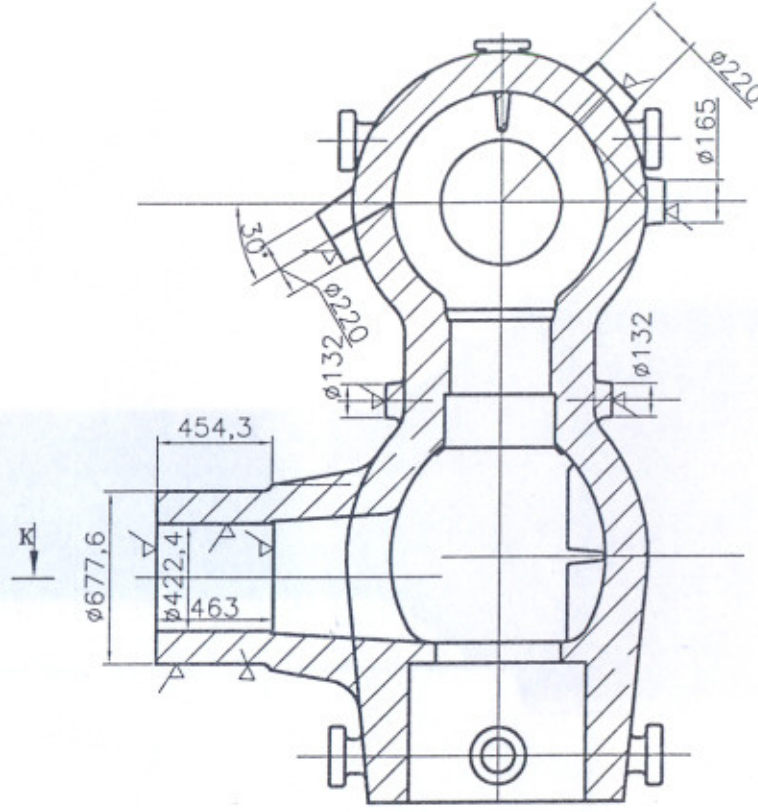
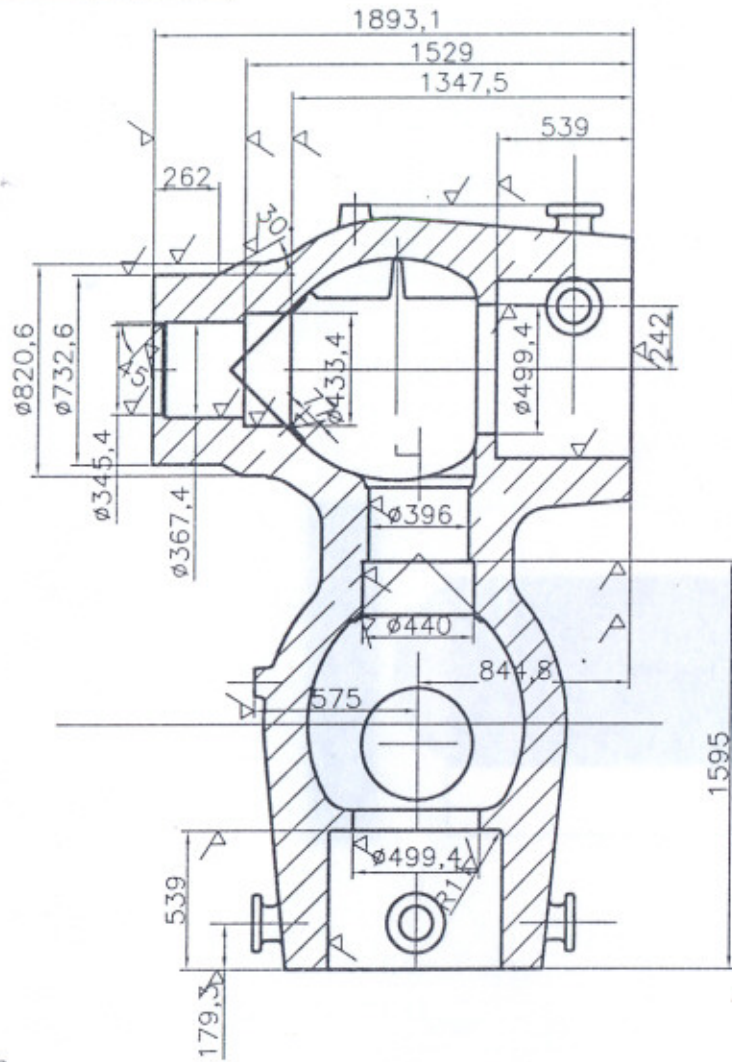
DLY.WT21500KG

DRG. NO.

04-HB-02R00

SHEET NO.

NO. OF SHEETS



NOTE:

1. Surface Finish 3.2 microns on machined surfaces.
2. Tolerance : Outside dimensions +0.5,-0
: Inside dimensions +0, -0.5
3. Runout of all diameters to be within 0.1 mm
4. Perpendicularity of surfaces to be within 0.1mm

CASTING	DLY.WT 14500 KG
DRG. NO. 04-HB-01R00	
SHEET NO.	NO. OF SHEETS



निविदा सूचना
TENDER ENQUIRY

AA-17001

भारत हैवी इलैक्ट्रिकल्स लिमिटेड

Bharat Heavy Electricals Ltd

सेन्ट्रल फाउन्ड्री फॉर्ज प्लांट- हरिद्वार-249 403 (भारत)

Central Foundry Forge Plant, Hardwar-249 403 INDIA

Phone : (0091) (133) 485356, 485269

• Telefax : (0091) (133) 425892 • Telex : 05909-213

UPTT NO. HR-0041496 Dt. 01-04-1994

C S T NO. HR-5016287 Dt. 16-03-1995

निविदा सूचना सं. ENQUIRY NO.*	3025/P/950 /8/5531P/2	दिनांक Date	30.09.2008
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ENQUIRY DUE DATE: 14.11.2008 कृपया निम्नलिखित के लिए निविदा दें। PLEASE QUOTE FOR THE FOLLOWING :

Vendor Code: T09285

To,
:
:
:
:
:
:

BHEL Phone: 01334-285326,285356

FAX: 01334-225892

INDIA

Attn:

SL NO	MATERIAL CODE MATERIAL DESCRIPTION	UNIT	TOTAL QTY	DELIVERY LOT QTY	SCHEDULE DELY_DT
1	FF4120418111 CNC HORIZONTAL BORER SPINDLE DIA :200 MM AS PER TECHNICAL SPECIFICATION NO. : FF07011 R00 SPEC: FF07011 R00 SPINDLE DIA :200MM DIM : S	NO	1	1	1 before 31.10.20

- This enquiry is 2 part tender. Techno-Commercial bid (Part - 1) and Price Bids (Part-2) should be submitted in separate envelopes. These two envelopes should be submitted in a common sealed envelope. Techno-Commercial Bid shall contain detailed Technical Specification, Drawing, Technical documents, Catalogues, taxes & duties, payment terms, delivery period, Validity of offer, Replica of Price Bid (Copy of price bid without price part) etc. The confirmation to the special terms & conditions must be submitted alongwith Techno-Commercial bid. Price bid (Part - 2) shall contain only prices.
 - TEST CERTIFICATE REQUIRED AS PER SPECIFICATIONS.
 - GUARANTEE CERTIFICATE REQUIRED AS PER SPECS. ALONGWITH DESPATCH DOCUMENTS
 - ERECTION/COMMISSIONING IS REQUIRED AT SITE.
 - OPERATION & MAINTAINANCE MANUAL IS REQUIRED ALONGWITH THE EQUIPMENT.
 - PRE-INSPECTION TO BE CARRIED OUT BY BHEL REPRESENTATIVE AT SUPPLIER'S WORKS.
 - SPECIFICATION NO. FF07011 R00 IS ENCLOSED.
 - SPECIAL TOOLS REQUIRED SHOULD BE QUOTED SEPARATELY.
 - DRAWING ARE ENCLOSED.
- ** Please submit authorization letter (format enclosed) for facilitating e-payment/electronic transfer of funds
- ** 100% payment within 30 days after receipt & acceptance of material at CFFP BHEL, Hardwar through e-payment.
- ** CFFP/BHEL Reserves the right to procure from more than one vendor.

For BHARAT HEAVY ELECTRICALS LIMITED

(MANOJ KUMAR)
ENGINEER (PUR)

You may contact the signatory at email: satul@bhelhwr.co.in

* महत्वपूर्ण : कृपया कोटेशन देने से पूर्व पीछे दिए गये अनुदेशों को ध्यानपूर्वक पढ़िये।

IMPORTANT : PLEASE READ CAREFULLY THE INSTRUCTIONS GIVEN ON REVERSE BEFORE QUOTING

ANNEXURE - I OF COMMERCIAL TERMS & CONDITIONS ; REV: 02
1) PAYMENT TERMS:
1. For Indigenous Vendors: 80% of the material cost to be paid against delivery of equipment at CFFP. Balance 20% of material cost and supervision / E&C and proving charges will be paid after satisfactory erection & Commissioning/ after acceptance of material at BHEL, CFFP(in cases where Erection and Commissioning is not involved.) Payment to be made through EFT (electronic fund transfer i.e e-payment Format attached.
2. For Foreign Vendors: 80% of the material cost to be paid against dispatch documents. Balance 20% of material cost and supervision / E&C and proving charges will be paid after satisfactory erection & Commissioning/ after acceptance of material at BHEL, CFFP (in cases where Erection and Commissioning is not involved.).Payment to be made on 70th day of date of bill of Lading through LC which shall be opened 3 months before scheduled delivery date. Bank charges to be borne by vendor.
NOTE:
a) As per payment terms, 20% will be released by BHEL after successful erection, commissioning and job proving.
b) this 20% will be released against submission of performance bank guarantee valid for entire warrantee period from the date of commissioning.
c) The security deposit is to be as per the tender condition.
1.1 LOADING (IF ANY TERM OF THIS ANNEXURE IS NOT AGREED BY VENDOR) WILL BE AS FOLLOWS:
Loading: Advance amount (such as through bank), if any (Amount X):1.5% per month for the quoted delivery period for the amount 'X'
Say Payment at the time of dispatch against shipping/dispatch documents (Amount Y):" 1.5% per month for the amount X+Y exceeding 80% of contract value i.e. 1.5% of (X+Y-0.8Z) where Z is the contract value".
In case any bidder does not accept any of the condition at (a) to (c) above then, their offer is likely to be rejected by BHEL and technical bid will not be processed, and no correspondence in this regards will be entertained.
1.2 P.B.G. TERMS: Performance Bank Guarantee to be submitted on the prescribed format equal to the value of 20% of the total order value valid WARRANTY / GUARANTEE agreed period. This bank guarantee, in the format to be prescribed by BHEL, shall have to be submitted before release of last balance payment(see annexure II and IV)
1.3 CURRENCY OF PAYMENT: Mention the currency in which payment has to be made.
1.4 FOR INDIGENOUS SUPPLY: For indigenous supply the currency shall be Indian Rupees

1.5 SUPERVISION CHARGES:
For Indian Suppliers: It should be quoted in Rupees.
For Foreign Suppliers: If supervision is being carried out by persons residing in India, it should be quoted in Indian Rupees. Time of completion of supervision/ Erection & Commissioning also to be mentioned.
1.6 TAXES: All statutory taxes, if any, will be deducted at source & to be borne by the beneficiary. Tax deduction certificate shall be issued at the end of financial year if required.
2.) SECURITY DEPOSIT: Vendor has to submit security deposit equal to the 10% of total material value of the Purchase order in the currency of order within one month of receipt of order in the form of Bank Guarantee in BHEL format valid for two months beyond shipment.
2.1 SUBMISSION OF BANK GUARANTEE : All bank guarantees for security deposit as well as for performance should be from one of the BHEL consortium banks and the bank guarantee should be in the Performa prescribed by BHEL (see annexure-II & III).
3) PENALTY FOR LATE DELIVERY: Penalty shall be applicable for delayed delivery @ 0.5% per week and part thereof subject to a maximum of 10% for total P.O. value.
3.1 LOADING ON PENALTY FOR LATE DELIVERY IF NOT AGREED BY VENDORS ON ABOVE TERMS: If any vendor do not accept the LD @ of 0.5% per week and part thereof subject to a maximum of 5% of total PO value, their offer will be ignored. Vendors accepting LD terms different from the proposed terms of 0.5% maximum 10% will be loaded @ %age deviation from the range of 10% on their prices (FOB for imported and ex-factory for indigenous). If the vendor does not accept as above their offer is likely to be ignored and technical bid will not be processed.
4) DELIVERY OF THE EQUIPMENT: Firm delivery period for the equipment to be stated w.e.f. date of LOI/ Order as under:1. Delivery period in weeks. 2. Period/ Time required to submit GA/Other drawings (Please specify other drawings). 3. Period/ time to supply equipment from the date of approval of drawings.
Prices should be quoted on FOR CFFP, destination basis only. Foreign vendors can also quote on FOB.
5) SETTLEMENT OF DISPUTES: Settlement of disputes through arbitration shall be in accordance with Arbitration Rules of Conciliation and Arbitration of the ICC, Paris. The venue of arbitration shall be Delhi. The courts of Delhi shall have exclusive jurisdiction. * For Indigenous Source. The venue of arbitration shall be Haridwar Court, which will have exclusive jurisdiction.
6) AUTHORIZATION OF PRE-INSPECTION: BHEL is authorized to pre inspect the material at works. The material will be dispatched only after getting clearance form BHEL.
7) DRAWING / DATA APPROVAL: Any drawing / data approval required from BHEL after placement of order shall be the responsibility of the vendor and any delay on account of the same shall be the responsibility of the vendor and have no bearing on the penalty applicable.
8) DRAWING/DESIGN/ INFORMATION USE: The vendor will have to give an undertaking that the drawing / design / information enclosed with the enquiry / proposed order will not be parted to any agency and will also not be used for manufacturing for any other customer.
09) 5 SETS OF O&M MANUAL: 5 Sets of Operation & Maintenance Manual shall have to be supplied along with the equipment. Final payment will be released only after receipt of the required documentation.
10) TOOLS AND SPARES: Special tools and recommended spares required.
11) TRAINING: Vendor shall provide required training to BHEL personnel free of cost.
12) WARRANTY/ GUARANTEE: 24 months from the date of commissioning or as per specifications if mentioned in specification.
13) CONTACT DETAILS: Details of Contact person Name, Designation, Department complete postal, E-mail address & Fax no, phone, Mobile no. to be mentioned.
14) PHYTO SANITARY CERTIFICATE: Phyto sanitary Certificate essential for packages (Wooden).
15) VALIDITY: Validity of the offer should be 180 days from tender opening.
16) BANK CHARGES: Bank Charges to be borne by vendor.
17). BHEL Reserves the right to open price bids through reverse auction. BHEL also reserve the right to negotiate with L1 bidder even after reverse auction. Please confirm your acceptance.
Note: Loading shall be applicable for any deviation in commercial ter viz. payment terms, PBG etc, for the amount/ period not agreed.
Attach separate sheet for additional information if necessary. The above terms and conditions supercedes the terms and conditions found contract.

AUTHORISATION LETTER
FOR E-PAYMENT/ELECTRONIC FUNDS TRANSFER (EFT/RTGS)
PLEASE FILL UP THE FORM IN CAPITAL LETTERS ONLY

TYPE OF REQUEST (Tick One) CREATE CHANGE

BHEL Vendor/ Supplier Code

Company's Name
Address
City
Pincode
State

Contact Person(S)
Telephone NO.
FAX. No.
e-mail id

1. Bank Name
2. Bank Address
3. Bank Telephone No.
4. Bank Account No.
5. Account Type.
6. Bank's Branch Code
7. Bank Swift Code
 (applicable to EFT only)
8. Enclose blank cancelled cheque

DECLARATION

1. I as representative/Owner of the above named company, hereby authorize BHEL CFFP, Ranipur, Haridwar to electronically make payments to the designated bank account. I hereby certify that the particulars given above are true, complete and correct.
- (2) If the transsation is delayed or not effected at all for reasons of incomplete or incorrect information, I would not hold BHEL/transfereing Bank responsible.
3. This authority remains in full force untill BHEL, CFFP, Ranipur, Haridwar receives & acknowledge written notification requesting a change or cancellation.
4. I have read the contents of the covering letter and agree to discharge the responsibility expected of me as a participant under E-payment/EFT/RTGS.

Date:
Authorized Signatory
Designation

Company Seal

Verification By Bank

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