

	BHARAT HEAVY ELECTRICAL LIMITED, BHOPAL				Enquiry No. :
	UNIT'S ADDRESS: PIPLANI				Due Date :
	UNIT'S PHONE NO.:				Supplier Qtn. No.:
	CONTACT PERSON'S NAME/DESGN./PHONE NO./E-MAIL (FROM PURCHASE DEPT.)				Specification : Rev. 00
					Date:
<b>SPECIFICATION FOR 6-SPINDLE CNC DRILLING MACHINE</b>					
<b>NOTE:-</b>					
1. Vendor (only OEMs) must submit complete information against clause S. No.18 (Qualifying condition ). The offer meeting this clause would only be processed.					
2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.					
3. The offer and all documents enclosed with offer should be in english language only.					
4. All dimensions are in mm unless otherwise stated.					
ADDRESS OF THE SUPPLIER :			ADDRESS OF THE INDIAN AGENTS :		
TELEPHONE NOS.:			TELEPHONE NOS.:		
FAX NOS.:			FAX NOS.:		
E-MAIL ADDRESS :			E-MAIL ADDRESS :		
<b>SCOPE: SUPPLY, ERECTION &amp; COMMISSIONING OF 6-SPINDLE CNC DRILLING MACHINE</b>					

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT		REQUIRED	OFFERED	DEVIATIONS	REMARKS
	PURPOSE & WORKPIECE					
1.1	<b>Purpose:</b> CNC Drilling Machine will be suitable for drilling of holes upto dia 40 mm on tube layout pitch varying from 1.20 to 1.325 times of outer tube diameter in Main Tube Plates and Support Tube Plates of Condenser of Thermal Power Plant. Material Hardness upto 500 BHN.		Vendor to confirm			
1.2	<b>Work Piece:</b>					
1.2.1	<b>Tube Plate</b>					
1.2.2	<b>Material:</b> – Carbon Steel, Stainless Steel, Alloy Steel, Stainless Steel clad Carbon Steel & Titanium clad Carbon Steel Plates.		Vendor to confirm			
1.2.3	Plate Size: 5000 mm x 9500 mm		Vendor to confirm			
1.2.4	Drilling depth : 150 mm ( in S S )		Vendor to confirm			
1.2.5	Total Thickness : 300 mm or more		Vendor to confirm			
1.2.6	Hole Dia: 14 to 40 mm		Vendor to confirm			
1.2.7	Hole accuracy : H7 to H8		Vendor to confirm			
1.2.8	Hole pitch on any layout: 20 to 40 mm.		Vendor to confirm			
1.2.9	Hole pitch tolerance : ± 0.04 mm		Vendor to confirm			
1.2.10	Hole Surface Finish: min. Ra 3.2		Vendor to confirm			
1.2.11	Hole straightness per 100mm depth : max. 0.03 mm		Vendor to confirm			
1.3	<b>Support Tube Plate</b>					
1.3.1	Support Tube Plates shall be drilled in stacking of 4 to 5 plates of thickness 16 mm each.		Vendor to confirm			
1.3.2	Material : Carbon Steel		Vendor to confirm			
1.3.3	Plate Size: upto 16 x 5000 x 9500 mm		Vendor to confirm			
1.3.4	Hole Dia: 14 to 40 mm		Vendor to confirm			
1.3.5	Hole accuracy : H7 to H8		Vendor to specify			
1.3.6	Hole pitch on any layout: 20 to 40 mm.		Vendor to confirm			

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1.3.7	Hole pitch tolerance (in all direction ) : $\pm 0.04$	Vendor to specify			
1.3.8	Hole Surface Finish: min. Ra 6.4	Vendor to specify			
1.3.9	Hole straightness per 100mm depth :max. 0.05 mm	Vendor to confirm			
2	<b>MACHINE SPECIFICATION: (Minimum Requirements)</b>				
2.1	No. of Spindles ;6	Vendor to confirm			
2.2	Spindle Orientation :Vertical	Vendor to confirm			
2.3	Drilling capacity in dia. : 40 mm in S.S	Vendor to confirm			
2.4	Power rating in KW of each spindle drive : 28 kW or more	Vendor to specify			
2.5	Spindle Motor & Drive Make: <b>FANUC <math>\alpha</math>i</b> or <b>SIEMENS 1PH</b> series spindle motor with matching spindle drive	Vendor to confirm			
2.6	Spindle Encoder: <b>FANUC/SIEMENS/HEIDENHAIN</b> rotary encoders for actual spindle rpm	Vendor to confirm			
2.7	Each spindle should be driven by its own spindle motor, individually controlled and programmable through CNC.	Vendor to confirm			
2.8	All work spindle shall be nitrited & fitted with radial & axial bearing	Vendor to confirm			
2.9	Adjustment of distances between spindles via NC programme through motors	Vendor to confirm			
2.10	Speed of the workspindles, infinitely variable 3200 rpm or more	Vendor to specify			
2.11	Range of Spindle Torque :60 to $>250$ Nm	Vendor to specify			
2.12	Type of Tool Clamping:Automatic	Vendor to confirm			
2.13	Spindle taper: ISO 50	Vendor to confirm			
2.14	Tool clamping & declamping :Hydraulic	Vendor to confirm			
2.15	Run out measured at Tool adapter :max. 0.01mm	Vendor to specify			
2.16	Tool clamping force: Suitable to meet ISO 50 arrangement: 25 kN or more	Vendor to specify			
2.17	Feed force of each work spindle : 5 kN or more	Vendor to specify			
2.18	Y-axis drilling carriage shall be parked away from the work table for easy & safe loading & unloading of Jobs.	Vendor to confirm			

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2.19	<b>Longitudinal Traverse along machine bed (Axis X):</b>				
2.19.1	Total Stroke: 10,000mm or more	Vendor to specify			
2.19.2	Feed rate (infinitely variable): 1 - 10,000 mm/min	Vendor to specify			
2.19.3	Rapid traverse: 10000mm/min	Vendor to confirm			
2.19.4	Position Feedback system: Heidenhain make sealed linear encoder	Vendor to specify			
2.19.5	Axis Resolution: 1 micron				
2.20	<b>Lateral Traverse across machine bed (Axis Y):</b>				
2.20.1	Total Stroke: 5500mm or more	Vendor to specify			
2.20.2	Feed rate (infinitely variable): 1 - 8,000 mm/min	Vendor to specify			
2.20.3	Rapid traverse: 8000mm/min	Vendor to specify			
2.20.4	Position Feedback system: Heidenhain make sealed linear encoder	Vendor to specify			
2.20.5	Axis Resolution: 1 micron	Vendor to confirm			
2.21	<b>Spindle Feeds (Axes Z1, Z2, Z3, Z4, Z5, Z6): available stroke for each spindle shall be around 750mm</b>				
2.21.1	Total stroke (for each spindle): 750mm or more	Vendor to specify			
2.21.2	Feed rate (infinitely variable): 1 - 8,000 mm/min or more	Vendor to specify			
2.21.3	Rapid traverse: 8000mm/min or more	Vendor to specify			
2.21.4	Position Feedback system: External or motor mount encoder	Vendor to specify			
2.21.5	Axis Resolution:	1 micron			
2.22	<b>FEEDS AND DRIVE SYSTEM:</b>				
2.22.1	Feed motors & drives: <b>FANUC αi</b> or <b>SIEMENS 1FT/1FK</b> series AC servo motors with matching AC servo drives.	Vendor to specify			
2.22.2	Details of System to ensure zero backlash for the axes	Vendor to specify			
2.22.3	Mechanism for locking / clamping the axes	Vendor to specify			

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2.22.4	Clamping force of each axes to be furnished	Vendor to specify			
<b>2.23 MACHINE CAPABILITY</b>					
2.23.1	Time required for the consecutive drilling of set of six holes of all available machine spindles for defined Tube plate, Material- Carbon Steel (IS 2062 Gr B or DIN 10025 Gr S 275 J2G3, Thickness of plate- 40mm, Diameter of hole- 32.05 H6 (Refer BHEL drg. for tube layout.)	≤ 25 second with indexible drill body & inserts . Vendor to specify			
<b>2.24 WORK PIECE TABLE AND HOLDING SYSTEM:</b>					
2.24.1	Size of work table: min. 6500 x 10500 mm	Vendor to specify			
2.24.2	Distance between T slot:250 mm	Vendor to confirm			
2.24.3	Size of T-slots:as per DIN 650 28 H8	Vendor to confirm			
2.24.4	Loading capacity of machine table : 5T/m <sup>2</sup> or more	Vendor to specify			
2.24.5	Height of floor blocks :min. 300 mm	Vendor to specify			
2.24.6	Finishing :As per Din 876 III	Vendor to confirm			
2.24.7	Number of aligning & clamping elements: 175 Nos.or more	Vendor to specify			
2.24.8	Details of mechanism for preventing of jumping of plates during drilling of packet of support tube plates.	Vendor to offer			
2.24.9	Details of support blocks between workpiece and bed plate for drilling.	Vendor to offer			
2.24.10	Setting scheme (details and drawings) for setting of workpiece on work table for drilling to be submitted with offer.	Vendor to submit			
<b>2.25 CONSTRUCTION:</b>					
2.25.1	Vendor to furnish material, hardness of guideways & constructional details, including explanatory drawings, of various components/ assemblies like Spindle Gear Box, Guideways/slides, Telescopic covers, Accessories, Machine Table, feed transmission system, hydraulic and lubrication system, feed back system etc. of the machine.	Vendor to submit			
2.25.2	All linear traversing axes shall be provided with <b>Steel Telescopic covers of rust resistant material</b> with wipers. Joints of telescopic covers should be so sealed to avoid mixing of coolant and other lubricating oil.	Vendor to offer			
2.25.3	Video images on CD including hard copy of the technical features / Literature with photographs, drawings explaining the technical features of the machine should be enclosed with the offer in English language.	Vendor to submit			

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<b>2.26</b>	<b>Machine X-axis Bed.</b>				
2.26.1	Stable and rigid, well-ribbed cast iron design or steel fabrication	Vendor to offer			
2.26.2	Good bed support for holding the machine bridge and absorption of the cutting forces	Vendor to offer			
2.26.3	Long term geometrical accuracy of the guideways	Vendor to offer			
2.26.4	Good guidance relation length to width	Vendor to offer			
2.26.5	Steel Telescopic cover for the guide ways.	Vendor to offer			
<b>2.27</b>	<b>Machine Bridge with operation platform</b>				
2.27.1	Stable and rigid, well-ribbed cast iron construction or steel fabrication	Vendor to offer			
2.27.2	Long-term geometrical accuracy in the guideways	Vendor to offer			
2.27.3	Telescopic covers for the guide ways.	Vendor to offer			
2.27.4	Good overview for the operator from the operating platform with chip protection cabin arranged at one side of the bridge	Vendor to offer			
<b>2.28</b>	<b>Tooling System</b>				
2.28.1	Tool holding, clamping and adaptors for carbide drills/indexable drills of internal coolant supply and taper shank drills of external coolant supply	Vendor to confirm			
2.28.2	All toolings system shall be to meet ISO 50 adaptors.				
2.28.3	Quantity of carbide cutting tool / indexable insert drills for drilling of following holes in main tube plates/ support tube plate are to be quoted with offer:- a) 12,199 holes Ø 32.15 per Main Tube Plate b) 7832 holes Ø 28.95 per Main Tube Plate c) 12,231 holes Ø 32.25 per support tube plate . d) 6 Nos Indexable drill size 40 mm for prove out machine capacity and check out its performance . Note: The sizes mentioned for Tube plate and support plate are tentative , However final sizes will be decided at the time of placement of order , the change sizes shall be in line and nearest to above sizes.	Vendor to confirm			
2.28.4	All cutting tools, adaptors,sleeves & tool holders recommended for drilling of proveout of Tube plate as per enclosed drawings No. 01600070031	Vendor to confirm			

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2.28.5	Cutting speed, feed rate, achievable surface finish & tolerances and tool life are to be specified by supplier for drilling of job to be proved as per drawing.	Vendor to confirm			
2.28.6	The machine shall have manual tool clamping/release through push button provided on machine control panel/ auxiliary hand pendant	Vendor to confirm			
<b>2.29 LUBRICATION SYSTEM</b>					
2.29.1	Automatic lubrication system and its monitoring for all axes, drilling spindles & gear boxes and wherever required.	Vendor to offer			
2.29.2	Grade of lubricating oil and its Indian equivalent.	Vendor to submit			
<b>2.30 HYDRAULIC SYSTEM :</b>					
2.30.1	Hydraulic system should be centralised. Hydraulic Tank shall preferably be located at floor level	Vendor to confirm			
2.30.2	All Hydraulic pumps and controls etc shall be from world fame manufacturers only like Yuken, Rexroth, Vickers etc.	Vendor to confirm			
2.30.3	Technical specification and make of all the hydraulic components like pumps, valves, hydraulic cylinders, pressure switches, flow switches, pressure relief valves, hose pipe etc.	Vendor to confirm			
2.30.4	Air cooling/refrigerated type cooling system of sufficient capacity to maintain cooling of Hydraulic oil at machine required temperature.	Vendor to confirm			
2.30.5	Each pump should have an independent motor.	Vendor to confirm			
2.30.6	Grade of hydraulic oil and its Indian equivalent.	Vendor to confirm			
2.30.7	First filling of all required oil & grease etc. should be supplied by vendor along with the specifications of oils/ greases .	Vendor to confirm			
<b>2.31 COOLANT SYSTEM :</b>					
2.31.1	Capacity of coolant pump	Vendor to specify			
2.31.2	Capacity of each work spindle (adjustable)	Vendor to specify			
2.31.3	Pressure of coolant at the workspindle	Vendor to specify			
2.31.4	Coolant filtration degree	Less than 50µm			

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2.31.5	Recirculating type coolant system with all accessories shall be provided. Selection of all the variants shall be through program and push buttons provided on the Operator's panel as well.	Vendor to specify			
2.31.6	Coolant collection and recirculation system should be leakproof & perfect to avoid any spillage on shop floor, trenches for cables & foundation pit of the machine etc. In no case coolant shall mix up with hydraulic/lubrication oil.	Vendor to confirm			
2.31.7	Coolant Filtration System: Recirculating type coolant system with Vacuum Rotary drum type filtration system or any other latest filtration system.	Vendor to specify			
2.31.8	Coolant flow diagram showing filters, pumps, valves, tanks etc.to be submitted with the offer.	Vendor to specify			
2.31.9	Pressure & rate of flow of coolant for different variants should be furnished in the offer. The pressure should be sufficient for the coolant to reach the tool tip at full pressure.	Vendor to specify			
2.31.10	Coolant tank capacity and details of the system including requisite sump, model, make, pressure, and flow rate of pump, location of coolant tank etc. should be clearly indicated.	Vendor to specify			
2.31.11	For finer control of coolant pressure and flow rate, after its activation shall be through program or switches, rotary/ potentiometer switches shall be provided on the operator's panel. Manual valve for closing coolant flow is also required.	Vendor to confirm			
2.31.12	Coolant pump and motor details for all variants	Vendor to confirm			
2.31.13	Provision of separate pump for drainage of dirty coolant from coolant tank	Vendor to specify			
2.31.14	Coolant specification (Preferably Indian equivalent shall also be specified)	Vendor to specify			
2.31.15	The coolant tank should be preferably fitted with skimmer for regular cleaning of coolant from contamination with tramp oil. (Optional)	Vendor to confirm			
<b>2.32</b>	<b>OPERATION AND CONTROL SYSTEM:</b>				
<b>2.32.1</b>	<b>OPERATOR'S PANEL:</b>				
2.32.1.1	Fixed/swivelling type air conditioned operator's pendant of <b>Rittal / Schneider</b> make with complete CNC operator panel (OP) and machine control panel (MCP) of required configuration shall be provided for safe, convenient and efficient operation. All switches should be within reach of operator of average height (170 cms) for easy operation. All displays/indications should also be conveniently placed accordingly. Layout showing complete details should be submitted.	Vendor to confirm			



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2.32.2	CNC SYSTEM & FEATURES :				
2.32.2.1	Make: FANUC / SIEMENS	Vendor to specify			
2.32.2.2	Details of Standard features	Vendor to specify			
2.32.2.3	The system should have full alphanumeric keyboard, TFT colour display (10.4" or larger), Machine Control Panel (MCP), RS232C serial interface, USB port for data input/output, network ready, graphic simulation and on-screen PLC Ladder display. All PLC input/output modules should be of FANUC/SIEMENS make. <b>(Latest hardware &amp; software versions, as available at the time of delivery, should be supplied).</b>	Vendor to specify			
2.32.2.4	Details of optional features, recommended by vendor. (Including features required for Prove-Out Components)	Vendor to specify			
2.32.2.5	Details of other CNC features:	Vendor to specify			
2.32.2.5.1	Axes Interpolation: Linear, Circular & Helical.	Vendor to confirm			
2.32.2.5.2	Max Number of simultaneous interpolation: 3	Vendor to confirm			
2.32.2.5.3	Part Program Storage: 2 MB or more	Vendor to confirm			
2.32.2.5.4	Technology Cycles: Geometry Calculation, standard Drilling, Tapping, Milling cycles.	Vendor to confirm			
2.32.2.5.5	Graphics simulation (Static and dynamic) of Part Programs and Machining process.	Vendor to confirm			
2.32.2.5.6	Co-ordinate Transformation: Datum shift, rotation, mirror image, scaling factor.	Vendor to confirm			
2.32.2.5.7	Pitch Error compensation (As applicable)	Vendor to confirm			
2.32.2.5.8	Backlash error compensation (As applicable)	Vendor to confirm			
2.32.2.5.9	Zero Offset for all axes	Vendor to confirm			

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2.32.2.5.10	Feed override switch 0-120% for all axis	Vendor to confirm			
2.32.2.5.11	Spindle speed override switch 70-120%	Vendor to confirm			
2.32.2.6	Provision for automatic safe shut down of CNC control in case of power failure	Vendor to confirm			
<b>2.33</b>	<b>SOFTWARE FOR GENERATING PART PROGRAM:</b>				
2.33.1	A suitable PC based software for generating part program for condenser tube layout (with maximum utilisation of all 6 spindles) from drawing file is to be supplied. Two copies of the software on CD ROM with extra hardware locks (dongle) are to be supplied as back up. Details of installation of software on the PC and its use is to be provided in the hard copy. (Software shall have the capability of calculations and illustrations of collision free movements, simulation of movements, automatic generation of NC-programs. Programming language- English, Measuring system-Metric, PC system- windows XP. CNC program generated by the system shall be used directly on the machine control panel. Software should be capable of handling input data in DXF/IGES and other universal formats). Software shall have the library of all possible drills to ease selection, material/job library which include size and mechanical properties, programmes etc in list form with graphical representation in 2D and in 3D forms.	Vendor to confirm			
2.33.2	Software should be capable of making NC program with single spindle as well as with any number of selected spindles combination (for example: Spindle no. - 1,2,5 & 6 etc.)	Vendor to confirm			
2.33.3	Supplier should specify the required Hardware configuration of PC/Workstation for installation of software	Vendor to confirm			
2.33.4	The software should be guaranteed for three years for free updates after commissioning	Vendor to confirm			
2.33.5	The supplier should also quote for the Annual Maintenance Contract (AMC) for the software after the guarantee period is over	Vendor to confirm			
<b>2.34</b>	<b>CYCLES:</b>				
2.34.1	Drilling cycles (Drilling, Peck Drilling, Deep hole Drilling, Tapping Cycles etc) required for drilling of Main Tube plate & Support Tube Plate (stacked in 6/8 plates of thickness 16mm each) shall be supplied.	Vendor to confirm			
2.34.2	A separate screen for giving drilling cycle values/ parameters for controlling drilling depth, clearance, peck values, speed/feed etc should be made available for all spindles through parameters	Vendor to confirm			

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<b>2.35</b>	<b>MANUAL CONTROL:</b>				
2.35.1	Complete manual operation of machine should be possible through Machine Control Panel (MCP). The MCP should have Spindle & Feed override switches, +/- Jog keys for individual axis, Start/Stop keys for Cycle, Spindle & Feed and additional keys/switches for auxiliary functions. Diagram of complete operator pendant with full details of all the switches/keys should be submitted.	Vendor to confirm			
<b>2.36</b>	<b>HAND HELD UNIT:</b>				
2.36.1	Hand Held unit, alongwith sufficient length of interfacing cable is to be offered for handwheel (MPG) operation of individual axis in jog & increment mode and provision for spindle inch in c.w & c.c.w directions	Vendor to confirm			
<b>2.37</b>	<b>UPS FOR CNC SYSTEM: (Only in case of PC based CNC systems)</b>				
2.37.1	UPS of 15 minutes for CNC system with inbuilt cooling and charge status display (Battery charging /discharging time should be specified by vendor)	Vendor to confirm			
<b>2.38</b>	<b>PORTABLE INPUT/OUTPUT DEVICE UNIT:</b>				
2.38.1	Note Book PC (Internationally reputed make and latest model) with Windows operating system is to be supplied for bi-directional transfer of program and data between the offered unit and supplied CNC system. The notebook must contain all application softwares (Licensed) for the supplied CNC, PLC and Drives systems along with required interfaces and cables.	Vendor to confirm			
<b>2.39</b>	<b>MACHINE LIGHTS:</b>				
2.39.1	Machine lights for sufficient illumination of complete working area should be provided for clear visibility.	Vendor to confirm			
2.39.2	A magnetic base portable spot light with sufficiently long cable should also be provided.	Vendor to confirm			
2.39.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to confirm			
2.39.4	Flashing/ rotary type End of Cutting and Program Stop Light.	Vendor to confirm			

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<b>2.40</b>	<b>AIRCONDITIONERS:</b>				
2.40.1	Door mounted Air Conditioners with dehumidifiers of reputed international make who have after-sales spares support in India or of Indian make like Advance/ Werner Finley/ Rittal for all Electrical/ Electronic Panels/ Cabinets including Operator's Panel (One no of sufficient capacity for each cabinet/ panel considering continuous operation at ambient temperature of 50°C). The blow of cool air from the air conditioners shall not fall directly on the electronic circuits/ modules. ACs must be incorporated with electrical/ refrigeration interlocks.	Vendor to confirm			
2.40.2	ACs unit must be mounted on the movable pendent with well-supported universal-head bolt. Two sets of cut-out labels are mandatory to be supplied with the units. The electrical connection of the AC unit must be with male-female connector, easily disconnected from the AC unit side. There has to be a MCCB to isolate the AC unit from the electrical panel.	Vendor to confirm			
2.40.3	For precise air/ oil temperature with energy-efficient operation, latest state-of-the-art technology features like constant pressure control, variable speed control of fan-motor, hot-gas bypass control, etc. needs to be incorporated in the above unit(s).	Vendor to confirm			
2.40.4	Unit (s) must be designed to work in extremely harsh industrial environment and needs protection from heat, dust, fumes, corrosive or oily vapours, moisture, etc. The condenser coil must resist dust accumulation & must transfer heat efficiently.	Vendor to confirm			
2.40.5	Vendor to supply the following information about Air Conditioners and Chiller Unit (s) used in the machine: - Type of Air Conditioning/ Chiller Unit. - Capacity of the 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. - Type of microprocessor-based controller with LCD Display with complete functional details. Detailed specifications of all the components fitted in the Unit(s) are to be submitted with BOM, make, etc. in technical bid. Vendor have to provide leaflet/ catalogue of all the brought-out items, refrigeration accessories and provide schematic layout of the system.	Vendor to confirm			
2.40.6	Compressor, refrigeration spares Items, preferably PHE (Plate-type Heat Exchanger), Gear Pump, etc. must be available in India and if possible can be repaired, locally. Vendor have to give training to operate, maintain & repair all the individual items and the Chiller/ AC Unit (s) as a whole. Exhaustive training is to be given for electrically integration of the Unit (s) with the CNC machines.	Vendor to confirm			

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<b>2.41</b>	<b>ELECTRICAL:</b>				
2.41.1	415V +/- 10%, 50HZ +/- 3 %, 3 Phase AC (3 wire system without neutral) Power Supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthing with required material details should be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Vendor to confirm			
2.41.2	All electrical / electronic equipment shall be tropicalized	Vendor to confirm			
2.41.3	All electrical & electronic control cabinets & panels should be dust proof as per IP 64	Vendor to confirm			
2.41.4	All electrical components should be mounted on DIN Rail	Vendor to confirm			
2.41.5	All electrical and electronic panels should be of Rittal / Schneider make have provision of sufficient illumination and power receptacles of 220VAC, 5 Amps. All adapters/ receptacles should have compatibility with Indian equivalents.	Vendor to confirm			
2.41.6	Motors/electrical equipment shall conform to IEC or Indian Standards	Vendor to confirm			
2.41.7	All cables outside the electrical cabinets and operator pendant must be routed through flexible conduits capable of withstanding stress, chip hazard and ingress of oil/coolant. Additionally, all cables moving with traversing axes should be of trailing type and installed in caterpillar / cable drag chain.	Vendor to confirm			
2.41.8	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to confirm			
2.41.9	In-cycle hour counter with reset facility.	Vendor to confirm			
2.41.10	The Switch Cabinet : If switch cabinet is located at the Machine Bridge, a suitable platform is to be provided for maintenance work.	Vendor to confirm			
<b>2.42</b>	<b>SAFETY ARRANGEMENTS:</b>				
2.42.1	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 and messages (with device identification) on CNC display and panels should be available.	Vendor to confirm			

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2.42.2	A detailed list of all alarms / indications provided on machine along with cause and remedy should be submitted by the supplier.	Vendor to confirm			
2.42.3	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Vendor to confirm			
2.42.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to confirm			
2.42.5	Emergency Switches at suitable locations as per International Norms are to be provided.	Vendor to confirm			
2.42.6	All hose pipes of coolant, Hydraulic oil and Lubricating oil should be properly numbered.	Vendor to confirm			
<b>2.43</b>	<b>ENVIRONMENTAL PERFORMANCE OF THE MACHINE :</b>				
2.43.1	Maximum noise level shall be 85 dB(A) at normal load condition, one meter away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635-16. Supplier to demonstrate compliance to noise level, if so required.	Vendor to confirm			
2.43.2	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to confirm			
2.43.3	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 confirm			
2.43.4	No hazardous chemicals shall be required to be used in the machine.	Vendor to confirm			
2.43.5	If any safety/environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to confirm			
2.43.6	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
<b>2.44</b>	<b>CHIP REMOVAL &amp; CONVEYOR SYSTEM:</b> Vendor to offer a suitable chip removal system & chip conveyor system to remove chips from the workpiece during drilling operation.	Vendor to specify			
2.44.1	Chip conveyor unit: A suitable chip conveyor system (2 nos) located on left & right side (1 no on each side) of the machine table for optimizing chip removal to the chip bin during operation as well as after machining of workpiece when machine table is cleared & prepared for set-up of next job. The chip bin is to be located on the floor at the side of one end of the machine. Two chip bins of appropriate size of Indian make, with wheels and handle for movement, should also be supplied.	Vendor to specify			
2.44.2	Type of chip conveyor	Vendor to specify			
2.44.3	Length and Width of conveyor	Vendor to specify			
2.44.4	Speed of conveyor	Vendor to specify			
2.44.5	Elevation of chip conveyor for chip bin	Vendor to specify			
2.44.6	Material of chip conveyor to be rust resistant	Vendor to specify			
2.44.7	Provision for smooth flow of chips to the conveyor.	Vendor to specify			
2.44.8	Operation of chip conveyor (forward & reverse) through push buttons on operator's panel and at Chip Conveyor	Vendor to specify			
2.44.9	Layout showing location of chip conveyor should be submitted.	Vendor to specify			
2.44.10	Video images on CD including hard copy of the technical feature and working of the system should be enclosed with the offer in English language.	Vendor to specify			
<b>2.45</b>	<b>Chip Brushing Unit:</b> Chip brushing system should be suitable to remove chips to both chip conveyors (left & right side) during drilling operation from workpiece and carry both short & curly chips efficiently & effectively with following information / features: a). Location of chip brushing unit b). Length of chip brushing unit c). Height adjustment for different workpieces thickness d). Provision of exchange of damaged/ worn out brushes e). Brushing cycle integrated in the NC program for removal of chips from the workpiece	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
<b>2.46</b>	<b>ULTRA ISOLATION TRANSFORMER</b>				
2.46.1	Indian make Ultra Isolation Transformer suitable for complete machine, its drives, controls, PLC etc.	Vendor to specify			
2.46.2	Make :M/s Neel Control, Mumbai & Aplab Electronic, Mumbai.	Vendor to specify			
2.46.3	Model & Rating	Vendor to specify			
2.46.4	Catalogue and technical literature of the Voltage Stabiliser shall be submitted..	Vendor to specify			
2.46.5	Spares Package for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor to specify			
<b>2.47</b>	<b>PNEUMATIC SYSTEM:</b>				
<b>2.47.1</b>	<b>AIR COMPRESSOR:</b>				
2.47.1.1	Independent Air Compressor (preferably of Indian make) with refrigerated type Air Dryer & Filter of suitable capacity for the total compressed air requirements of the machine & accessories and to suit required air quality should be supplied. The compressor unit should be suitable for continuous duty (24 x 7 basis).	Vendor to specify			
2.47.1.2	Make & Model of Air Compressor	Vendor to specify			
2.47.1.3	Make & Model of Refrigerated Air Dryer	Vendor to specify			
2.47.1.4	Capacity (Flow, Pressure & KW)	Vendor to specify			
2.47.1.5	Catalogue and technical literature of air compressor shall be submitted.	Vendor to specify			
2.47.1.6	Spare package for Air Compressor for 2 years working should also be offered.	Vendor to specify			
<b>2.47.2</b>	<b>COMPRESSED AIR POINTS:</b>				
2.47.2.1	Compressed Air Point with manual ON/ OFF Valve and flexible pipe of suitable length for work piece cleaning shall be provided.	Vendor to specify			



SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
2.48	DIAGNOSTIC SYSTEM				
2.48.1	FAULT DIAGNOSTIC SYSTEM:				
2.48.1.1	All alarms and messages should be displayed on the CNC monitor with device ID numbers. Additionally, softcopy and hardcopy of all alarms and messages with cause and remedial measures must be supplied.	Vendor to confirm			
2.49	LEVELING & ANCHORING SYSTEM				
2.49.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc to be supplied with the machine.	Vendor to confirm			
3.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE:				
3.1	Special tools and equipment required for erection and necessary tools like Torque Wrench, Spanners, Keys, grease guns etc for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer	Vendor to confirm			
3.2	Test mandrel for checking run-out/taper & alignment should be supplied				
4.0	SPARES (Optional : To be quoted seperately ):				
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 with proper identification number by Vendor. The list to include following, in addition to other recommended spares: <b>(Unit Price of each item of spare should be offered)</b>	Vendor to specify			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
4.2	<b>Mechanical &amp; Hydraulic Spares:</b> Following Spares are to be offered:				
4.3	Pumps used on machine i.e Hydraulic / Hydrostatic, lubrication, coolant and oil cooling - recirculating system (1 no. each type).	Vendor to specify			
4.4	Pressure control valves, Pressure reducing valves, Flow control valves & Direction control valves used in Hyd / Lub / Pneumatic/ coolant circuit. (1 no. of each type)	Vendor to specify			
4.5	Pressure switches, flow switches used in Hyd / Lub / Pneumatic/ coolant circuit. (1 No. of each type)	Vendor to specify			
4.6	All types of regenerative type filter inserts (10 No. of each type)	Vendor to specify			
4.7	All types of Disposable type filter inserts (30 nos. of each type)	Vendor to specify			
4.8	All types of Accumulators with charging kit (1 no. of each type)	Vendor to specify			
4.9	One set of belts (including timing belt) used in the machine	Vendor to specify			
4.10	One no of drilling spindle used in the machine	Vendor to specify			
4.11	One no of each type of bearing used in the machine	Vendor to specify			
4.12	One no of each type of gear used in the machine	Vendor to specify			
4.13	One set of hose pipe with end connection used in the machine.	Vendor to specify			
4.14	All types of couplings used with different pumps (1 no. of each type) & pressure sleeves used in machine.	Vendor to specify			
4.15	All types of shaft seals (2 no. of each type), O-rings & Piston Rings (5 nos. of each type) used in the machine.	Vendor to specify			
4.16	One set of pneumatic filtration / condensate drain system.	Vendor to specify			
4.17	Refractometer for concentration measurement of coolant with water- 1no	Vendor to specify			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
	<b>Electrical /Electronic / CNC Spares:</b> Following Spares are to be offered:				
4.18	Limit Switches/ Micro Switches (2 Nos each type )	Vendor to specify			
4.19	Relays ( 2 Nos each type )	Vendor to specify			
4.20	Contactors ( 2 Nos each type )	Vendor to specify			
4.21	RTD temperature transmitter ( 1 No each type )if used,.	Vendor to specify			
4.22	Proximity Switches ( 2 Nos each type )	Vendor to specify			
4.23	Push Buttons ( 5 Nos each type )	Vendor to specify			
4.24	Indicating Lamps ( 10 Nos each type )	Vendor to specify			
4.25	Semiconductor Fuses ( 3 Nos each type )	Vendor to specify			
4.26	Circuit Breakers ( 1 No each type )	Vendor to specify			
4.27	Main Power Switch ( 1 No each type )	Vendor to specify			
4.28	Encoders ( 1 No each type )	Vendor to specify			
4.29	Scanning Heads for Linear Scales ( 1 No each type )	Vendor to specify			
4.30	PCBs for CNC Controller (1 No each type)	Vendor to specify			
4.31	I/O Cards for PLC ( 1 No each type )	Vendor to specify			
4.32	Control & Power modules for Spindle & Feed Drives (1 No each type)	Vendor to specify			
4.33	All types of spares for total machine and accessories should be available for at least 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 them in advance, if required	Vendor to specify			
4.34	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 specify			
4.35	Vendor to submit the complete list of spares for machine and accessories along with specification / type/model, part identification number and name & address of the supplier of all bought out items shall be furnished along with documentation to be supplied with the machine.	Vendor to specify			
4.36	Vendor to submit list of necessary accessories required	Vendor to specify			
4.37	Commissioning Spares	Vendor to specify			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT		REQUIRED	OFFERED	DEVIATIONS	REMARKS
5.0	DOCUMENTATION					
5.1	Five sets of Hard Copies (Print form) and three sets of soft copies (on CD/DVD) of the following documents in <b>English language</b> should be supplied along with the machine		Vendor to confirm			
5.2	Operating manuals of Machine & CNC system		Vendor to confirm			
5.3	Programming Manuals of Machine & CNC system		Vendor to confirm			
5.4	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic & Lubricating circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list, identification number, make and specification of all components.		Vendor to confirm			
5.5	Maintenance, Interface & commissioning manuals for CNC system, spindle & feed drives and position feedback system.		Vendor to confirm			
5.6	Manufacturing drawings for all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.		Vendor to confirm			
5.7	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.		Vendor to confirm			
5.8	Detailed specification of all rubber items and hydraulic/lube fittings		Vendor to confirm			
5.9	Operating Manuals, Maintenance Manuals & Catalogues for supplied Automatic Tool Offset & Job Measuring Systems, Isolation Transformer, Air-Compressor and all supplied Accessories.		Vendor to confirm			
5.10	Electrical Schematics of the machine with comments in English.		Vendor to confirm			
5.11	PLC program with symbols & comments in English.		Vendor to confirm			
5.12	Soft copy of complete machine data and PLC project with symbols and comments in English		Vendor to confirm			
5.13	Complete software back-up (Ghost) of hard disk (only in case of PC based CNC system) on DVD		Vendor to confirm			
5.14	Complete list of parts/items (Bill of materials) used in the machine in English language.		Vendor to confirm			
5.15	Erection & Commissioning Instructions.		Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
5.17	Detailed descriptions of pneumatic, hydraulic and lubricant system.	Vendor to confirm			
5.19	Trouble shooting and remedial measures	Vendor to confirm			
5.20	DOs and DONOTs.	Vendor to confirm			
5.21	Pneumatic maintenance check list giving frequency of parts to be replaced and time taken for perventive maintenance in a year.	Vendor to confirm			
5.22	List of replaceable parts and complete list of Mechanical, Electrical and Electronic spares with identification numbers.	Vendor to confirm			
5.23	Drawings/details of tooling with identification numbers and functioning details.	Vendor to confirm			
5.24	Manufacturing drawings of all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.	Vendor to confirm			
5.25	List of all bought out items with technical specifications, model & make.	Vendor to confirm			
5.26	Identification number on all hydraulic and lubricating hose pipes, etc.	Vendor to confirm			
<b>6.0</b>	<b>TRAINING</b>				
6.1	BHEL Persons should be trained at supplier's Works for 8 man-weeks (2 man weeks for each area) period in the area of (a) CNC part programming /technology/ use of programming software, use of all CNC features & supplied accessories etc. (b) Electronic & CNC maintenance for machine & other supplied equipments (c) Mechanical, Electrical & Hydraulic maintenance of the machine & other supplied equipments (d) Operation of the machine & other supplied equipments.	Vendor to confirm			
6.2	Training charges, if any, per man days may be quoted seperately.	Vendor to confirm			
6.3	Air-fare, boarding & lodging for the trainees shall be borne by BHEL for training and supplier works.	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
6.4	Competent english speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.	Vendor to confirm			
6.5	Vendor should commit to organize 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			
6.6	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to confirm			
6.7	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to confirm			
6.8	Three weeks manufacturer's supervision of independent operation of machine by BHEL after job proveout at BHEL works.	Vendor to confirm			
6.9	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts/ engineers during their stay at BHEL works	Vendor to confirm			
7.0	<b>FOUNDATION :</b>				
7.1	Vendor shall submit the preliminary layout drawing for getting BHEL 's approval within one month from the date of Letter of Intent (LOI) / P.O. whichever is earlier. Complete foundation design including details viz. static/dynamic load details etc. and final layout drawings (considering soil condition data at BHEL, Bhopal) 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 & bed plate for work piece including space requirement for Voltage Stabilizer, Isolation Transformer, Air compressor, Chip Bin, Chip removal system/conveyor, coolant tank & any other accessories. BHEL will construct complete foundation for the machine under supervision of supplier and at supplier's responsibility. Vendor should arrange equipments 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 foundation bolts of the machine.	Vendor to confirm			
7.2	Vendor should provide floor plan with all data and dimensions for the installation of machine.	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
8.0	<b>ERECTION &amp; COMMISSIONING:</b>				
8.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control & 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 will be provided by BHEL. Details of these requirements should be informed by vendor in advance.	Vendor to confirm			
8.2	Supplier to take full responsibility for shifting of machine to installation site	Vendor to confirm			
8.3	Erection & Commissioning of Voltage stabilizer, Isolation Transformer and Air Compressor etc. shall also be responsibility of the Vendor.	Vendor to confirm			
8.4	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at <b>Sl. No. 12 (Machine Acceptance)</b> shall form part of the commissioning activity.	Vendor to confirm			
8.5	Test mandrel for checking run-out/taper & alignment should be supplied by the Vendor.	Vendor to confirm			
8.6	Tools, Tackels, Test Mandrels, Instruments and other necessary equipment including Laser Equipment required to carry out all above activities should be brought by the Vendor.	Vendor to confirm			
8.7	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to confirm			
8.8	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 confirm			
8.9	<b>TOUCH-UP PAINTS:</b> Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colours of paint used.	Vendor to confirm			
8.10	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm			
8.11	Charges, duration, terms & conditions for E&C should be furnished in detail separately by vendor along with offer.	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
9	ACCURACY TESTS:				
9.1	GEOMETRICAL ACCURACIES :				
9.1.1	Submit test chart for all accuracies as per ISO 8636-2 standard.	Vendor to confirm			
9.1.2	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at supplier's works and during erection & commissioning at BHEL works.	Vendor to confirm			
9.1.3	Vendor to confirm that it will be possible to machine prove-out components to specified drawing accuracies with above mentioned machine accuracies.	Vendor to confirm			
9.2	MACHINE POSITIONING ACCURACIES & REPEATABILITY: Should be measured as per VDI/DGQ 3441 (Latest Revision) using LASER INTERFEROMETER.				
9.2.1	Positioning accuracy in X / Y axis (Pa) per 1000 mm	max. 20 µm			
9.2.2	Positioning accuracy in Z axis (Pa) per 1000 mm	max. 20 µm			
9.2.3	Repeatability in X / Y axis (Ps)	max. 12 µm			
9.2.4	Repeatability in Z axis (Ps)	max. 12 µm			
9.2.5	Positioning accuracy over entire traverse in: X- axis (Pa)	max. 55 µm			
9.2.6	Positioning accuracy over entire traverse in: Y- axis (Pa)	max. 35 µm			
9.2.7	Positioning accuracy over entire traverse in Z axis (Pa)	max. 10 µm			
9.2.8	Vendor to confirm that it will be possible to machine prove-out components to specified drawing accuracies with above mentioned machine accuracies.	Vendor to confirm			
10	AMBIENT CONDITIONS & THERMAL STABILITY :				
10.1	Total machine including CNC system and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Power Supply: Voltage: 415 V +/- 15% Frequency: 50 Hz +/- 3% No. of phases = 3 phase, 3 wire system Ambient Conditions: Temperature = 5 to 48 degree Celsius Relative Humidity = 95% max. Working Condition : Fabrication Shop floor with dust and metallic fumes of fabrication area. (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 confirm			



SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
10.2	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by vendor. (Confirm that machine is suitable for above and details of provisions on the machine for the same should be furnished)	Vendor to confirm			
<b>11</b>	<b>PROVEOUT OF BHEL COMPONENTS :</b>				
11.1	Drawings of proveout components (Main Tube Plate & Support Tube Plate (in stack) Drg. No. - 01 600070031) are enclosed. Vendor to submit preliminary process, time study of drilling with break-up details like - loading, unloading of work piece, machine set-up, drilling time, tool change time, periodic inspection time and total drilling time of proveout component and tool list recommended by them along with the offer. Change in process/tools may be mutually discussed and agreed. Complete drilling 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. Material for the proveout components shall be provided by BHEL. Vendor should submit the CNC programs, setting schemes, process sheets, tooling layouts, time studies etc. in advance for the prove out components. Vendor shall be fully responsible for drilling of proveout components as per drawing and other requirements specified by BHEL to the full satisfaction of BHEL.	Drg. No. 01600070031 enclosed.  Vendor to submit with offer.			
<b>12</b>	<b>MACHINE ACCEPTANCE: (Tests/Activities should be Performed by Vendor)</b>				
<b>12.1</b>	<b>Tests/Activities should be carried out at supplier's works on the machine before dispatch : (Pre-dispatch Inspection)</b>				
12.1.1	Geometrical accuracies as per test chart.	Vendor to confirm			
12.1.2	Positioning accuracies as per VDI-DGQ/3441	Vendor to confirm			
12.1.3	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 confirm			
12.1.4	Demonstration of all features of the machine, control system & accessories	Vendor to confirm			
12.1.5	To check out the max. drilling capacity, finish, performance & other cutting parameter etc. Machine shall be tested out by using max size of the drill 38.5 mm	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
12.2	Tests/Activities should be carried out at BHEL works while commissioning the machine :				
12.2.1	Geometrical accuracies as per test chart.	Vendor to confirm			
12.2.2	Positioning accuracies as per VDI-DGQ/3441	Vendor to confirm			
12.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to confirm			
12.2.4	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor to confirm			
12.2.5	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine	Vendor to confirm			
12.2.6	Drilling of test piece: - Vendor to arrange Test pieces and tooling for it's drilling	Vendor to confirm			
12.2.7	Proveout drilling of BHEL component as per <b>SI. No.-11.1</b>	Vendor to confirm			
12.2.8	Three weeks supervision of independent operation of machine by BHEL after job proveout	Vendor to confirm			
12.2.9	Training of BHEL machine operators in operation of complete machine & accessories etc by the supplier's experts / engineers during their stay at BHEL works	Vendor to confirm			
12.2.10	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to confirm			
13.0	<b>PRE-DESPATCH INSPECTION:</b>				
13.1	Pre-despatch inspection at vendor's works by BHEL personnel	Vendor to confirm			
13.2	Pre-despatch inspection will be carried out as mentioned at clause 12.1.	Vendor to confirm			
14.0	<b>AFTER SALES SERVICE:</b>				
14.1	Vendor should provide prompt after sales service to ensure smooth trouble free working of the machine and spares availability during and after guarantee period.	Vendor to confirm			
15.0	<b>PACKING:</b>				
15.1	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			
16.0	<b>GUARANTEE :</b>				
16.1	The machine should be guaranteed <b>for two years</b> smooth operation after commissioning and job proving.	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
17.0	<b>GENERAL :</b>				
17.1	Machine Model	Vendor to confirm			
17.2	Total connected load (KVA):	Vendor to confirm			
17.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to confirm			
17.4	Painting of Machine / Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to confirm			
17.5	Total weight of the machine	Vendor to confirm			
17.6	Weight of heaviest part of machine for handling during erection.	Vendor to confirm			
17.7	Weight of the heaviest assembly / sub-assembly of the Machine for handling during Erection.	Vendor to confirm			
17.8	Dimensions of largest part/ sub-assembly/ assembly of the machine	Vendor to confirm			
17.9	Vendor to submit, along with offer, reference list of customers where similar machines have been supplied mentioning broad specifications of the supplied machine i.e. model, spindle power, load capacity, max.job envelope, CNC system etc	Vendor to confirm			
17.10	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Vendor to confirm			
17.11	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 confirm			
18	<b>QUALIFYING CONDITIONS :</b>				
18.1	Only those vendors, who have commissioned at least one 6-spindle (or more Spindles) CNC Drilling Machine for similar applications in the past 10 years with X=10000mm Y=5500mm Z=750mm or Higher sizes and such machine is presently working satisfactorily for more than one year in India/ Abroad after commissioning should quote. Detailed list of experience & reference list shall be furnished along with offer.	Vendor to confirm			
18.2	Name, designation, Phone No., Fax No. and E-mail address of the contact person/issuer of the Performance Certificate of the customer is to be informed.	Vendor to confirm			
18.3	Complete postal address of the customer.	Vendor to confirm			

SL.NO.	DESCRIPTION FOR BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATIONS	REMARKS
18.4	Year of commissioning.	Vendor to confirm			
18.5	Application for which the machine is supplied	Vendor to confirm			
18.6	Performance certificate mentioning model, year of commissioning, broad specifications and application, from the customers regarding satisfactory performance of machine supplied to them & issued within one year of tender opening.	Vendor to confirm			
18.7	BHEL reserves the right to physically see and verify performance of referred machine for size and performance vis a vis its application and job accuracies.	Vendor to confirm			
18.8	Technical evaluation of only those offers will be made who qualify as per the above qualifying conditions. Other offers shall not be considered.	Vendor to confirm			
<b>19</b>	<b>OTHER FEATURES:</b>				
<b>19.1</b>	<b>NETWORKING:</b>				
19.1.1	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			
19.1.2	a) The machine shall appear as a node in the Entire Network. (Network Neighborhood)	Vendor to confirm			
19.1.3	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			
19.1.4	c) The program transfer between CNC system and network should also be possible in CNC Mode.	Vendor to confirm			
<b>20.0</b>	<b>MACHINE MONITORING SYSTEM (MMS) SIGNALS</b>				
20.1	Following MMS signals would be made available on a specifically earmarked terminal strip.	Vendor to confirm			
20.2	a) Control ON	Vendor to confirm			
20.3	b) Cycle ON	Vendor to confirm			
20.4	c) Spindle Running	Vendor to confirm			
20.5	d) Feed Active (Any of the axes moving)	Vendor to confirm			
20.6	e) M30 (Program Stop)	Vendor to confirm			
20.7	f) Alarm Active	Vendor to confirm			