

	BHARAT HEAVY ELECTRICAL LIMITED		Enquiry No. :		
	UNIT'S ADDRESS:		Due Date :		
	UNIT'S PHONE NOS.		Supplier Qtn. No.:		
	CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM		Date :		
SPECIFICATION CUM COMPLIANCE CERTIFICATE FOR <u>VERTICAL BORER (Conventional), TABLE DIA=4500 MM</u>					
Note :-					
1. Vendor must submit complete information against clause no. 14.0 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.					
ADDRESS OF THE SUPPLIER :			ADDRESS OF THE INDIAN AGENTS :		
TELEPHONE NOS.:			TELEPHONE NOS.:		
FAX NOS.:			FAX NOS.:		
E-MAIL ADDRESS :			E-MAIL ADDRESS :		
SCOPE: SUPPLY, ERECTION & COMMISSIONING OF VERTICAL BORERS COMPLYING WITH SPECIFICATIONS AS BELOW :					
SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
1.0	PURPOSE & WORKPIECE MATERIAL				
1.1	Purpose: This machine is required to rough & finish machine components of Steam Turbines like Valve cones, Servomotor casings, Yokes, Bearings, Sealing rings and other fabricated structures demanding high accuracies & surface finish.	Vendor to note & accept			

1.2	Work Piece Material: Carbon Steel, Nimonic Steel, Alloy Steel, Stainless Steel, Inconel, Cast Iron, Stellite and Non-Ferrous materials like Aluminium Alloys, Bronze, Copper, Babbit material etc.	Vendor to note & accept			
1.3	Application : Machine should be able to work continuously in 3 shifts	Vendor to note & accept			
2.0	SPECIFICATION:				
2.1	MACHINE CONFIGURATION				
2.1.1	Vertical Borer with Single Ram	Vendor to note			
2.2	CAPACITY & SIZE				
2.2.1	Maximum Height for Turning & Facing	4000 mm or more			
2.2.2	Maximum Turning Diameter	4500mm or more			
2.2.3	Maximum Workpiece Weight	45000Kg or more			
2.2.4	Maximum Swing Diameter	Vendor to inform			
2.2.5	Minimum Boring Diameter (using standard turning tool holder & tool clamped on the ram)	400mm or less			
2.2.6	Machine Power	60 KW or more			
2.3	TABLE				
2.3.1	Table Diameter	Minimum 4500mm			
2.3.2	Load Capacity	45000Kg or more			
2.3.3	Table Speed (Infinitely Variable)	1-30 rpm (approx)			
2.3.3.1	No. of Speed Ranges from Gear Box	2 or 3 (max)			
2.3.4	Power of Main Drive (S1 - Continuous Rating) AC	Vendor to inform			
2.3.5	Details of Main Drive viz.Type, Make, Model etc.	Vendor to inform			
2.3.6	No. of Jaws/Vices	4			
2.3.7	Table Torque - Speed diagram should be submitted.	Vendor to submit			
2.3.8	Type of Bearing for the Table (Details to be submitted)	Vendor to inform			
2.3.9	Size of T - slots, their position and accuracy. Drawing of Table showing details of the T - slots etc. should be submitted.	Vendor to submit			
2.3.10	Two perpendicular accurate Slots should be provided at the Center of the table to use for alignment purposes. Sizes (Width & Depth), accuracy etc. of these slots should be furnished along with a Drawing.	Vendor to inform & submit			
2.3.11	Single piece construction of machine table	Vendor to confirm			
2.3.12	Position of machine table - with ref. to machine bed plate in vertical direction	Vendor to inform			
2.4	CROSS RAIL				
2.4.1	Vertical Travel.	Vendor to inform			
2.4.2	Vertical Traverse Rate.	Vendor to inform			
2.4.3	Maximum Height of Cross Rail bottom from Table Top	Vendor to inform			
2.4.4	Horizontal traverse of saddle (X-axis) from one end to other of cross-rail across the table	Vendor to offer			
2.4.5	Details of crossrail movement through lead screw	Vendor to submit			
2.4.6	Clamping of cross-rail	Vendor to inform			

2.5	TOOL HEAD and RAM				
2.5.1	Cross - Section of Ram	Vendor to inform			
2.5.2	Cross section of ram should be rigid enough for troublefree machining with maximum projection of ram and also suitable for specified minimum bore dia	Vendor to confirm			
2.5.3	Maximum angle of ram swivel (manual positioning)	+/- 45 degree or more			
2.5.4	Detail mechanism of clamping of all above	Vendor to submit			
2.5.5	Tool shank	40mm x 40 mm (min.)			
2.5.6	Force Deflection Diagram with details	Vendor to submit			
2.6	MAIN TRAVERSES				
2.6.1	Vertical Travel of Ram (Z-Axis) For maximum turning/facing height of 4000mm. (If offered Turning Height, Sl.No.. 2.2.1, is more than 4000mm, Ram travel should also be increased by half value of increase in Turning Height above 4000mm)	2200 mm (min.)			
2.6.2	Maximum Distance between Table Top and Standard Turning Tool Holder with Tool.	Vendor to inform			
2.6.3	Minimum Distance between Table Top and Standard Turning Tool Holder with Tool should be zero.	Vendor to confirm			
2.7	MACHINE GUIDEWAYS				
2.7.1	Cross-rail guideway should have harden steel strip & matching part should have turcite sheet	Vendor to offer			
2.7.2	Ram guigeways should be made of forged/ hardened steel and it's matching part should have turcite sheet	Vendor to offer			
2.7.3	Matching part of column guideways (for cross rail movement) should have turcite sheet with boundary line lubrication				
2.7.4	Bearings for table rotation (Details should be submitted)	Vendor to inform			
2.7.5	Metallic Telescopic Covers: Waterproof Telescopic Covers of rust resistant steel should be provided with pads/wipers on both left and right sides of tool head on the crossrail and also above & below the crossrail on both columns covering the guide ways. Joints of telescopic covers should be sealed to avoid mixing of coolant & hydrostatic oil . The movement of telescopic covers should be troublefree and requiring minimum maintenance.	Vendor to offer			
2.8	FEEDS AND DRIVE SYSTEM				
2.8.1	Cutting feed in X & Z Axes	Party to quote			
2.8.2	Rapid feed in X & Z Axes	Party to quote			
2.8.3	Feed drives/motors X & Z axes (detail of model, make, type, rating etc. should be submitted)	Vendor to offer			
2.8.4	Mechanism for locking X & Z axis	Vendor to offer			
2.8.5	PLC should be of Siemens/ Sneider / ABB / Allen Bradley make	Vendor to inform			

2.8.6	Drive controller of axis drives should be of Siemens/ Fanuc/ ABB make	Vendor to inform			
2.8.7	The machine should be equipped with Digital Read out system of axis resolution 0.005 mm for X & Z traverses make Heidenhein only	Vendor to offer			
2.8.8	Control system Conventional (based on PLC)	Vendor to offer			
2.9	OPERATOR'S PANEL				
2.9.1	Operator's panel having complete machine control system shall be provided. All switches with suitable interlocks with table rotation should be within reach of operator of average height (5' 5") for easy & safe operation.	Vendor to offer			
2.10	MACHINE LIGHTS				
2.10.1	Machine Lights for sufficient illumination of complete working area on the table, on the ram to view tool inside long casing type jobs and operator's panel also, should be provided for clear visibility.	Vendor to offer			
2.11	HYDRAULIC SYSTEM (Details should be Submitted by the Vendor)				
2.11.1	The System should be centralised & re-circulating type. Hydraulic tank should be placed preferably at shop floor.	Vendor to offer			
2.11.2	System's make Rexroth / Vickers Sperry manufacturer (Details to be submitted)	Vendor to inform			
2.11.3	Filtration System, Details should be submitted. (EPE / HYDAC make)	Vendor to offer			
2.11.4	Failure indication	Vendor to offer			
2.11.5	Automatic shut off provision, Details should be submitted.	Vendor to offer			
2.11.6	Each pump should have an independent motor. Tandem pumps should not be used. Maximum desired permissible pressure is 100 bar. If anywhere, pressure is more than 100 bar then one set of such pipeline should be offered in spare in addition to other spares.	Vendor to offer			
2.11.7	Complete hydraulic system should be designed to avoid any leakage or spillage.	Vendor to confirm			
2.12	FIRST FILLING OF OILS				
2.12.1	First filling of all required Oils & Grease etc. for the machine, etc. to be supplied by vendor. Indigenous (Indian) source or Indian equivalent and specifications of oils/ greases are also to be provided by the vendor.	Vendor to offer			
2.13	COOLANT SYSTEM				
2.13.1	Machine should have Recirculating Type Flood Coolant System. Coolant collection should be leak proof to avoid mixing of coolant in table hydrostatic oil	Vendor to offer			
2.14	REQUIREMENT FOR ELECTRICAL EQUIPMENT				

2.14.1	Voltage = 415V +10% / -10% , Frequency= 50Hz +3 / -3 , No. of phases = 3 phase with neutral. Power Supply source, as above, 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 including Transformer etc. 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 accept & offer			
2.14.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized.	Vendor to offer			
2.14.3	All motors shall conform to IEC or Indian Standards	Vendor to offer			
2.14.4	Vendor should ensure the proper earthing for the machine and its peripherals/accessories. Any material requirement for the same should be informed with foundation design/drawings. The vendor can take earthing connection from the nearest column of the production shop.	Vendor to offer			
2.15	SAFETY ARRANGEMENTS Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to offer			
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.	Vendor to offer			
2.15.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to offer			
2.15.3	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 offer			
2.16	ENVIRONMENTAL PERFORMANCE OF THE MACHINE : The Machine should conform to following factors related to environment :	Vendor to offer			
2.16.1	Maximum noise level shall be 85 dB(A) at normal load condition, 1 meter away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635-16, if required. Supplier to demonstrate compliance to noise level, if so required.	Vendor to confirm			
2.16.2	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to confirm			

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 confirm			
2.16.4	No hazardous chemicals shall be required to be used in the machine.	Vendor to confirm			
2.16.5	Paint of the machine should be oil / coolant resistant and should not get peeled off and mixed up with coolant.	Vendor to confirm			
3.0	LEVELING & ANCHORING SYSTEM				
3.1	Complete set of anchoring material. Details to be submitted	Vendor to offer			
4.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE				
4.1	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 by the vendor. List of such tools should be submitted with offer.	Vendor to offer			
5.0	SPARES :				
5.1	Itemised breakup of mechanical, hydraulic, electrical and electronic spares	Vendor to offer			
5.1.1	Mechanical & Hydraulic Spares : Following Spares are to be offered.	Vendor to offer			
5.1.1.1	Pumps used on machines i.e. Hydraulic, lubrication, coolant and oil cooling	Vendor to offer			
5.1.1.2	Control Valves (1 no. each type)	Vendor to offer			
5.1.1.3	All types of flow control, pressure regulators, pressure reducer valves (1	Vendor to offer			
5.1.1.4	All types of pressure switches, flow switches and float switches (1 no. each	Vendor to offer			
5.1.1.5	All types of filter inserts of regenerative type (10 nos. of each type)	Vendor to offer			
5.1.1.6	All types of filter inserts of disposal type (30 nos. each type)	Vendor to offer			
5.1.1.7	Accumulators with charging kits (1 no each type)	Vendor to offer			
5.1.1.8	All types of O-rings & Hydraulic Hoses (1 set of each type)	Vendor to offer			
5.1.1.9	One set of each type Belts and chain Sprockets used in the machine	Vendor to offer			
5.1.1.10	One set of each type Lead screw with nut used in the machine	Vendor to offer			
5.1.1.11	All types of wipers/ bellow covers used in the machine	Vendor to offer			
5.1.1.12	Party must provide one set of bearing used in table rotation	Vendor to offer			
5.1.1.13	Each type of ball screws used in machine	Vendor to offer			
5.1.1.14	Seal-kit sets used in different hydraulic cylinders in machine	Vendor to offer			
5.1.2	Electrical /Electronic Spares : Following Spares are to be offered.	Vendor to offer			
5.1.2.1	Contactors (2 Nos each type)	Vendor to offer			
5.1.2.2	Limit switches (2 No each type)	Vendor to offer			
5.1.2.3	Module case circuit breaker (2 Nos each type)	Vendor to offer			
5.1.2.4	Pressure Switches (2 Nos each type)	Vendor to offer			

5.1.2.5	Flow Switches (2 Nos each type)	Vendor to offer			
5.1.2.6	Float Switches (2 Nos each type)	Vendor to offer			
5.1.2.7	Signal Lamps (50 Nos)	Vendor to offer			
5.1.2.8	Push Buttons (10 Nos)	Vendor to offer			
5.1.2.9	Selecter Switches (1 No each type)	Vendor to offer			
5.1.2.10	Spare for drive controller	Vendor to offer			
5.1.2.11	I/R unit (1 No)	Vendor to offer			
5.1.2.12	Complete DRO unit (1 No.)	Vendor to offer			
5.1.2.13	Heidenhein scanning head (1 No. each type along with scale)	Vendor to offer			
5.1.2.14	Table encoder (1 No)	Vendor to offer			
5.1.2.15	Main switch (1 No.)	Vendor to offer			
5.1.2.16	Lubrication unit (1 No)	Vendor to offer			
5.1.2.17	Telescopic brush used on the machine ----- 10 piece	Vendor to offer			
5.1.2.18	Telescopic brush inserts used on the machine ----- 50 piece	Vendor to offer			
5.1.2.19	Microswitch used in the machine ----- 25 numbers each type	Vendor to offer			
5.1.2.20	10K, 10Turn Potentiometer ----- 20 piece	Vendor to offer			
5.1.2.21	10K, 10Turn dial knob ----- 20 piece	Vendor to offer			
5.1.2.22	The MCBDB having 3 phase, 20 amp socket & plug	Vendor to offer			
5.1.2.23	The MCBDB having 2 phase, 10 amp socket & plug	Vendor to offer			
6.0	DOCUMENTATION : Three sets of following documents (Hard copies) in English language should be supplied along with the machine. And one soft copy on CD	Vendor to offer			
6.1	Operating manuals of Machine	Vendor to offer			
6.2	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Coolant / Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list and vendor's part nos.	Vendor to offer			
6.3	Catalogues, Operation & Maintenance Manuals of all bought out items including drawings, wherever applicable.	Vendor to offer			
6.4	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to offer			
6.5	Operating Manuals, Maintenance Manuals & Catalogues for supplied accessories.	Vendor to offer			
6.6	Complete list of parts/items(Bill of materials) used in the machine in English language.	Vendor to offer			
6.7	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to offer			
6.8	Manufacturing drawing of lead screw and nut used in Vertical, cross & ram slide in the machine	Vendor to offer			
6.9	Details of critical Bearing & clutches used in the machine	Vendor to submit			

6.10	Diagram showing the locations of Electrical components and mechanical sub-assemblies used in the machine	Vendor to submit			
6.11	Manufacturing drawings of Pulleys and soft material parts (e.g. Bushes, wedges etc) used in the machine	Vendor to submit			
6.12	Detail of different setting require in the machine	Vendor to submit			
6.13	Specifications / grade of oils and greases used / required in the machine	Vendor to submit			
7.0	TRAINING				
7.1	a) Training of machine operation, mechanical & electrical & electronic maintenance should be provided free of cost at supplier works for one week. b) Pre-dispatch inspection may be carried out by BHEL representative at Party's works. However it is at the discretion of BHEL and final acceptance will be done at BHEL, Jagdishpur after carrying out all the required accuracy tests etc.	Vendor to offer			
8.0	FOUNDATION				
8.1	Foundation drawing is to be submitted by supplier within 2 months weeks of placement of LOI. 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 foundation bolts of the machine.	Vendor to accept & offer			
9.0	ERECTION & COMMISSIONING				
9.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control & all types of other supplied equipment/accessories, 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 few helping personnel shall also be provided by BHEL. Details of these requirements should be informed/discussed by vendor and agreed with BHEL in advance.	Vendor to offer			
10.0	ACCURACIES				
10.1	Geometrical Accuracy, Positional Accuracy Tests shall be in accordance with relevant ISO (Latest Revision) or equivalent applicable Standard/Suppliers Test chart whichever is finer. 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			
11.0	Packing				

11.1	Sea worthy & rigid packing for all items of complete machine, 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			
12.0	GUARANTEE				
12.1	Guarantee for complete machine and all supplied accessories/attachments/equipments/items for 18 months from the date of acceptance of the machine at BHEL Jagdishpur or 24 months from the shipment, whichever is earlier.	Vendor to offer			
13.0	GENERAL				
13.1	Machine Model	Vendor to inform			
13.2	Total connected load (KVA):	Vendor to inform			
13.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to inform			
13.4	Painting of Machine / Electrical Panels : RAL 6011 Apple Green (Polyurethane Paint)	Vendor to offer			
13.5	Total weight of the machine	Vendor to inform			
13.6	The supplier is to submit a clause wise deviation statement against each clause of this technical specification along with the offer.	Vendor to submit			
14.0	QUALIFYING CONDITIONS				
14.1	Party has to furnish list of the customers (with complete address, name of the contact person and telephone number) to whom he had supplied Vertical Borer of same size or bigger size with features as per SI No. 2. This should be proven machine with these features.	Vendor to confirm			
14.1.1	Name of the customer / company where similar machine is installed.	Vendor to Specify			
14.1.2	Complete postal address of the customer.	Vendor to Specify			
14.1.3	Month & Year of commissioning.	Vendor to Specify			
14.1.4	Application for which the machine is supplied .	Vendor to Specify			
14.1.5	Name and designation of the contact person of the customer.	Vendor to Specify			
14.1.6	Phone, FAX no. and email address of the contact person of the customer.	Vendor to Specify			
14.1.7	Performance certificate from the customers regarding satisfactory performance of machine supplied to them in original.	Vendor to Specify			
14.1.8	BHEL reserves the right to verify information provided by vendor. In case the information provided by vendor is found to be false/incorrect, the offer shall be rejected.	Vendor to Specify			