



Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

An ISO 9001
Company

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY	Phone: +91 431 257 70 49 Fax : +91 431 252 07 19 Email : csguna@bheltry.co.in Web : www.bhel.com
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	Enquiry Number:	Enquiry Date:	Due date for submission of quotation:
	2620800058	11.07.2008	13.08.2008

You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order

Item	Description	Quantity	Delivery (Item required at BHEL on)
10	CNC Horizontal Boring Machine – Spindle Dia 110 mm as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in) Note: Offer should be CFR - Chennai Seaport basis.	1 No.	30.06.2009
20	CNC Horizontal Boring Machine – Spindle Dia 110 mm as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in) Note: Offer should be CFR - Mumbai Seaport basis.	1 No.	30.06.2009

Note:

Item should be evaluated separately. Item wise CFR price should be quoted.

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats along with technical specifications can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference “2620800058”.

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED Sr. Manager / Capital Equipment / MM
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PART A

CNC HORIZONTAL BORING MACHINE – SPINDLE Ø 110

SECTION – I : QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer for the CNC HORIZONTAL BORING MACHINE – SPINDLE Ø 110

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	<p>Only those vendors (OEMs), who have supplied and commissioned at least ONE CNC HORIZONTAL BORING MACHINE (Spindle size 110 mm or higher with Spindle travel 500 mm or higher) in the past ten years (from the date of opening of Tender) and such machine is presently working satisfactorily for more than one year after commissioning (from the date of opening of Tender) should quote.</p> <p>However, if such machine had already been supplied to BHEL, then that machine should be presently working satisfactorily for more than six months after its commissioning and acceptance (from the date of opening of Tender).</p>	
The vendor should submit following information where similar machine has been supplied for qualification of their offer.		
1.1	Name and postal address of the customer or company where similar machine is installed.	
1.2	Name and designation of the contact person of the customer.	
1.3	Phone, FAX no and email address of the contact person of the customer.	
1.4	Month and Year of commissioning of the machine.	
1.5	Application for which the machine is supplied	
1.6	Performance certificate from the customer regarding satisfactory performance of machine supplied to them. A suggested format for performance certificate is enclosed in SECTION - IV	
2.0	BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.	

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SECTION – II

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

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

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SECTION – III

The BIDDER to note:

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

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SECTION – IV

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

PERFORMANCE CERTIFICATE

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

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Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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PART- B

TECHNICAL SPECIFICATION FOR CNC HORIZONTAL BORING MACHINE- Dia 110 mm

Quantity – 2 Nos. – 1 No. for Tiruchy & 1 No. for IVP Goindwal

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER’S OFFER With Technical Details																									
1.0	<p>PURPOSE: This machine is intended for machining of castings and forgings meant for manufacturing valves.</p> <p>The various operations to be carried out are: Facing, OD Turning, Boring, Grooving, Milling, Drilling & Tapping, and Thread cutting (Internal and External)</p> <p>NOTE: During operations of Facing, OD Turning& Boring, the machine will be subjected to intermittent load as machining will be carried out on stellite / ss hard-faced surfaces. These hard-faced surfaces will have hardness in the range of 425 BHN.</p>																										
1.1	<p>WORKPIECE MATERIAL SPECIFICATION: The work piece material is either Steel Casting or Steel Forging.</p> <table><tr><th>Material</th><th>Description</th><th>ASTM Specification</th><th>Hardness</th></tr><tr><td rowspan="4">Steel Casting</td><td rowspan="2">Carbon Steel</td><td>A216 WCB, WCC</td><td>185 BHN</td></tr><tr><td>A352 LCB, LCC</td><td>225 BHN</td></tr><tr><td>Alloy Steel</td><td>A 217 WC5, WC6, WC9, C12A</td><td>210 BHN</td></tr><tr><td>Stainless Steel</td><td>A351 CF3M, CF8, CF8C and CF8M</td><td>230 BHN</td></tr><tr><td rowspan="3">Steel Forging</td><td>Carbon Steel</td><td>SA 105</td><td>185 BHN</td></tr><tr><td rowspan="2">Alloy Steel</td><td>SA 182 F22 Class 3</td><td>210 BHN</td></tr><tr><td>SA 182 F91</td><td>225 BHN</td></tr></table> <p>NOTE: Certain stellite / ss hard faced surfaces of the work pieces having hardness of 425 BHN will have to be machined.</p>	Material	Description	ASTM Specification	Hardness	Steel Casting	Carbon Steel	A216 WCB, WCC	185 BHN	A352 LCB, LCC	225 BHN	Alloy Steel	A 217 WC5, WC6, WC9, C12A	210 BHN	Stainless Steel	A351 CF3M, CF8, CF8C and CF8M	230 BHN	Steel Forging	Carbon Steel	SA 105	185 BHN	Alloy Steel	SA 182 F22 Class 3	210 BHN	SA 182 F91	225 BHN	
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Steel Casting	Carbon Steel	A216 WCB, WCC	185 BHN																								
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Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.0	MACHINE DETAILS:		
2.1	CONFIGURATION & CONSTRUCTION: A representative configuration is shown in Annexures 1 & 2		
2.1.1	Vendor to furnish constructional details of the machine including explanatory drawings of various components/ assemblies like Headstock, Facing Unit, Tool Holder Slide, Machine Bed, Feed Transmission System, Feed back System etc. of the machine with details of material & their hardness.	Vendor to Furnish	
2.1.2	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features should be enclosed with the offer	Vendor to Submit	
2.1.3	Machine should be Metric execution. (construction wise)	Vendor to Confirm	
2.1.4	Head Stock Counter balancing System. (Details of the offered system to be submitted)	Vendor to Submit	
2.2	HEADSTOCK:		
2.2.1	Geared Head stock unit shall be of enclosed box type construction. The machine shall have a facing head also. Selection of spindle mode or facing head mode shall be through CNC system. It should be possible to use spindle without dismantling or removing the facing head.	Vendor to specify the arrangement of head- stock briefly.	
2.2.2	Spindle Diameter	Around 110 mm Vendor to specify	
2.2.3	Spindle taper – ISO 50	Vendor to confirm	
2.2.4.	Headstock Vertical travel on Y axis (above table surface)	1000 mm	
2.2.5	Min distance spindle axis to table surface	100 mm	
2.2.6	Spindle travel (Z axis)	500 mm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.2.7	Feed rate for Y&Z axes (Infinitely variable)	Vendor to specify	
2.2.8	Y axis rapid feed rate	Vendor to specify	
2.2.9	Z axis rapid feed rate	Vendor to specify	
2.2.10	No. of speed ranges (spindle)	Vendor to Specify	
2.2.11	Spindle speed range selection: Electro Hydraulic system through CNC.	Vendor to confirm	
	Spindle speed (infinitely variable) : approx. 5 – 2000 RPM	Vendor to specify	
2.2.12	Spindle drive power (AC Continuous Rating - S1):The spindle drive and motor shall be Fanuc / Siemens. (Details of make, model, type etc. to be furnished in the offer)	Around 25 KW	
2.2.13	Torque-Power-Speed characteristics of the spindle system to be submitted by the vendor along with offer	Vendor to submit	
2.2.14	Forward and reverse rotation of spindle motor with suitable braking mechanism.	Vendor to confirm	
2.3	FACING UNIT:		
2.3.1	Facing Head Diameter	Vendor to specify	
2.3.2	Maximum Turning diameter OD : 800 mm	Vendor to specify	
2.3.3	Speed of Rotation	Vendor to specify	
2.3.4	Facing head Slide Traverse (U axis) – Min. 150 mm	Vendor to specify	
2.3.5	Feed rate of U axis (Infinitely variable)	Vendor to Specify	
2.4	ROTARY TABLE:		
2.4.1	Table size L x W : Min. 1200 mm X 1200 mm	Vendor to Specify	
2.4.2	Maximum weight of the job (on table)	5000 kgs.	
2.4.3	Min distance from facing head to edge of table	Vendor to specify	
2.4.4	Table or column Longitudinal travel (W axis)	1400 mm	
2.4.5	Table or column Cross travel (X axis)	1600 mm	
2.4.6	Feed rate for W & X axes	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.4.7	Rapid Feed rate for W & X axes	Vendor to specify	
2.4.8	Table rotation : B axis	360°	
2.4.9	Table Indexing positions	3,60,000 positions	
2.4.10	4x90° precision indexing with locking arrangement.	Vendor to confirm	
2.4.11	Table rotary movement speed	0.1 to 1 rpm	
2.4.12	T slot size	Vendor to specify	
2.4.13	T slot pitch	Vendor to specify	
2.5	<u>Metallic Telescopic Covers</u> Metallic Telescopic Covers of rust resistant material to be provided with wipers for the traversing axes. Telescopic covers should be sealed to avoid mixing of coolant & hydrostatic oil. Column guide ways are to be completely covered.	Vendor to Confirm	
2.6	FEED DRIVE SYSTEM:		
2.6.1	Feed drive motors [AC servo motors] shall be digital type of Fanuc / Siemens (Details of model, make, type etc. to be furnished in the offer)	Vendor to specify	
2.6.2	Vendor to specify feed force for all axes	Vendor to specify	
2.6.3	Feed back system: Fanuc/ Siemens / Heidenhein encoders. (Details to be furnished in the offer)	Vendor to specify	
2.6.4	Type of power transmission: Pre-loaded backlash-free re-circulating ball screw drive for feed drive axes. Detailed Specification for all ball screws used in the machine shall be submitted. The specification shall address the following points: (a) Diameter, (b) Pitch (c) Length (d) Make (e) Model	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.7	OPERATION AND CONTROL SYSTEM:		
2.7.1	OPERATOR'S PANEL: Operator's panel having complete CNC and machine control system with monitor of required configuration shall be provided for convenient and efficient operation. All switches should be within reach of operator. All displays/indications should be conveniently placed. (Layout showing complete details should be submitted with the offer)	Vendor to Submit	
2.7.2	CNC SYSTEM & FEATURES:		
2.7.2.1	Make: Fanuc / Siemens	Vendor to specify	
2.7.2.2	Type: PC based latest version (Simultaneous interpolation of three axes)	Vendor to confirm	
2.7.2.3	Model: Suitable and Latest version, as available at the time of ordering, should be supplied.	Vendor to confirm	
2.7.2.4	Details of Standard features. List to be submitted by vendor.	Vendor to Submit	
2.7.2.5	Details of optional features: Optional features recommended by vendor to be submitted.	Vendor to Submit	
2.7.2.6	Details of other optional features:	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.7.2.7	The system should have full alphanumeric keyboard, TFT colour display (preferably 17"), additional draw-out type QWERTY Key Board and mouse in suitable enclosure, RS232C serial interfaces, parallel interface for printer, COM port for telediagnosics, network ready with LAN, electronic hand wheels for all axes, CD drive unit with CD writer for data input/output, hard disk of sufficient capacity (not less than 80 GB), graphic simulation and preinstalled system software & other required software etc. (Details should be submitted by Vendor).	Vendor to Confirm & Vendor to Submit	
2.7.2.8	The system should have a meter for showing the spindle power	Vendor to Confirm	
2.7.2.9	The CNC system should have a feature for locking X , Y, Z axes through M codes.		
2.7.3	MANUAL CONTROL: Complete manual control of machine with required switches / keys should be provided on operator's panel for selection of required axis, axis direction, cutting feed, spindle rpm, Direction of Spindle Rotation (with inching) i.e. CW/ CCW, cutting feed and spindle rpm on/off, display of axis position values etc, for manual operation without using CNC program or MDI mode. (Diagram/ Sketches for switches/ keys provided on operator's pendant to be submitted).	Vendor to Confirm & Vendor to Submit	
2.7.4	HAND HELD UNIT / HAND WHEEL:		
2.7.4.1	Hand Held unit with sufficient length of interfacing cable or Hand wheel for axis selection, axis movement with pulse generator and axis position display and emergency stop is to be offered with complete details. This is required for job setting.	Vendor to Confirm & Vendor to Submit	
2.7.5	UPS FOR CNC SYSTEM:		

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.7.5.1	UPS of 30 minutes for CNC system with inbuilt cooling and charge status display.	Vendor to specify	
2.8	MACHINE LIGHTS:		
2.8.1	Machine Lights for sufficient illumination of complete working area on all sides of operator's location should be provided.	Vendor to Confirm	
2.8.2	A magnetic base portable spotlight with sufficiently long cable should also be provided.	Vendor to Confirm	
2.8.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents.	Vendor to Confirm	
2.8.4	Voltage shall be 24 V for the hand lamp.	Vendor to Confirm	
2.9	AIR CONDITIONERS:		
2.9.1	Air Conditioners with Dehumidifiers of suitable capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Make: Rittal / Warner & Finley or any other reputed make acceptable to BHEL. Detailed specifications to be submitted.	Vendor to Submit	
2.10	HYDRAULIC SYSTEM:		
2.10.1	Make: Rexroth / Vickers Sperry or any other reputed make acceptable to BHEL	Vendor to specify	
2.10.2	Hydraulic system should be centralized. Hydraulic Tank shall preferably be located at floor level All hydraulic pipelines to be neatly laid out. (Details should be furnished at contract stage)	Vendor to Confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.10.3	Hydraulic circuits shall be designed with minimum number of control valves and to suit oil of ISO VG 46 or 68 only. Also minimum number of check-points to be provided wherever pressure is required to be read for setting and trouble shooting. MINIMESS Pressure Gauge - 1 No with Connecting Hose to be provided.	Vendor to Confirm	
2.10.4	The control voltage for all solenoid operated valves	24 V DC	
2.10.5	Filtration System, Details to be submitted.	Vendor to specify	
2.10.6	Failure indication:	Vendor to specify	
2.10.7	Automatic shut off provision.	Vendor to specify	
2.10.8	Refrigerated type cooling system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, hydrostatic oil and gearbox oil, etc. at a temperature not exceeding 50 °C irrespective of the ambient conditions. Vendor should submit complete details.	Vendor to specify	
2.10.9	Hydraulic pump capacity (flow / pressure)	Vendor to specify	
2.10.10	Each pump should have an independent motor.	Vendor to Confirm	
2.11	First filling of all required Oils & Grease etc. Should be supplied by vendor. Oil grade: ISO VG46 or 68 Grease: Servo gem grade 2 (preferred) Indigenous (Indian) source or Indian equivalent and specifications of oils/ greases are also to be provided by the vendor.	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.12	COOLANT SYSTEM:		
2.12.1	Re-circulating type Flood Coolant System, with all accessories shall be provided. It shall be possible to program the coolant on / off as also select coolant on/off manually from operator's panel. Coolant should be available at the tool cutting point for all conditions (turning, facing or deep boring) of machining, using spindle or using faceplate.	Vendor to Confirm	
2.12.2	Coolant Pressure & flow rate to be furnished.	Vendor to Furnish	
2.12.3	Coolant collection and re-circulation system shall be leak proof to avoid spillage on shop floor.	Vendor to Confirm	
2.12.4	Coolant Filtration System: Re-circulating type with suitable filtration unit. Vendor shall give details of offered filtration unit.	Vendor to specify	
2.12.5	Coolant Flow Diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.	Vendor to Submit	
2.12.6	Coolant pump & motor details for all types of coolant system are to be submitted with the offer.	Vendor to specify	
2.12.7	The coolant tank should be fitted with skimmer for regular cleaning of coolant from contamination with tramp oil.	Vendor to Confirm	
2.13	ELECTRICAL SYSTEM:		
2.13.1	415V $\pm 10\%$, 50HZ ± 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 it could be incorporated during construction of foundation.	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.13.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized	Vendor to Confirm	
2.13.3	All electrical & electronic control cabinets & panels should be dust and vermin proof and shall have IP 54 protection.	Vendor to Confirm	
2.13.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm	
2.13.5	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 Confirm	
2.13.6	Motors shall conform to IEC or Indian Standards	Vendor to Confirm	
2.13.7	All cables moving with traversing axes should be installed in Caterpillar/ Drag chain. Additionally, all the cable trays required for laying the cables shall be included in the offer.	Vendor to Confirm	
2.13.8	Vendor should ensure proper earthing for the machine and its peripherals.	Vendor to Confirm	
2.13.9	In-cycle hour counter with reset facility and digital energy meter is to be included in the offer.	Vendor to Confirm	
2.14.0	SAFETY ARRANGEMENTS:		
2.14.1	Following safety features in addition to other standard safety features should be provided in the machine:	Vendor to Confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

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

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
3.0	SERVO VOLATGE STABILIZER:		
3.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc with no undesirable Harmonics in the stabilizer output.	Vendor to specify	
3.2	Make. : NEEL / DELTA / AEI / POWER AID	Vendor to specify	
3.3	Model & Rating (Suitable for the machine load)	Vendor to specify	
3.4	Spares Package for the Voltage Stabilizer for 2 years working should also be offered.	Vendor to Confirm	
3.5	Catalogue of the Voltage Stabilizer shall be submitted with the offer.	Vendor to Submit	
4.0	ULTRA ISOLATION TRANSFORMER		
4.1	Ultra Isolation Transformer (Indian make) suitable for complete machine, its drives, controls & PLC etc. shall be supplied.	Vendor to Confirm	
4.2	Make: NEEL / DELTA / AEI / POWER AID	Vendor to specify	
4.3	Model and Rating: (Suitable for the machine load)	Vendor to specify	
4.4	Spares Package for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor to Confirm	
4.5	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Vendor to Submit	
5.0	Compressed air points:		
5.1	Compressed air at 60 to 70 psi will be made available at one point. The vendor shall indicate the inlet point for compressed air in the layout drawing of the machine.	Vendor to Confirm	
6.0	TOOLING:		
6.1	Complete Description of Tooling System	Vendor to specify	
6.2	List of tooling required:	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
6.2.1	<p>List of tooling required: Refer Annexure-3 & 4 for near about model of Tool holding arrangement for facing head operations. For Turning/Boring with Facing Head, the following tools shall be supplied:</p> <p>Base tool holder 250mm long to suit U-axis slide: 2 Nos.</p> <p>Extension Bars for turning/boring as given below:</p> <p>Extension Bars of length L (working Length) = 650mm, 500mm, 250 mm& 150 mm: Each.1 No. The cutting tool shank, mounted on these bars shall be preferably 32 X 32. These extension bars shall be used with the base tool holders specified above</p>	Vendor to Confirm	
6.2.2	<p>For Facing operation with Facing Head, the following tools shall be supplied:</p> <p>Extension Bars of length L (working Length) = 650mm, 500mm, 250 mm& 150 mm: Each.1 No. The cutting tool shank, mounted on these bars shall be preferably 32 X 32. These extension bars shall be used with the base tool holders specified above</p>	Vendor to Confirm	
6.2.3	<p>For milling: the following items shall be supplied: ISO 50 Adaptor for face mill cutter $\phi 250\text{mm}$= 1 No.</p> <p>ISO 50 collet type Adaptors of following sizes With collets 25mm, 32 mm, 36 mm, 40 mm & 50 mm= Each 1 No</p> <p>ISO 50 / MT Adaptors (for screwed end MT) for following: ISO 50 / MT2, ISO 50/ MT3, ISO 50 /MT4 and ISO 50 / MT5: Each 1 No.</p>	Vendor to Confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
6.2.4	For Drilling: the following items shall be supplied: ISO 50 Adaptors for following tang end Morse tapers. a) ISO 50 - MT2: 1 No b) ISO 50 - MT3: 1 No c) ISO 50 - MT4: 1 No d) ISO 50 – MT5: 1 No	Vendor to Confirm	
6.3	TAPPING ATTACHMENTS:		
6.3.1	For Thread Diameter Range: M16 to M42 & NPT ½ “ to 1¼”	Vendor to Confirm	
Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
6.4	For Job holding: The following fixtures shall be included a) Two Sets of V Blocks (in pairs) to accommodate job diameter range of 150mm to 800mm. b) Two pairs of Clamping chains with ratchet mechanism and Tenons to suit the table T-Slots.	Vendor to Confirm	
6.5	All cutting tools, tool holders, arbors, boring bars, clamping elements etc. shall be recommended for machining of prove out components. Itemized pricing of the cutting tools, tool holders, arbors, boring bars must be indicated separately in the price bid. The technical offer should contain the unpriced list.	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
7.0	MEASURING SYSTEM:		
7.1	Automatic job measuring system, comprising of Spindle Mounted Renishaw make Wireless system, with measuring cycles, calibration system and all types of probes/ stylii required for measuring all machined dimensions of the prove-out components. Vendor to furnish detailed description of the system along with offer.	Vendor to specify	
8.0	DIAGNOSTIC SYSTEM:		
8.1	TELE DIAGNOSTIC SYSTEM:		
	Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied CNC system for remote diagnosis and correction of the problems in both CNC System and PLC of the machine. This should be provided free of charge for the guarantee period. Vendor should inform terms and conditions for this service after guarantee period. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future	Vendor to confirm	
9.0	FAULT DIAGNOSTIC SYSTEM:		
9.1	Supplier's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include customized auto-diagnostic system with supporting hardware and software, which shows detailed cause, and remedy for the fault on the display with full video diagnostic help for faults related to mechanical and electrical maintenance.	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
-----------	-----------------------	------	---------------------------

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
9.2	Help guide should be provided to use both diagnostic systems	Vendor to Confirm	
10.0	PORTABLE DATA LOADING DEVICE: (optional) Portable Data loading device with sufficient length of interface cable, HDD of size not less than 40GB, CD Drive, TFT Display of size 14" and suitable preinstalled software for loading PLC program, RS 232 Port, Ethernet chord, USB port, Machine data and CNC part programs shall be supplied with the machine. Vendor should furnish details.	Vendor to specify	
11.0	LEVELING & ANCHORING SYSTEM		
11.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc shall be supplied for the Machine, Rotary Table, Floor Plates etc.	Vendor to Confirm	
12.	TOOLS FOR OPERATION & MAINTENANCE:		
12.1	The vendor shall supply special tools required for the operation and maintenance of the machine. The vendor shall also supply necessary standard tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine. List of all such Special and standard tools shall be submitted with offer	Vendor to Confirm Vendor to Submit	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details	
13	SPARES:		
13.1	<p>The Vendor shall recommend and submit list of spares required for the machine for two years of trouble free operation on three shifts /day basis under two headings as</p> <p>a) Mechanical & hydraulic spares: The list may generally include all types of pumps, Valves, pressure switches / transducers, filters, seals etc.</p> <p>b) Electrical & electronic spares: The list may generally include all types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Scanning Heads for Linear Scales, MMC module, NCU module, Operator's panel with Display Unit, Floppy Disk Unit, I/O Cards for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.</p> <p>c) Un-priced list of spares with quantities, specified in a & b above, should be submitted with this technical offer.</p> <p>d) Unit Price of each item figuring in c shall be submitted in a sealed cover with the price bid.</p>	Vendor to Submit	
13.2	All types of spares for the total machine and its accessories should be available for minimum ten years, after supply of the machine. If any spares or controls are likely to become obsolete within this period, the vendor should inform BHEL and provide details of it's suppliers to enable BHEL to procure them in advance.	Vendor to Confirm	
13.3	In case of ordering, a complete list of spares for the machine and its accessories along with spares specification / type / model, and name & address of the spare supplier shall be submitted along with documentation while supplying the machine.	Vendor to Confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
14.0	DOCUMENTATION:		
14.1	3 sets of following documents (3 Hard copies) in English language should be supplied along with the machine	Vendor to confirm	
14.2	Operating manuals of Machine & CNC system	Vendor to confirm	
14.3	Programming Manuals of Machine & CNC system	Vendor to confirm	
14.4	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams.	Vendor to confirm	
14.5	Maintenance, Interface & commissioning manuals for CNC system, spindle & feed drives.	Vendor to confirm	
14.6	Manufacturing drawings for all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.	Vendor to confirm	
14.7	Catalogues / O&M Manuals of all bought out items.	Vendor to confirm	
14.8	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to confirm	
14.9	Bearings: Make& Specification for all bearings used in the machine.	Vendor to Specify	
14.10	Ball Screws: Detailed Specification for all ball screws used in the machine shall be submitted. The specification shall address the following points: (a) Diameter,(b) Pitch (c) Make (d) Model	Vendor to specify	
14.11	Operating Manuals, Maintenance Manuals & Catalogues for Isolation Transformer and voltage stabilizer.	Vendor to confirm	
14.12	PLC program printouts (Ladder diagram & Statement list) with comments in English.	Vendor to confirm	
14.13	PLC program on CD, NC data & PLC data on CD.	Vendor to confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
14.14	Complete back up of hard disk on GHOST CD and clear written Instructions (1 copy) to take back up and reloading of a new hard disk.	Vendor to confirm	
14.15	The vendor shall submit complete Master List of parts used in the machine.	Vendor to Submit	
14.16	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to confirm	
15.0	TRAINING:		
15.1	The Vendor shall train Three BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) of the Machine at Vendor's works for a period not exceeding 5 working days.	Vendor to confirm	
15.2	Airfare, boarding & lodging for the BHEL Engineers shall be borne by BHEL.		
15.3	The Vendor shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance after the commissioning of the Machine at BHEL works for not less than 6 working days	Vendor to confirm	
15.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to confirm	
15.5	Vendor to quote on the basis of per man per Day for training at vendor's work	Vendor to specify	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
16.0	FOUNDATION:		
16.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Vendor shall submit complete foundation details including static and dynamic loads within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for Voltage Stabilizer, Isolation Transformer, & any other accessories. BHEL shall construct complete foundation for the machine.	Vendor to confirm	
16.2	The Vendor shall indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.		
17.0	ERECTION & COMMISSIONING		
17.1	1.Supplier to take full responsibility for supervision of the erection. Supplier will be responsible for start up, testing of machine, it's control system & all types of other supplied equipment, machine accuracy tests, machining of test pieces, acceptance tests. 2.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. 3.Other requirements like crane and helping personnel shall be provided by BHEL.	Vendor to confirm	
17.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer shall also be responsibility of the vendor.	Vendor to confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
17.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, mentioned under the clause " Machine Acceptance " should form part of the commissioning activity.	Vendor to confirm	
17.4	Tools, Tackles, Test Mandrels, instruments and other necessary equipment including Laser equipment required to carry out all above activities should be brought by the supplier.	Vendor to confirm	
17.5	The supplier shall arrange commissioning spares required for commissioning of the machine.	Vendor to confirm	
17.6	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colors of paint used.	Vendor to confirm	
17.7	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm	
17.8	Duration, terms & conditions for E&C should be furnished with the technical offer in detail. Charges for Erection & Commissioning shall be submitted with the price bid.	Vendor to confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
18.0	ACCURACY TESTS:		
18.1	GEOMETRICAL ACCURACY:		
18.1.1	Geometrical Accuracy Tests shall be in accordance with ISO 3070 standard or equivalent applicable standard. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.	Vendor to confirm	
18.1.2	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance tests at Suppliers works and during Erection & Commissioning at BHEL Works.	Vendor to confirm	
18.2	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 - 2 (Latest Revision) using LASER INTERFEROMETER.	Vendor to confirm	
18.2.1	Positioning Accuracy on traversing axes (Pa per 1000mm)	± 0.016 mm	
18.2.2	Positioning Accuracy Pa for B-axis	± 3.6 sec	
18.2.3	Repeatability on traversing axes (Ps per 1000mm)	± 0.008 mm	
18.2.4	Repeatability Ps for B-axis	± 3.6 sec	
18.2.5	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works	Vendor to specify	
19.0	AMBIENT CONDITIONS & THERMAL STABILITY:		
19.1	Power Supply : AC 415 V $\pm 10\%$ Frequency : 50 Hz ± 3 HZ Phases : 3 phase 3 wire system Compressed air supply: 60-70 psi Ambient Temperature: max 50 °C Relative Humidity = 85% (Vendor to confirm that machine is suitable for above conditions)	Vendor to confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
19.2	Weather conditions are tropical. Atmosphere may be dust laden during some part of the year. Machine will be installed in the normal shop floor condition. (Vendor to confirm that machine is suitable for above)	Vendor to confirm	
19.3	Thermal Stability of the machine shall be good enough to withstand the specified ambient conditions in order to meet the accuracy requirements of BHEL components. Vendor to confirm for trouble-free operation of the machine.	Vendor to confirm	
19.4	The Vendor should confirm that the machine and its accessories is suitable for continuous operation at its full capacity for 24 hours a day and 7 days a week through out	Vendor to confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
20.0	PROVEOUT OF BHEL COMPONENTS:		
20.1	<p>1. Drawings of prove-out components are enclosed. Please refer Annexure 5 (for 1 machine at Tiruchy) & Annexure 6 (for 1 machine at IVP Goindwal) for prove out components List and operations. Material for the prove-out components will be provided by BHEL.</p> <p>2. For machining of prove-out components, Job setting plan, Machining process plan and Requirement of tools etc. shall be discussed and agreed mutually. (Final prove out component drawing number may change, however, the machining features of the changed components shall be in line with the original component drawing.)</p> <p>3. Using CNC programs of the vendor, Complete machining of prove-out components shall be done by vendor at BHEL works to the specified design accuracy and surface finish.</p> <p>4. The vendor shall supply all job holding fixtures, cutting tools, tool holders, arbors, boring bars etc. necessary for machining of prove-out components.</p> <p>5. Vendor shall submit final job setting plan, machining process plan, tool layout & list with complete description, time studies etc. within two months of placement of order for the prove- out components. Vendor shall submit CNC Programs prior to start of erection of machine at BHEL Works.</p> <p>6. Vendor shall be fully responsible for machining of prove-out components as per drawing and other requirements specified by BHEL. Clarifications regarding accuracy requirements of the prove-out components, whether specified or not, should be discussed by vendor during initial technical discussions.</p>	Vendor to Confirm	
21.0	MACHINE ACCEPTANCE:		
21.1	Tests/Activities to be carried out at supplier's works on the machine before despatch:	Vendor to Confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
21.1.1	Geometrical Accuracy Tests as per test chart provided by the vendor.	Vendor to Confirm	
21.1.2	Positioning Accuracy Tests as per VDI-DGQ/3441 / ISO 230 - 2	Vendor to Confirm	
21.1.3	The machine shall be test run continuously for 48 hrs. If any break down occurs during this test, the test will be repeated again for 48 hrs from restarting.	Vendor to Confirm	
21.1.4	Demonstration of all features of the machine, CNC system and all Accessories.	Vendor to Confirm	
21.1.5	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to Confirm	
21.2	Tests/Activities to be carried out at BHEL works while commissioning the machine:	Vendor to Confirm	
21.2.1	Geometrical Accuracy Tests as per test chart	Vendor to Confirm	
21.2.2	Positioning Accuracy Tests as per VDI-DGQ/3441 / ISO 230 - 2	Vendor to Confirm	
21.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to Confirm	
21.2.4	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from that time.	Vendor to Confirm	
21.2.5	Demonstration of all features of the machine, CNC system & all accessories to the satisfaction of BHEL for their efficient and effective use.	Vendor to Confirm	
21.2.6	Demonstration by actual use of all supplied attachments and accessories to their full capacity.	Vendor to Confirm	
21.2.7	Machining of NAS Test Piece. Vendor to supply test piece and tooling for it's machining.	Vendor to Confirm	

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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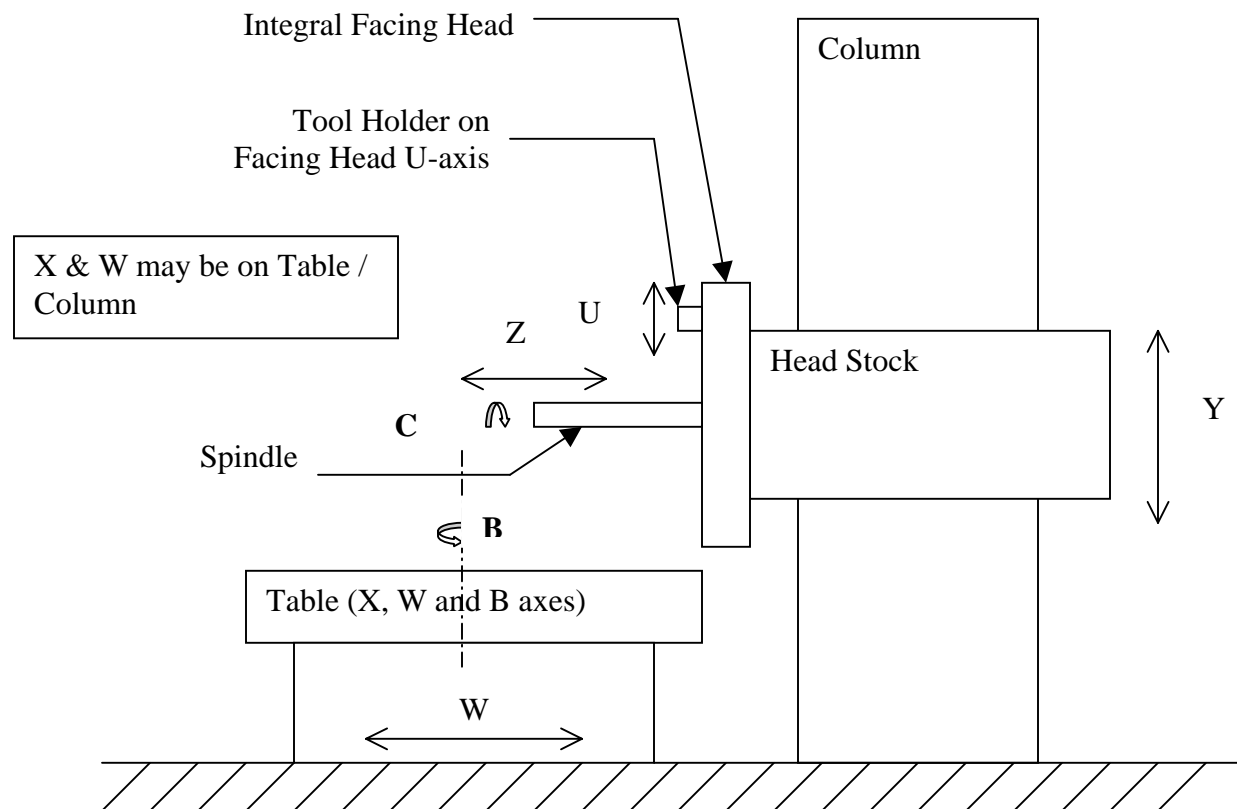
Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
21.2..8	Prove-out of BHEL components	Vendor to Confirm	
22.0	PACKAGING:		
22.1	Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes	Vendor to Confirm	
23.0	GUARANTEE:		
23.1	24 months from the date of acceptance of the machine.	Vendor to Confirm	
24.0	GENERAL:		
24.1	The vendor should submit the following information:	Vendor to confirm	
24.2	Machine Model	Vendor to specify	
24.3	Total connected load (KVA):	Vendor to specify	
24.4	Floor area required (Length, Width, Height) for complete machine & accessories.	Vendor to specify	
24.5	Painting of Machine/ Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to Confirm	
24.6	Total weight of the machine	Vendor to specify	
24.7	Weight of heaviest part of machine	Vendor to specify	
24.8	Weight of the heaviest assembly/ subassembly of the Machine	Vendor to specify	
24.9	Dimensions of largest part/ subassembly of the machine	Vendor to specify	

Annexure-1&2: Sketch showing approximate configuration of the machine.

Annexure-3&4: Sketch showing approximate configuration Tool holder.

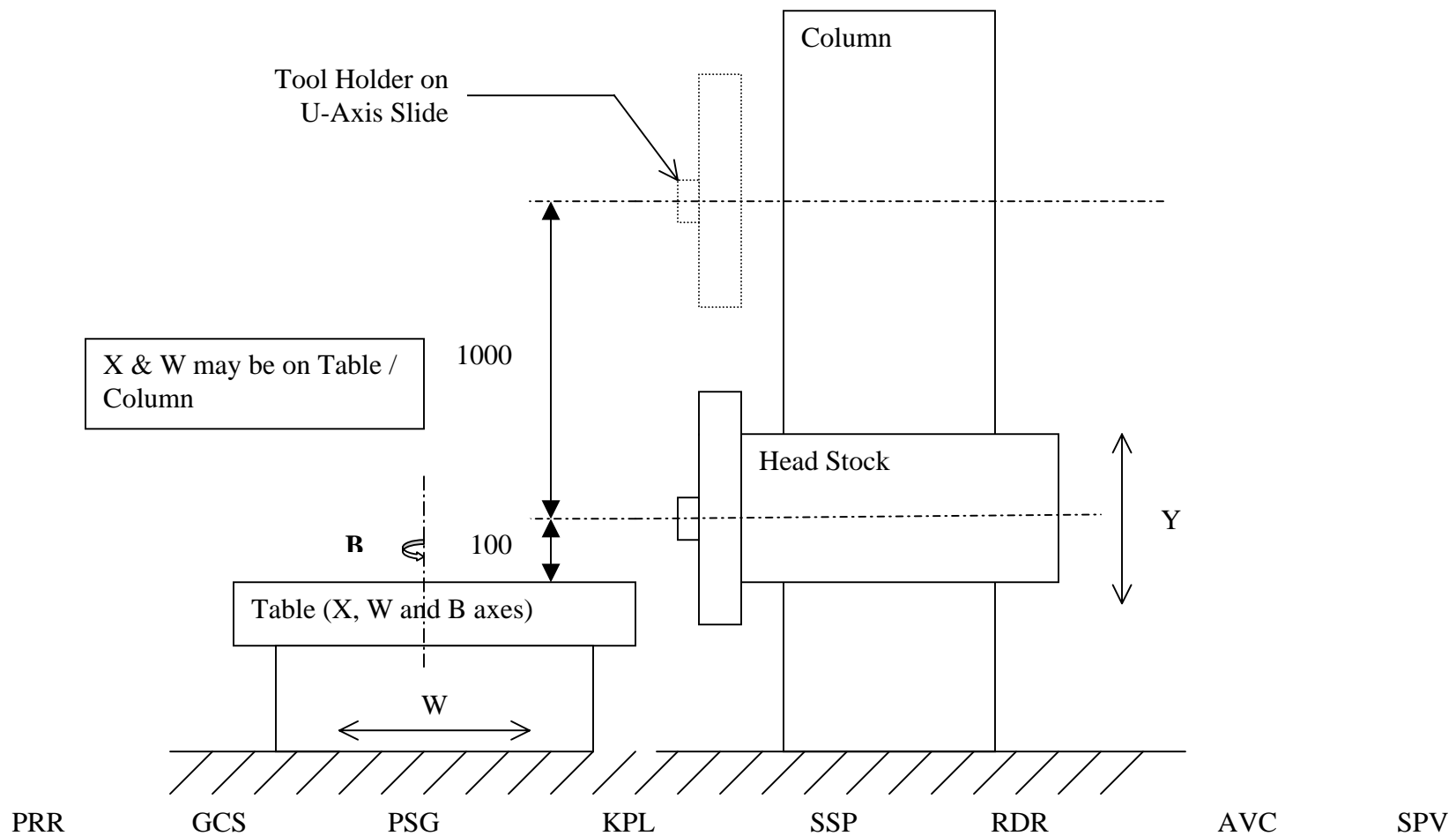
Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Annexure 1: Configuration of CNC Horizontal Boring Machine



Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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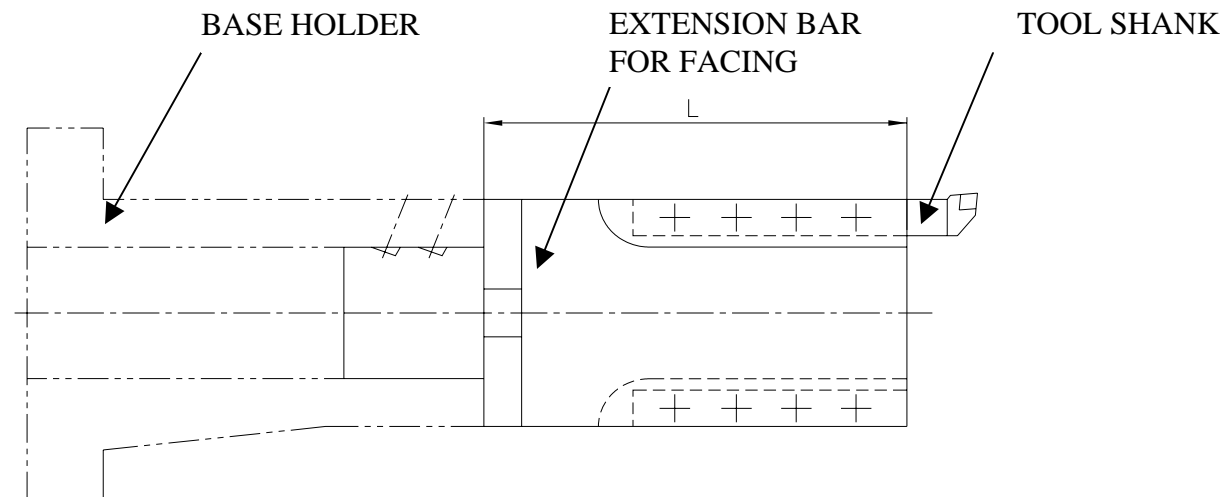
Annexure-2: Configuration of CNC Horizontal Boring Machine



Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Annexure-3: Configuration of Tool holder on U- Axis slide

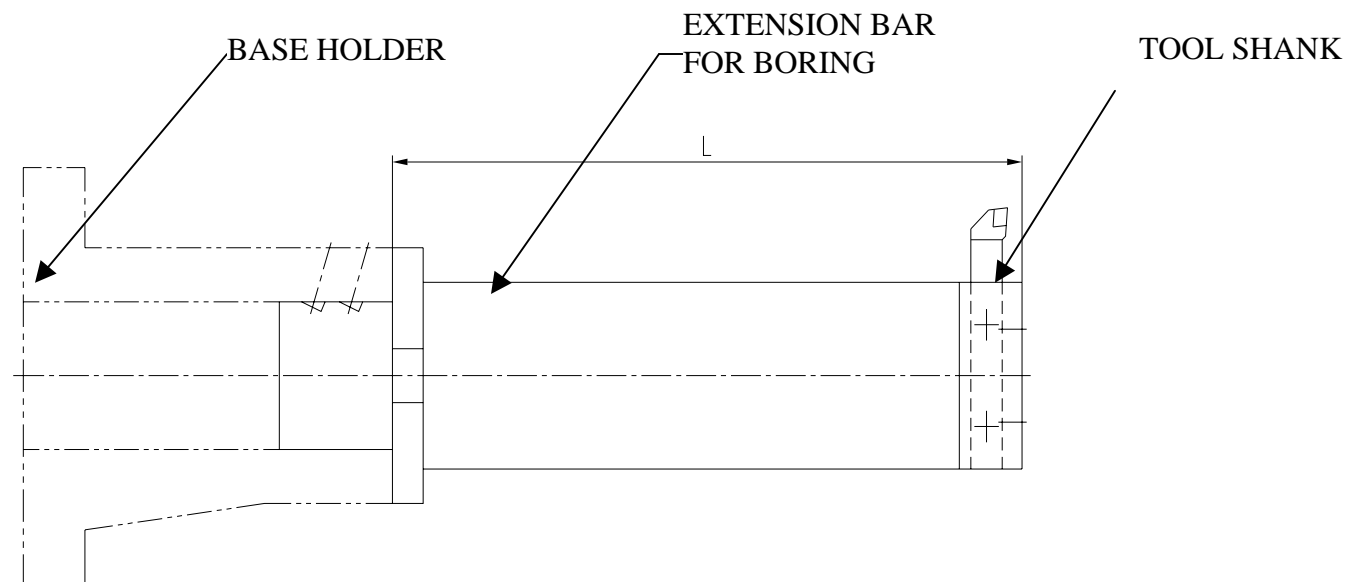
FOR FACING



Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Annexure-4: Configuration of Tool holder on U- Axis slide

FOR BORING



Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Annexure - 5 : Prove out Job details for CNC 110 HB M/C FOR TIRUCHY

Sl. No.	Job	Prove Out Job Qty.	Drawing No.	Title	Operations
1	Body tubing spool	1 No.	1V 4745 03360	Body tubing spool	Drilling , tapping & spot facing (Refer Detail - G).
2	ARS 140	1 No.	1V 6504 14089	Body Assy. Final M/Cing	Ref. Machining Notes For ARS 140
			1V 6504 14090	Body Assy. welding	Reference Drg
			3V 6504 03541	Flange	Reference Drg
3	24" 600 cl CRHNRV	1 No.	2 V 0000 17517	CRHNRV Assy.	Weld Edge preparation at the inlet and outlet ends as per drg. No. 4-V-L753-20368
			2V 0000 17518	Body Assy	Reference Drg
			4V L753 20368	Edge Prepration	Reference Drg

Doc. Ref.	CAS – V/IVP – II – 02	Date	2 nd July 2008
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Annexure - 6

<u>Prove out Job details for CNC 110 HB M/C FOR IVP GOINDWAL</u>				
Prove out job Description	Prove out Job qty	Prove out Drawing No.	Title of Drg.	Operations to be done
GV 24"(size) 150 # (Class) Body	1 No.	3VN80523440	Body Assy	Seat Fine Facing
		3VN36117206	Seat Ring Assy.	For ref.
		1VN80505160	Body	Third flange machining, inlet and outlet side machining, seat bore machining.
		1VN80505158R/01	Body	Reference drg.
		2VN92008145	Gate Valve Assy.	Weld Edge Preparation Machining on the inlet and outlet ends
		CAS-V-II-IVP-110 CNC HB	Weld Edge Preparation 24"/ 150# GV	
FV 20"(size) 150 # (Class) Body	1 No.	2VZ02117269	Body Assy	Weld Cleaning and Seat fine facing.
		3VZ02122678	Seat	For ref.
		2VZ02117270	Body Rough	Third flange machining, inlet and outlet side machining, seat bore machining as per detail E, Hinge pin bore machining as per detail in section AA
		2VZ02117266R	Body	Reference drg.