



Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT/ MATERIALS MANAGEMENT

An ISO 9001
Company

ENQUIRY	Phone: +91 431 257 70 49 Fax : +91 431 252 07 19 Email : csguna@bheltry.co.in Web : www.bhel.com
NOTICE INVITING TENDER	

TWO PART BID	Enquiry Number:	Enquiry Date:	Due date for submission of quotation:
Tender to be submitted in two parts.	2620900166	31.08.2009	15.10.2009

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

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity
10	Vertical Machining Centre as per the technical specification, general guidelines instructions & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.

Important points to be taken care during submission of offer

- 1. Delivery required 10 months from the date of purchase order.**
- 2. Grace period of 2 months beyond the above delivery period will be considered.**
- 3. Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**

BHEL's General guidelines / instructions (refer MM/CE/GT/001) including bank guarantee formats and list of consortium banks, commercial terms check-list 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 "2620900166".

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 / MM / Capital Equipment

PART A**VERTICAL MACHINING CENTER****SECTION – I : QUALIFYING CRITERIA**

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer.

S. No.	REQUIREMENTS	Vendor's Response
1	<p>Only those vendors (OEMs), who have supplied and commissioned at least one CNC Vertical Machining Center / CNC Vertical Bed type Milling & Drilling Machine with</p> <ol style="list-style-type: none"> 1. Spindle power 11 KW or more 2. Table size of 1200 mm x 600 mm or more and 3. Table Load carrying capacity 1000 Kg or more <p>in the past ten years and at present such machine should be working satisfactorily for a minimum period of one year after commissioning, as on the date of opening of this Tender are eligible to quote.</p> <p><i>(However, if such machine had already been supplied to BHEL, then that machine should be presently working satisfactorily for a minimum period of six months after commissioning, as on the date of opening of this Tender.)</i></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	Along with the Technical offer, the Vendor should submit one Performance certificate from the customer for the satisfactory performance of the machine supplied to them. For obtaining the Performance certificate, a suggestive format is provided in SECTION – IV.	
1.7	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.	

2.0	<p>DELIVERY: The bidder shall quote the best possible delivery. However the delivery shall not exceed 10 months with an additional grace period of 2 months. The additional grace period will attract a penalty, which is explained in the commercial terms of the enquiry.</p> <p>The delivery period shall be reckoned from the date of purchase order to dispatch from the vendor works.</p>	
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SECTION – I I

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 Vertical Machining Centers / CNC Vertical Bed type Milling & Drilling Machines have been supplied in the past.	
4.0	Details of Vertical Machining Centers / CNC Vertical Bed type Milling & Drilling Machines supplied to other BHEL units, if any. (Year of commissioning, Table size, Table load carrying capacity, 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.	

SECTION – III

The BIDDER to note:

S. No.	PARTICULARS	Vendor's Response
7.0	<p>The BIDDER / VENDOR shall submit the offer in TWO PARTS.</p> <ol style="list-style-type: none"> 1. Technical Offer [with PART A & PART B] and Commercial offer. 2. Price Bid. 	
8.0	<p>The Technical Offer shall contain a comparative statement of Technical Specifications demanded by BHEL and Offer Details submitted by the Bidder, against each clause.</p> <p>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.</p>	
9.0	<p>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.</p>	
10.0	<p>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.</p>	

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) Table Size b) Table load Carrying Capacity c) Max Job envelope d) Spindle Power (cont. rating) e) Spindle Taper	
6. Performance of the Equipment (Tick whichever is applicable)		Best in the market
		Satisfactory
		Good
		Average
		Not Satisfactory
7. Any Other remarks		
Date:		Signature & Seal of the Authority Issuing the Performance Certificate

PART-B TECHNICAL SPECIFICATION OF VERTICAL MACHINING CENTER

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details										
1.0	PURPOSE & WORKPIECE MATERIAL											
1.1	PURPOSE: The machine is intended for machining steel components. The machine will be used extensively for milling, drilling and reaming operations.											
1.2	<p>WORKPIECE MATERIAL: The work piece material and specification is tabulated below.</p> <table border="1" data-bbox="384 537 1360 800"> <thead> <tr> <th data-bbox="384 537 573 578">Material</th> <th data-bbox="573 537 1056 578">ASTM Specification</th> <th data-bbox="1056 537 1360 578">Hardness range</th> </tr> </thead> <tbody> <tr> <td data-bbox="384 578 573 651">Carbon Steel</td> <td data-bbox="573 578 1056 651">A216 WCB, WCC, SA 105, SA 515 Gr70, A352 LCB, LCC</td> <td data-bbox="1056 578 1360 800" rowspan="3">185 – 250 BHN</td> </tr> <tr> <td data-bbox="384 651 573 724">Alloy Steel</td> <td data-bbox="573 651 1056 724">A 217 WC5, WC6, WC9, C12A, SA 182 F22 Class 3</td> </tr> <tr> <td data-bbox="384 724 573 800">Stainless Steel</td> <td data-bbox="573 724 1056 800">A351 CF3M, CF8, CF8C, CF8M, SA 182 F91</td> </tr> </tbody> </table> <p>Largest Job Size (L x B x H) = 950 X 480 X 90 mm</p>	Material	ASTM Specification	Hardness range	Carbon Steel	A216 WCB, WCC, SA 105, SA 515 Gr70, A352 LCB, LCC	185 – 250 BHN	Alloy Steel	A 217 WC5, WC6, WC9, C12A, SA 182 F22 Class 3	Stainless Steel	A351 CF3M, CF8, CF8C, CF8M, SA 182 F91	
Material	ASTM Specification	Hardness range										
Carbon Steel	A216 WCB, WCC, SA 105, SA 515 Gr70, A352 LCB, LCC	185 – 250 BHN										
Alloy Steel	A 217 WC5, WC6, WC9, C12A, SA 182 F22 Class 3											
Stainless Steel	A351 CF3M, CF8, CF8C, CF8M, SA 182 F91											
2.0	CONFIGURATION: Approximate configuration of the Machine is shown in annexure – 2.											
2.1	CONSTRUCTION:											
2.1.1	Vendor to furnish constructional details of the machine including explanatory drawings of various components/ assemblies like Column, Table, ATC, Machine Bed, Feed Transmission System, Feed back System etc. of the machine with details of material & their hardness.	Vendor to specify										
2.1.2	Movable Chip / Splash Guard with transparent windows to view progress of machining, should be provided for the Table with sufficient height to avoid splash of Coolant and scattering of Chips on Operator's Platform and on Shop Floor.	Vendor to specify										

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.1.3	Video images on CD / Hard copy of literature with photographs & drawings explaining the technical features shall be enclosed with the offer	Vendor to specify	
2.1.4	Machine should be metric execution.	Vendor to confirm	
2.2	TABLE		
2.2.1	Size of Clamping Surface / Table (L X B): Min. 1200 X 600 mm	Vendor to specify	
2.2.2	Max. Weight of Work-piece:	1000 Kg	
2.2.3	Details of T-Slots (No / Size / Pitch):	Vendor to specify	
2.2.4	Load carrying capacity of Table:	Vendor to specify	
2.2.5	Central Slot tolerance:	Vendor to specify	
2.2.6	Lateral Slot size and tolerance:	Vendor to specify	
2.2.7	Table surface and central slot should be accurately machined and they will be used as reference surfaces.	Vendor to confirm	
2.3	SPINDLE		
2.3.1	Spindle Diameter:	Vendor to specify	
2.3.2	Spindle Motor Power (AC Continuous Duty S1): The spindle drive and motor shall be of Fanuc / SIEMENS (Details of model, make, type etc. to be furnished in the offer)	Min. 11 KW Vendor to specify	
2.3.3	Spindle Bearing Diameters (Radial & Axial):	Vendor to specify.	
2.3.4	Taper in Spindle:	ISO / BT 50	
2.3.5	Spindle speed range (Infinitely variable): 30 – 3000 RPM	Vendor to specify	
2.3.6	No of speed ranges (Selectable through program):	Vendor to specify	
2.3.7	Torque/Power/Speed diagram of spindle motor is to be submitted with the offer.	Vendor to submit	
2.3.8	Minimum and maximum height from Spindle Face to Table Top	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
2.3.9	Minimum and maximum distance from Spindle Center to Table Center	Vendor to specify	
2.3.10	Drilling capacity:	50 mm	
2.4	TRAVERSES		
2.4.1	Longitudinal Travel of Table or column –X Axis: Min. 1050 mm	Vendor to Specify	
2.4.2	Spindle Head Vertical Travel- Z Axis: Min. 500 mm	Vendor to Specify	
2.4.3	Table or Column Cross Travel- Y Axis: Min. 550 mm	Vendor to Specify	
2.5	FEEDS AND DRIVE SYSTEM		
2.5.1	Rapid Feed Rate in X, Y& Z Axes:	Vendor to specify	
2.5.2	Feed Rate in X, Y& Z Axes (Infinitely variable):	Vendor to specify	
2.5.3	Feed drive motors [AC servo motors] shall be digital type of Fanuc or Siemens. (Details of model, make, type etc. to be submitted with the offer)	Vendor to specify	
2.5.4	Feed back system for X, Y & Z axes: Fanuc / Siemens / Heidenhain encoders (Details to be submitted with the offer.)	Vendor to specify	
2.5.5	Mechanism for locking / clamping the axes:	Vendor to specify	
2.5.6	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	
2.5.7	Metallic Telescopic Covers of rust resistant material shall be provided with wipers for guide ways of all axes. Provision should be made to avoid mixing of coolant & hydraulic oil.	Vendor to specify	

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.6	OPERATION AND CONTROL SYSTEM	
2.6.1	OPERATOR'S PANEL	
2.6.1.1	Preferably Swiveling type operator's panel having complete CNC and machine control system with CRT of required configuration shall be provided at an ergonomically suitable location. All switches should be within reach of operator for easy & safe operation. All displays/indications should also be conveniently placed accordingly. Layout showing complete details should be submitted.	Vendor to submit
2.6.2	CNC SYSTEM & FEATURES	
2.6.2.1	Make: Fanuc / Siemens	Vendor to specify
2.6.2.2	Type: PC based latest version (With Simultaneous interpolation of three axes)	Vendor to Confirm
2.6.2.3	Model: Suitable and Latest version, as available at the time of ordering, should be supplied.	Vendor to specify
2.6.2.4	Details of Standard features: List to be submitted by Vendor.	Vendor to specify
2.6.2.5	Details of optional features, recommended by vendor:	Vendor to specify
2.6.2.6	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 for LAN, electronic hand wheels for all axes, CD/DVD drive unit with CD/DVD 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 & submit details

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.6.3	MANUAL CONTROL	
2.6.3.1	Complete manual control of machine with required switches/ keys should be provided on operator's panel for selection of required axis, axis direction, cutting feed, table/ spindle speed, cutting feed on/off, display of axis position values etc. for manual operation without using CNC program, CNC option Manual Turn or MDI mode. Diagrams/ sketches for switches/ keys provided on operator pendent should be submitted.	Vendor to confirm
2.6.4	HAND HELD UNIT:	
2.6.4.1.	Hand Held unit along with sufficient length of interfacing cable for axis selection; axis movement with pulse generator, axis position display and emergency stop is to be offered with complete details. This is required for job setting.	Vendor to specify
2.6.5	UPS FOR CNC SYSTEM	
2.6.5.1	UPS of 30 minutes for CNC system with inbuilt cooling and charge status display	Vendor to specify
2.7	MACHINE LIGHTS	
2.7.1	Machine Lights for sufficient illumination of complete working area should be provided for clear visibility.	Vendor to confirm
2.7.2	A magnetic base portable spot-light with sufficiently long cable should also be provided.	Vendor to confirm
2.7.3	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to confirm
2.7.4	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to confirm
2.7.5	Voltage shall be 24V for the hand lamp	Vendor to confirm

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.8	AIR CONDITIONERS: 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 Confirm & submit
2.9	HYDRAULIC SYSTEM:	
2.9.1	Make: Rexroth / Vickers Sperry or any other reputed make acceptable to BHEL	Vendor to specify
2.9.2	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
2.9.3	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 measured for setting and trouble shooting. MINIMESS Pressure Gauge - 1 No with Connecting Hose to be provided.	Vendor to confirm
2.9.4	The control voltage for all solenoid operated valves shall be 24V DC	Vendor to confirm
2.9.5	Filtration System:	Vendor to specify
2.9.6	Failure indication:	Vendor to specify
2.9.7	Automatic shut off provision.	Vendor to submit
2.9.8	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
2.9.9	Hydraulic pump capacity (flow / pressure):	Vendor to specify

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.9.10	Each pump should have an independent motor.	Vendor to confirm
2.10	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
2.11	COOLANT SYSTEM:	
2.11.1	Coolant System with all accessories for following types shall be provided. Selection of required type shall be enabled through program as well as manual (by push buttons on the Operator's panel).	Vendor to confirm
2.11.2	a) Re-circulating type Flood Coolant System.	Vendor to Confirm
2.11.3	b) High Pressure Coolant system through Spindle.	Vendor to Confirm
2.11.4	Coolant Pressure for each type to be furnished.	Vendor to Furnish
2.11.5	Coolant flow rate for each type be furnished.	Vendor to Furnish
2.11.6	All Spindle mounted tool holders, boring bars and adapters etc. shall have through tool coolant provision.	Vendor to Confirm
2.11.7	Coolant collection and recirculation system should be leak proof to avoid spillage on shop floor.	Vendor to Confirm
2.11.8	Coolant Filtration System: Re-circulating type with suitable filtration unit. Vendor shall give details of offered filtration unit.	Vendor to submit
2.11.9	Coolant flow diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.	Vendor to submit
	Coolant pump & motor details for all types of coolant system are to be submitted with the offer.	
2.11.10	Coolant Tank Capacity:	Vendor to specify
2.11.11	Coolant pump & motor details:	Vendor to specify

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.11.12	The coolant tank should be fitted with skimmer for regular cleaning of coolant from contamination with tramp oil.	Vendor to Confirm
2.12	ELECTRICAL:	
2.12.1	415V \pm 10%, 50 HZ \pm 3 HZ, 3 Phase AC (3 wire system with out 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 is to be informed by vendor well in advance so that the same could be incorporated during construction of foundation.	Vendor to Confirm
2.13	Tropicalisation: All electrical / electronic equipment shall be tropicalized.	Vendor to Confirm
2.13.1	All electrical & electronic control cabinets & panels should be dust and vermin proof and shall have IP 54 protection.	Vendor to Confirm
2.13.2	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to Confirm
2.13.3	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
2.13.4	Motors shall conform to IEC or Indian Standards	Vendor to Confirm
2.13.5	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays required for laying of cables should be included in the offer.	Vendor to Confirm
2.13.6	Vendor should ensure proper earthing for the machine and its peripherals.	Vendor to Confirm

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.13.7	In-cycle hour counter with reset facility and digital energy meter shall be provided	Vendor to Confirm
2.14	SAFETY ARRANGEMENTS:	
2.14.1	Machine should have adequate and reliable safety interlocks or 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
2.14.2	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to specify
2.14.3	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
2.14.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor to Confirm
2.14.5	Emergency Switches at suitable locations as per International Norms should be provided.	Vendor to Confirm
2.14.6	Oil & water 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	Maximum noise level shall not exceed 85 dB(A) at normal load condition, 1 meter away from the machine.	Vendor to Confirm
2.15.2	There shall not be any emissions from the machine except fumes of cutting fluid during machining.	Vendor to Confirm
2.15.3	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

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
2.15.4	No hazardous chemicals shall be used in the machine.	Vendor to confirm
2.15.5	If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to Confirm
2.15.6	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor to confirm
2.16	CHIP CONVEYOR	
2.16.1	A chip conveyor to carry both short and curly chips efficiently and effectively to the chip bin on the floor should be provided at the side of the machine. Two chip bins of appropriate size of Indian make, with wheels and handle for movement, should also be supplied.	Vendor to confirm
2.16.2	Type of chip conveyor:	Vendor to specify
2.16.3	Width of conveyor	Vendor to specify
2.16.4	Elevation of chip conveyor for chip bin:	Vendor to specify
2.16.5	Material of chip conveyor	Vendor to specify
2.16.6	Provision for smooth flow of chips to the conveyor:	Vendor to specify
2.16.7	Operation of chip conveyor (forward & reverse) through push buttons on operator's panel and at Chip Conveyor should be possible.	Vendor to confirm
2.16.7	Layout showing location of chip conveyor should be submitted.	Vendor to submit
3.0	SERVO VOLTAGE STABILIZER (SVS) :	
3.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, CNC, 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 the noise level also)	Vendor to specify
3.4	Spares Package for the Voltage Stabilizer for 2 years working should also be offered.	Vendor to Confirm

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
3.5	Catalogue of Voltage Stabilizer to be submitted.	Vendor to Submit
	First fill of oil shall be supplied along with the machine if the SVS is oil cooled.	
4.0	ULTRA ISOLATION TRANSFORMER	
4.1	Indian make Ultra Isolation Transformer suitable for complete machine, CNC, drives, controls, PLC etc. shall be offered.	Vendor to confirm
4.2	Make: NEEL / DELTA / AEI / POWER AID	Vendor to specify
4.3	Model & Rating:.	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.	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
5.2	For work piece cleaning, Compressed Air Point with manual ON/OFF Valve at a suitable location and flexible hose of suitable length shall be provided in the machine.	Vendor to Confirm
6.0	TOOLINGS	
6.1	All supplied tool holders, Cutting Tools, adapters etc. shall have through coolant provision so that coolant is available directly on the cutting tip during all possible operations. Provision for external coolant shall also be provided.	Vendor to confirm

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
6.2	<p>Adaptors for drilling: The vendor shall supply the following tang end Morse taper drilling adaptors</p> <ul style="list-style-type: none"> a) ISO / BT # 50 - MT # 4 : 2 nos b) ISO / BT # 50 - MT # 3 : 2 nos c) ISO/ BT # 50 - MT # 2 : 2 nos d) ISO/ BT # 50 Collet Type: 2 nos (with 2 set of collets range 6 mm to 32 mm) 	Vendor to confirm
6.3	<p>Adaptor / Side lock holder (Weldon type) are required for indexable insert drill.</p> <p>ISO 50/BT-50-----Dia 20-----2 nos. ISO 50/BT-50-----Dia 25-----2Nos. ISO 50/BT-50-----Dia 32-----2Nos. ISO 50/BT-50-----Dia 40-----2Nos.</p>	
6.4	<p>Adaptors for milling: Vendor shall supply the following milling adaptors (Screwed end)</p> <ul style="list-style-type: none"> a) ISO/BT # 50 - MT # 4 : 2 nos. b) ISO/BT # 50 - MT # 3 : 2 nos c) ISO/BT # 50 - MT # 2 : 2 nos d) ISO/BT # 50 Adaptors for face/shoulder mills with ID=22,27,32 mm: each 1 no. 	Vendor to confirm
6.5	All cutting tools, adaptors, sleeves & tool holders shall be supplied for machining of prove-out components:	Vendor to confirm
7.0	FAULT DIAGNOSTIC SYSTEM	
7.1	Supplier's own diagnostic system with required hardware and software should be supplied and installed on the CNC system. This should include standard auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display and supplier's smart diagnostic system for	Vendor to confirm

	full video diagnostic help for faults related to mechanical and electrical maintenance.		
Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
7.2	Help guide should be provided to use both diagnostic systems		
8.0	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	
9.0	LEVELING & ANCHORING SYSTEM		
9.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc should be supplied.	Vendor to confirm	
10.0	TOOLS FOR OPERATION & MAINTENANCE		
10.1	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 Vendor to submit	
11	SPARES:		
11.1	1) 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 a) Mechanical & hydraulic spares and b) Electrical & electronic spares. The list shall generally include the following items. a) Mechanical & Hydraulic Spares: All types of pumps, All types of Valves, All types of pressure switches / transducers, All types of filters, All types of seals b) Electrical & Electronic Spares: All types of Relays, Contactors,	Vendor to Submit	

	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. c) Un-priced list of spares with quantities, specified at a&b above, should be submitted with this technical offer. d) Unit Price of each item figuring in c shall be submitted with the price bid.		
Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
11.2	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	
11.3	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	
12.0	DOCUMENTATION:		
12.1	3 sets of following documents (3 Hard copies) in English language should be supplied along with the machine	Vendor to confirm	
12.2	Operating manuals of Machine & CNC system	Vendor to confirm	
12.3	Programming Manuals of Machine & CNC system	Vendor to confirm	
12.4	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams.	Vendor to confirm	
12.5	Maintenance, Interface & commissioning manuals for CNC system, spindle & feed drives.	Vendor to confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
12.6	Manufacturing drawings for all supplied tool holders, coolant connections, adapters, sleeves, fixtures etc.	Vendor to confirm	
12.7	Catalogues / O&M Manuals of all bought out items.	Vendor to confirm	
12.8	Detailed specification of all rubber items and hydraulic/lube fittings	Vendor to confirm	
12.9	Bearings: Make& Specification for all bearings used in the machine.	Vendor to Specify	
12.10	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) Length, (d) Make (e) Model	Vendor to specify	
12.11	Operating Manuals, Maintenance Manuals & Catalogues for Isolation Transformer and voltage stabilizer.	Vendor to confirm	
12.12	PLC program printouts (Ladder diagram & Statement list) with comments in English.	Vendor to confirm	
12.13	PLC program on CD, NC data & PLC data on CD.	Vendor to confirm	
12.14	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	
12.15	The vendor shall submit complete Master List of parts used in the machine.	Vendor to Submit	
12.16	One additional set of all the above documentation on CD ROM, wherever possible.	Vendor to confirm	
13.0	TRAINING:		
13.1	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	
13.2	Airfare, boarding & lodging for the BHEL Engineers shall be borne by BHEL		

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
13.3	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
13.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to confirm
13.5	Vendor to quote on the basis of per man per day for training at vendor's works.	Vendor to specify
14.0	FOUNDATION:	
14.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of purchase order. 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
14.2	The Vendor shall indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.	Vendor to Specify
15.0	ERECTION & COMMISSIONING	
15.1	<p>1.Supplier to take full responsibility for supervision of the erection. Start up, testing of machine, it's control system & all types of other supplied equipment, machining of test pieces etc. are the responsibility of the supplier.</p> <p>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.</p>	Vendor to confirm

	3.Other requirements like crane and helping personnel shall also be provided by BHEL, free of cost.		
Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
15.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer shall also be responsibility of the vendor.	Vendor to confirm	
15.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, mentioned under clause (Machine Acceptance) shall form part of the commissioning activity.	Vendor to confirm	
15.4	Tools, Tackles, Test Mandrels, instruments and other necessary equipment including Laser equipment required to carry out all above activities should be brought by the supplier.	Vendor to confirm	
15.5	The supplier shall arrange commissioning spares required for commissioning of the machine.	Vendor to confirm	
15.6	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	
15.7	Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm	
15.8	Duration, terms & conditions for E&C should be furnished with this technical offer in detail. Charges for the same shall be submitted with the price bid.	Vendor to confirm	
16.0	ACCURACY TESTS:		
16.1	GEOMETRICAL ACCURACY:		
16.1.1	Geometrical Accuracy Tests shall be in accordance with ISO 10791 standard or equivalent applicable standard. Detailed Test Charts for the same, clearly showing the accuracies to be achieved on the machine, shall also be submitted with the offer.	Vendor to confirm	

16.1.2	All the 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	
16.2	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 – 2 (latest revision) using laser interferometer.	Vendor to confirm	
16.2.1	Positioning Accuracy on all traversing axes (Pa per 1000mm)	± 0.016 mm	
16.2.2	Repeatability on all traversing axes (Ps per 1000mm)	± 0.008 mm	
16.2.3	All the above accuracies to be demonstrated to BHEL engineers during pre-acceptance at Suppliers works and during Erection & Commissioning at BHEL Works	Vendor to confirm	
17.0	AMBIENT CONDITIONS & THERMAL STABILITY:		
17.1	Power Supply : AC 415 V ±10% Frequency : 50 Hz ±3HZ Phases : 3 phase 3 wire system Compressed air supply: 60-70 psi Ambient Temperature: max 45 °C Relative Humidity = 85% Vendor to confirm that machine is suitable for above conditions	Vendor to confirm	
17.2	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	
17.3	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	
17.4	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	

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDER'S OFFER With Technical Details
18.0	PROVEOUT OF BHEL COMPONENTS:	
18.1	<p>1. Drawings of prove-out components are enclosed. Please refer Annexure 1 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 cutting tools, job holding fixtures, 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
19.0	MACHINE ACCEPTANCE: (Tests/Activities should be Performed by Vendor)	
19.1	Tests/Activities should be carried out at supplier's works on the machine before dispatch:	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
19.1.1	Geometrical accuracies as per test chart.		
19.1.2	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 – 2 (latest revision) using laser interferometer.	Vendor to confirm	
19.1.3	The machine should be tested for continuous running of 48 hrs. If any break down occurs during this test, the test should be repeated for 48 hrs from restarting.	Vendor to confirm	
19.1.4	Demonstration of all features of the machine, control system & accessories.	Vendor to confirm	
19.1.5	Machining of test piece as per NAS/AFNOR/ISO. Vendor to supply test piece and tooling for it's machining.	Vendor to confirm	
19.2	Tests/Activities should be carried out at BHEL works while commissioning the machine:		
19.2.1	Geometrical accuracies as per test chart.		Vendor to confirm
19.2.2	Machine positioning accuracies & repeatability should be measured as per VDI/DGQ 3441 / ISO 230 – 2 (latest revision) using laser interferometer.	Vendor to confirm	
19.2.3	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor to confirm	
19.2.4	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 restarting.	Vendor to confirm	
19.2.5	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	
19.2.6	Prove-out machining.	Vendor to confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDER'S OFFER With Technical Details
19.2.7	Machining test piece as per NAS/AFNOR/ISO. Vendor to arrange Test pieces and tooling for it's machining.	Vendor to confirm	
20.0	PACKING		
20.1	Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes.	Vendor to specify	
21.0	GUARANTEE		
21.1	12 months from the date of acceptance of the machine at BHEL OR 18 months from dispatch, whichever is earlier		
22.0	GENERAL		
22.1	Machine Model:	Vendor to furnish	
22.2	Total connected load (KVA):	Vendor to furnish	
22.3	Floor area required (Length, Width, Height) for complete machine & accessories:	Vendor to furnish	
22.4	Painting of Machine / Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint)	Vendor to confirm	
22.5	Total weight of the machine: Vendor to specify	Vendor to furnish	
22.6	Weight of heaviest part of machine:	Vendor to furnish	
22.7	Weight of the heaviest assembly / sub-assembly of the Machine:	Vendor to furnish	
22.8	Dimensions of largest part/ sub-assembly/ assembly of the machine:	Vendor to furnish	
22.9	Lifting arrangement of the machine / it's sub-assys.	Vendor to furnish	

Annexure – 1: Table Showing Prove-out component list and operations.

Annexure – 2: Sketch showing approximate configuration of the machine.

ANNEXURE - I**Prove out Job details for VMC**

Sl. No	Job	Prove out Qty	Drawing No.	Operations
1	CAM (Type 1194)	1	2 – 80 – 999- 99344 1 – 80 – 999- 99065	Drilling, reaming, profile milling
2	CAM (Type 1174)	1	2 – 80 – 999- 99324 1 – 80 – 999- 99059	Drilling, reaming, profile milling

PPD

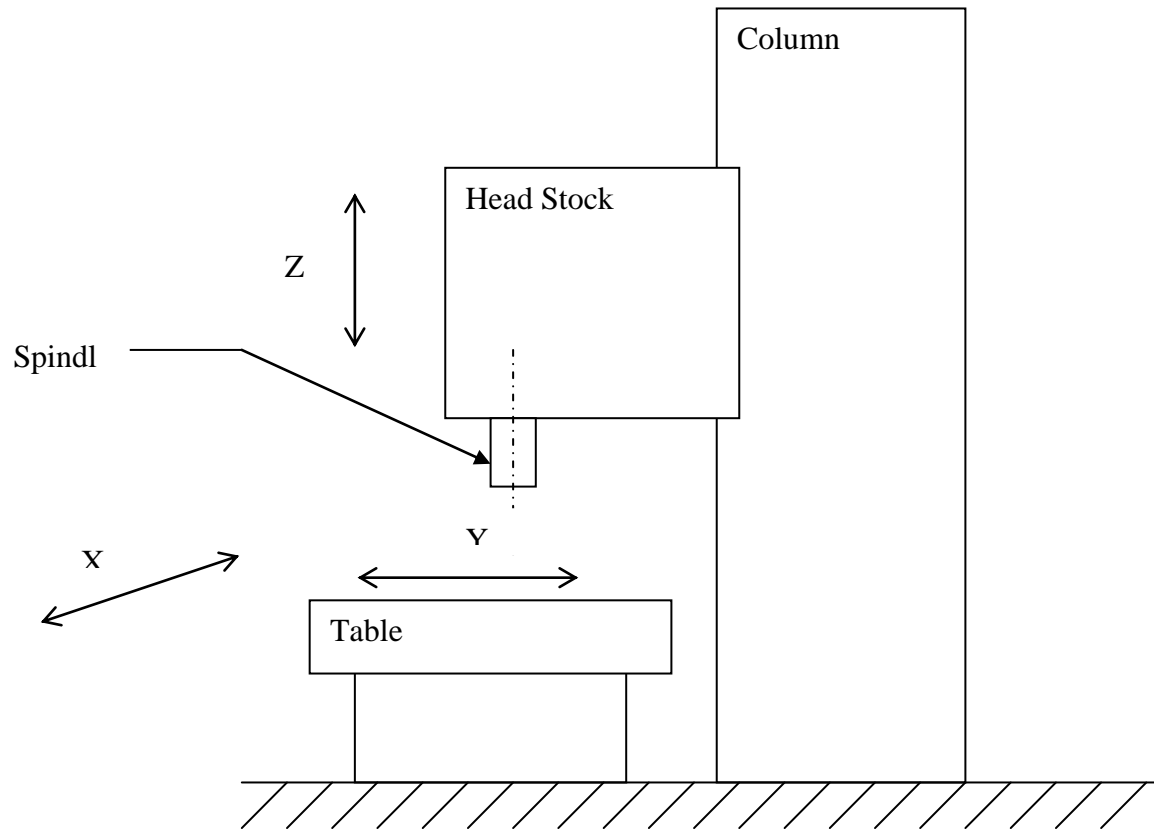
KPL

RSR

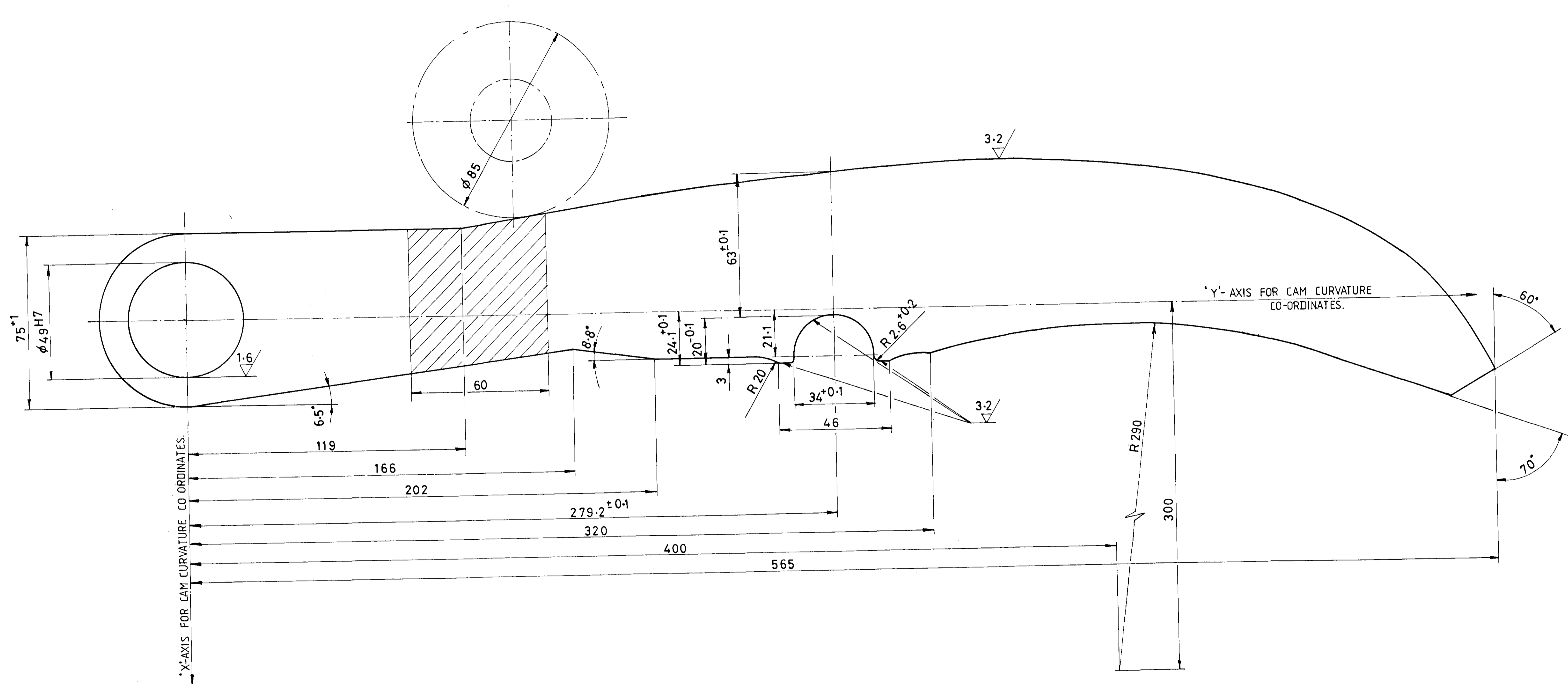
RDS

NRM

**Annexure-2: Approximate Configuration of
CNC Vertical Milling**



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NOTES.

- AFTER MACHINING ITEM TO BE ELECTROPLATED WITH ZINC AND YELLOW CHROMATISED FOR $10 - 15 \mu$
- FOR CO-ORDINATES OF THE CAM CURVATURE REFER DRG.No: 2-80-999-99324.
- PLATE AS PER SPECIFICATION SA 299 CAN ALSO BE USED IN PLACE OF SA 515 Gr 70

FITTING DIMENSION.	UPPER DIMENSION.	LOWER DIMENSION.
49H7	49.025	49.000

VARIANT NUMBER	ITEM NUMBER	DESCRIPTION	UNIT	DRAWING NUMBER	ITEM NO	MATERIAL CODE	UNIT WEIGHT	ZONE
		PLATE T=60 110 x 602.5		1-80-999-99059		15-942-121 SA-515-Gr70	17.800	

DEPT	GRADE OF UNTOOL DIM	SCALE	WEIGHT (KG)	REF. TO ASSY./OLD DRG./	DATE	NO. OF VAR.
	C/M/F	N.T.S	17.800	56129 +1-5637/04	23-11-93	

REV	DATE	ALTERED	REV	DATE	ALTERED
02		APPROVED.	01		APPROVED.

TITLE	CARD CODE	DRAWING NO.	REV
CAM TYPE: 1174	U 01	1-80-999-99059	00

