



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

MATERIALS MANAGEMENT / CAPITAL EQUIPMENT

ENQUIRY

Phone: +91 431 257 79 38
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Enquiry Number:	Enquiry Date:	Due date for submission of quotation:
2620800085	22.08.2008	26.09.2008

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	Plasma Transferred Arc Welding Equipment as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 No.	30.06.2009

BHEL commercial terms & conditions with Price Bid and Bank Guarantee formats 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 “2620800085”.

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

Manager / MM / Capital Equipment

PART A

CNC PLASMA TRANSFERRED ARC WELDING EQUIPMENT

SECTION – I : QUALIFYING CRITERIA

The BIDDER has to compulsorily meet the following requirements to get qualified for considering the technical offer for the CNC PLASMA TRANSFERRED ARC WELDING EQUIPMENT

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	Only those vendors (OEMs), who have supplied and commissioned at least ONE PLASMA TRANSFERRED ARC WELDING EQUIPMENT for hard-facing application, 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. 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).	
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. For obtaining the performance certificate from the customer, a suggestive format is provided 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, to whom plasma transferred arc welding equipment have been supplied in the past.	
4.0	Details of plasma transferred arc welding equipment supplied to other BHEL units, if any. (Year of commissioning, application of machine)	
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. Performance of the Machine (Strike off whichever is not applicable)	Best in the market / Satisfactory / Good / Average / Not Satisfactory
6. Any Other remarks	
<div style="display: flex; justify-content: space-between; align-items: flex-end; padding: 10px;"> <div>Date:</div> <div>Signature & Seal of the Authority Issuing the Performance Certificate</div> </div>	

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PART - B**SPECIFICATION FOR CNC PLASMA TRANSFERRED ARC WELDING EQUIPMENT - TABLE DIA 1500 MM**

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
1.0	PURPOSE: The CNC Plasma Transferred Arc (PTA) Hard-Surfacing System is required for multi-pass, multi-layer surfacing on circular , rectangular, square, cylindrical and conical components meant for manufacturing Valves components.	
1.1	JOB: Hard facing of Discs, Wedges, Seat Rings etc made of Carbon Steel, Low Alloy Steel & Stainless Steel used in Industrial Valves, using Stellite Gr.6, Stellite 21, Hayness Alloy No.25 or equivalent hard facing materials in powder form.	
1.2	Size of Job: a) Circular Jobs : Dia. 50 mm to 1250 mm Thickness 400 mm (max) b) Others: 400 mm x 400 mm (max) Thickness 70 mm (max) c) Maximum weight of job: 1400 Kg. Width of Deposit: 6 mm to 70mm Width of deposit per pass: 6 mm to 50 mm Max. Thickness of Deposit: 8 mm Max. Number Of Layers: 4 The configuration of jobs are indicated in Annexure - I	Vendor to confirm

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
1.3	The hard faced surface will be subject following methods of inspection: a) Liquid penetrant inspection. b) Hardness measurement. c) UT for ensuring bonding.	Vendor to confirm
1.4	The hard faced surface shall be free from cracks and pinholes. Perfect metallic bonding shall be achieved between the parent material and the hard facing material. With Stellite 6, a hardness in the range 400 to 430 BHN shall be achieved.	Vendor to confirm
2.0	Specification	
2.1	Indicative Machine Configuration is indicated in Annexure-2	
2.2	PTA Welding Power Source	
2.2.1	Main power source	
2.2.2	Type: Inverter type	Vendor to confirm
2.2.3	Rating: 350A, 100% duty cycle, DC	Vendor to confirm
2.2.4	Welding Current Range: 15 to 350A	Vendor to confirm
2.2.5	Welding Voltage Range: 10 to 40V	Vendor to confirm
2.2.6	OCV: 70 Volts	Vendor to confirm
2.2.7	Pilot Power Source	
2.2.7.1	Rating: 100A, 100% duty cycle, DC	Vendor to confirm
2.2.7.2	Current Range: 1 to 100A	Vendor to confirm
2.2.7.3	Voltage Range: 10 to 40V	Vendor to confirm
2.2.8	The power source shall be provided with input device with display & on screen menu to enable programming of welding parameters. Necessary software shall be included in the supply. It should be possible to set all welding parameters associated with power source through CNC part program also. Vendor to provide details of the offered software and also indicate the memory size for program storage and the no. of programs that can be stored.	Vendor to specify

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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDERS OFFER With Technical Details
2.3	Gas supply unit with Electronically Adjustable Gas flow controller		
2.3.1	The gas supply unit shall be provided with three different gas flow lines & indicators - one for Argon as plasma gas, the second for Argon as powder feeding gas and the third for Argon as welding shielding gas.	Vendor to confirm	
2.3.2	The gas flow shall be electronically adjustable. Vendor to specify the range of adjustability for the following : a) Pilot Gas b) Powder Transport Gas c) Shielding Gas Vendor to indicate the parameters	Vendor to specify	
2.3.2.1	The accuracy level of adjustability shall be around $\pm 1\%$. Vendor to indicate the accuracy level.	Vendor to furnish	
2.3.3	Vendor to indicate the working pressure and the low gas switch point.	Vendor to specify	
2.4	Cooling unit:		
2.4.1	A refrigerated type water cooling unit, of suitable capacity, shall be offered, to provide chilled water at constant temperature, for cooling of the torch.	Vendor to confirm	
2.4.2	Vendor to indicate the capacity of the refrigerant type chiller offered.	Vendor to furnish	
2.5	Ignition unit:		
2.5.1	High frequency arc ignition unit complete with gas, water, power, controls & torch connections for pilot arc ignition.	Vendor to confirm	
2.6	Control unit:		
2.6.1	PLC based CNC system for control of entire welding cycle, including powder feeding system, Gas flow rates , Torch oscillation (U axis), and linear axes (X, Y, Z).	Vendor to confirm	

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
2.7	Powder Feeding system:	
2.7.1	Positive feed type suitable for feeding powder of particle size from 45µm to 250µm without additional mechanical vibrator unit	Vendor to confirm
2.7.2	Should be capable of adjusting powder feed rate automatically during upslope & downslope time of welding current. Vendor to furnish the details of the powder feed system, the powder feeding adjusting mechanism. The powder feeding system shall preferably be wheel type using transport gas.	Vendor to furnish details
2.7.3	Working pressure:	Vendor to specify
2.7.4	Powder Feed Rate: 0.5 to 10 Kg / hour	Vendor to confirm
2.7.5	Transport Gas flow rate:	Vendor to specify
2.8	Mechanical Torch Oscillation Device: (U-Axis)	
2.8.1	Drive: AC servo motor	Vendor to confirm
2.8.2	Oscillation width:	Vendor to specify
2.8.3	Oscillation speed :	Vendor to specify
2.8.4	Dwell time left / right: 0 to 60 sec.	Vendor to confirm
2.8.5	For carrying out concentric layers of weld surfacing without interruption of welding, it should be possible to shift the zero position of the oscillation unit to the desired centre of the next concentric layer, under program control, with necessary overlap at the end of each pass.	Vendor to confirm
2.9	Arc Voltage Control (AVC)	
2.9.1	Voltage setting range:	Vendor to specify
2.9.2	The control accuracy shall be 0.1 V	Vendor to confirm
2.9.3	Should have provision to switch on & off, Jog up/down.	Vendor to confirm

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
2.10	Operator panel	
2.10.1	Fixed / Swiveling type operator's panel having complete PLC machine control system of required configuration shall be provided on the operators platform. Layout showing complete details should be submitted.	Vendor to confirm and furnish details
2.10.2	The operating panel shall be used for presetting welding parameters. Preset & actual welding parameters shall be digitally displayed.	Vendor to confirm
2.10.3	Remote Pendant Control : A hand held control unit with 10 Mtrs. Long extension cable shall be provided. This hand held unit shall have provision for controlling welding current, powder feeding, welding On/Off.	Vendor to confirm:
2.10.4	It should be possible to manually set following parameters at the operators panel.	
	a) Pre-flow / Post-flow / Flow during welding for Pilot Gas, Powder Transport	Vendor to confirm
	b) Gas & Shield Gas	Vendor to confirm
	c) Pilot Arc Current	Vendor to confirm
	d) Transfer Arc Current	Vendor to confirm
	e) Upslope / downslope of welding current	Vendor to confirm
	f) Crater (end) current and Crater (end) Current duration	Vendor to confirm
	g) Arc Voltage	Vendor to confirm
	h) Powder feeding start delay time	Vendor to confirm
	i) Upslope / downslope of powder feed rate	Vendor to confirm
	j) Powder feeding rate (in kg/hour)	Vendor to confirm
	k) Oscillation amplitude / speed	Vendor to confirm
	l) Oscillation start / stop delay time	Vendor to confirm
	m) Dwell left / right	Vendor to confirm
	It should be possible to set these parameters through CNC Part Program also.	Vendor to confirm

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
2.11	3 Axis Mechanical Manipulator :	
2.11.1	An indicative configuration of the M/C is enclosed in annexure – II. Vendor to furnish the layout showing the general arrangement of the offered machine	Vendor to furnish
2.11.2	X axis (Horizontal Axis) drive: AC Servomotor	Vendor to confirm
2.11.2.1	Traverse length: 2000 mm	Vendor to confirm
2.11.2.2	Travel Speed: (infinitely variable)	Vendor to specify
2.11.2.3	Min / Max. distance of torch from column face:	Vendor to specify.
2.11.3	Y axis (Vertical Axis) Drive: AC Servo motors	Vendor to confirm
2.11.3.1	Traverse length: 1000 mm	Vendor to confirm
2.11.3.2	Traverse speed: (infinitely variable)	Vendor to specify.
2.11.3.3	Min. distance of Torch Tip from table:	Vendor to specify.
2.11.4	Z axis (Transverse Axis) Drive: Servomotor	Vendor to confirm
2.11.4.1	Traverse 500 mm	Vendor to confirm
2.11.4.2	Traverse speed: (infinitely variable)	Vendor to specify
2.11.5	The axes slides are to be protected against dust by metal covers / bellows	Vendor to confirm
2.11.6	Make of feed-back encoders : Heidenhain / Fanuc / Seimens.	Vendor to specify
2.11.7	The AC servo drives shall be of Fanuc / Seimens make or any other reputed make acceptable to BHEL.	Vendor to specify
2.12	Tiltable Turn Table :	
2.12.1	Welding turn table for clamping, rotation (B axis) and tilting (C-axis) of work pieces.	Vendor to confirm
2.12.2	Display of angle of tilt and speed of rotation shall be available on the operator's panel.	Vendor to specify
2.12.3	Weight carrying capacity: 1500 kg.	Vendor to confirm

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDERS OFFER With Technical Details
2.12.4	Dia. of table: Around 1500 mm with minimum 4 radial T-slots. Vendor to specify size of table and T slots	Vendor to specify	
2.12.5	Central Hole: Dia. 40 mm (max)	Vendor to specify	
2.12.6	Max. height of table top (horizontal) from floor: around 1000 mm	Vendor to confirm	
2.12.7	Rotation Speed	Vendor to specify	
2.12.8	Tilting angle: 0° to 90°	Vendor to confirm	
2.12.9	Tilting speed:	Vendor to specify	
2.12.10	Tilting torque of the table	Vendor to specify	
2.12.11	The bearings of table shall be protected from damage due to welding current by providing suitable earthing arrangement.	Vendor to confirm	
2.14	PTA Torch Holder:		
2.14.1	Torch holding arrangement vendor to specify	Vendor to specify	
2.14.2	Torch adjustment in vertical & horizontal directions -around 60 mm	Vendor to specify	
2.15	Plasma Powder Welding Torch		
2.15.1	Type: Water Cooled Heavy Duty machine welding torch – Vendor to furnish details of torch	Vendor to furnish	
2.15.2	Rating: 15-350A (100% duty cycle)	Vendor to confirm	
2.15.3	Deposition Rate: 10 Kg/hour.	Vendor to confirm	
2.15.4	Size of tungsten electrode	Vendor to specify	
2.16	CONSTRUCTION:		
2.16.1	Vendor to furnish material, hardness of guideways & constructional details , including explanatory drawings, of various components/ assemblies like Powder feed system, Torch Oscillation unit, Torch holder, Torch, Guideways/ slides, Telescopic covers, Accessories, lubrication system, feed back system etc. of the machine.	Vendor to furnish	

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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDERS OFFER With Technical Details
2.16.2	Video images on CD including hard copy explaining the technical features / Literature with photographs, drawings explaining the technical features should be enclosed with the offer	Vendor to furnish	
2.16.3	The machine shall be metric execution	Vendor to confirm	
2.17	First fill of oil and grease shall be in the scope of vendor.		
3.0	CNC SYSTEM & FEATURES		
3.1	The CNC system shall be Fanuc / Seimens / any other reputed make acceptable to BHEL. Vendor to furnish make, model no. and details of the offered system	Vendor to specify	
3.2	Details of Standard features of the CNC system :List to be Submitted by vendor	Vendor to furnish	
3.3	Details of optional features, recommended by vendor. Vendor to give details.	Vendor to furnish	
3.4	Vendor to list the machine specific CNC program codes to be defined by the machine builder.	Vendor to specify	
3.5	The system should have full alphanumeric keyboard, TFT colour display (preferably 17"), additional draw-out type QWERTY Key Board and mouse in suitable enclosure, USB ports, 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 furnish	
3.6	Provision for automatic safe shut down of CNC Control in case of Power Failure	Vendor to confirm	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDERS OFFER With Technical Details
3.7	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, feed on/off, display of axis position values etc. for manual operation without using CNC program or MDI mode. Diagrams/ sketches for switches/ keys provided on operator's pendent should be submitted.	Vendor to confirm	
3.8	UPS FOR CNC SYSTEM: UPS of 30 minutes for CNC system with inbuilt cooling.	Vendor to confirm	
4.0	MACHINE LIGHTS:		
4.1	Machine Lights for sufficient illumination of complete working area should be provided for clear visibility.	Vendor to confirm	
4.2	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to confirm	
4.3	Flashing / rotary type End of Cutting and Program Stop Light.	Vendor to confirm	
5.0	AIRCONDITIONERS: Air Conditioners with Dehumidifiers of suitable / sufficient capacity should be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Detailed specifications of the same to be submitted. Make: Rittal / Warner & Finley or any other reputed make acceptable to BHEL. Details to be submitted.	Vendor to furnish	

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
6.0	ELECTRICAL:	
6.1	415V \pm 10% , 50HZ \pm 3 HZ, 3 Phase AC (3 wire system without neutral) Power Supply Voltage will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthing with required material details is to be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Vendor to confirm
6.2	Tropicalisation: All electrical / electronic equipment shall be tropicalized	Vendor to confirm
6.3	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor to confirm
6.4	All electrical components should be mounted on DIN Rail	Vendor to confirm
6.5	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
6.6	Motors shall conform to IEC or Indian Standards	Vendor to confirm
6.7	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
6.8	Vendor should ensure the proper earthing for the machine and its peripherals	Vendor to confirm

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
7.0	<p>SAFETY ARRANGEMENTS: Following safety features in addition to other standard safety features should be provided on the machine:</p> <ul style="list-style-type: none"> a) Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available. b) A detailed list of all alarms / indications provided on machine should be submitted by the supplier. c) All the hoses, 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. d) Emergency Switches at suitable locations as per International Norms are to be provided. <p>Water pipe lines should not run with electrical cable in the same tray / trench.</p>	Vendor to confirm & furnish
8.0	<p>ENVIRONMENTAL PERFORMANCE OF THE MACHINE: The Machine shall conform to following factors related to environment :</p> <ul style="list-style-type: none"> a) Maximum noise level shall not exceed 85 dB(A) at normal load condition, 1 M away from the machine. b) There shall not be any emissions from the machine except fumes and light during welding. c) If any safety / environmental protection enclosure is required it should be built in the machine by the vendor. d) Paint of the machine should be oil resistant and should not peel off. 	Vendor to confirm

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
9.0	DIAGNOSTIC SYSTEM	
9.1	FAULT DIAGNOSTIC SYSTEM Supplier's own diagnostic system with required hardware and software should be supplied and installed. This should include standard auto-diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display.	Vendor to confirm
9.2	Help guide should be provided to use both diagnostic systems	Vendor to confirm
10.0	PORTABLE PG UNIT: (Optional) Portable Data loading device (PG Unit) with sufficient length of interfacing cable, HDD of size not less than 40GB, CD Drive, TFT Display of size 14” and suitable preinstalled software for loading PLC program, Machine data and CNC part programs shall be supplied with the machine. Vendor shall give details.	Vendor to confirm and furnish details
11.0	SPARES:	
11.1	Itemized breakup of mechanical, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor.	Vendor to furnish
11.2	The vendor to offer the following mandatory spares : Mechanical spares - Welding Torch – 2 sets complete with hoses for gas, powder and power cables. Welding Nozzles – 10 sets Sealing O rings – 50 nos. in each size Tungsten electrode – 10 nos. of offered sizes Electric / Electronic spares – All types of Relays – 1 set Contactors – 1 set	Vendor to furnish

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
11.2 (Contd.)	Proximity switches – 1 set Push Buttons – 1 set Indicating lamps – 1 set Semiconductors fuses – 1 set Circuit breakers – 1 set Main Power switch – 1 set I/O cards for PLC – 1 set Power module & control cards for feed drives – 1 set	
11.3	All types of spares for total machine and accessories should be available for at-least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure them in advance, if required	Vendor to confirm
11.4	Vendor to confirm that complete list of spares for machine and accessories, along with specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	Vendor to confirm
12.0	Portable electrode grinding/dressing equipment: Vendor shall quote for a portable electrode grinding equipment for grinding the tungsten rod, of size recommended for use on this PTA. Vendor to furnish the make, model and technical details of the offered grinder	Vendor to confirm & furnish
13.0	TRAINING	
13.1	The Vendor shall train Two BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) of the Machine at Vendor's works for a period of 5 working days.	
13.2	Air-fare, boarding & lodging for the trainees shall be borne by BHEL	

Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDERS OFFER With Technical Details
13.3	The Vendor shall impart training to BHEL's Operators and Maintenance crew in Operation and Maintenance after the commissioning of the Machine at BHEL works for not less than 6 working days		
13.4	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel.		
13.5	Vendor to quote on per man per day basis for training at vendor's works		
14.0	FOUNDATION:		
14.1	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 Isolation Transformer, & any other accessories. BHEL shall construct complete foundation for the machine.		
14.2	The Vendor shall indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.		
15.0	LEVELING & ANCHORING SYSTEM Complete anchoring system including foundation bolts, anchoring materials, fixators, leveling shoes etc should be supplied	Vendor to confirm	
16.0	TOOLS FOR ERECTION, OPERATION & MAINTENANCE: Special tools and equipment required for erection and necessary tools like Torque Wrench, Spanners, Keys, grease guns etc.for operation and maintenance of the machine should be supplied.	Vendor to confirm	

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
17.0	ERECTION & COMMISSIONING	
17.1	<p>1. Supplier to take full responsibility for supervision of erection. Start-up, testing of the machine it's control system and all types of other supplied equipment and hard facing deposition on the test pieces 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> <p>3. Other requirements like crane and helping personnel shall also be provided by BHEL, free of cost.</p>	Vendor to confirm
17.2	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests under clause (Machine Acceptance) shall form part of the commissioning activity.	Vendor to confirm
17.3	The supplier should bring tools, Tackels, instruments, laser equipment and other necessary equipments required to carry out all above activities.	Vendor to confirm
17.4	The supplier shall arrange commissioning spares required for commissioning of the machine	Vendor to confirm
17.5	All Cover Plates required for the machine and its peripherals including pits, if any, shall be supplied and installed by the vendor.	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.	Vendor to confirm
17.7	<p>Schedule of Erection and Commissioning shall be submitted with the offer.</p> <p>Charges, duration, terms & conditions for E&C should be furnished in detail</p>	Vendor to furnish

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Clause	PARTICULARS AND BHEL SPECIFICATION		BIDDERS OFFER With Technical Details
18.0	MACHINE POSITIONING ACCURACIES & REPEATABILITY		
18.1	Positioning Accuracy on traversing axes (Pa per 1000mm)	Vendor to specify	
18.2	Repeatability on traversing axes (Ps per 1000mm)	Vendor to specify	
19.0	AMBIENT CONDITIONS & THERMAL STABILITY		
19.1	Power Supply : AC 415 V \pm 10% Frequency : 50 Hz \pm 3HZ 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	
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	
20.0	PROVEOUT OF BHEL COMPONENTS :		
20.1	1. One job each of the configuration shown in annexure- I and from within the range of sizes indicated in Cl. 1.2 will be identified for prove-out at BHEL works 2. The prove-out job material will be supplied by BHEL	Vendor to confirm	

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details	
20.1 (Contd.)	<p>3. Prove-out will consist of making defect free hard facing deposition using satellite gr.6</p> <p>4. The stellite 6 powder and tungsten electrode for prove-out jobs shall be arranged by BHEL</p> <p>5. The acceptance criteria will be as mentioned in cl. 1.4, using inspection methods specified in cl. 1.3</p> <p>6. The procedure for hard facing for the prove-out components shall be furnished along with the offer.</p> <p>7. The vendor shall be fully responsible for the hardfacing of the prove-out components meeting the requirements in cl. 1.4</p>		
21.0	MACHINE ACCEPTANCE: (Tests/Activities should be Performed by Vendor)		
21.1	Tests/Activities to be carried out at supplier's works on the machine before dispatch:		
21.1.1	Demonstration of all features of the machine, control system & accessories	Vendor to confirm	
21.1.2	<p>Hard facing of test piece:</p> <p>Weld test specimen, stellite 6 powder, tungsten electrode and other consumables shall to be arranged by vendor</p> <p>Vendor shall demonstrate, 3 Kg satellite deposition without interruption. The test specimen shall be designed to obtain a weld deposit depth of 4 mm. A two pass two layer weld deposition shall be planned.</p> <p>The weldment, shall be machined for a depth of about 0.5 / 1 mm and the weldment shall be subject to tests mentioned in Cl. 1.3 and shall meet the requirements of Cl. 1.4</p>	Vendor to confirm	

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
21.2	Tests/Activities to be carried out at BHEL works while commissioning the machine :	
21.2.1	Hardfacing of test piece at vendors works, shall be repeated at BHEL works. The test specimen, stellite 6 powder and tungsten electrode shall be arranged by the vendor.	Vendor to confirm
21.2.2	Full load test to demonstrate the maximum weight carrying capacity of the table.	Vendor to confirm
21.2.3	Demonstration of all features of the machine, control system & accessories.	Vendor to confirm
21.2.4	Prove out of BHEL components	Vendor to confirm
22.0	Documents: Three sets of following documents (Hard copies) in English language should be supplied along with the machine	Vendor to confirm
22.1	Operating manuals of Machine & CNC system	
22.2	Programming Manuals of Machine & CNC system	
22.3	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Powder/ Gas / Cooling Water circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also	
22.4	Maintenance, Interface & commissioning manuals for CNC system & feed drives.	
22.5	Manufacturing drawings for all supplied Torch Nozzles, Hose connectors etc.	
22.6	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.	
22.7	Detailed specification of all rubber items and lube fittings	
22.8	Specification of recommended Stellite 6 powder. Addresses of suppliers of stellite 6 powder to this specification.	

Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
22.9	Bearings: Make, Specification and Bearing number for all bearings used in the machine.	
22.10	Ball Screws: Detailed Specification for all ball screws used in the machine. The specification shall address the following points: Diameter, Pitch, Make, Model	
22.11	Operating Manuals, Maintenance Manuals & Catalogues for supplied Isolation Transformer and all supplied Accessories.	
22.12	PLC program print-outs (Ladder diagram and statement list) with comments in English.	
22.13	PLC program on CD, NC data & PLC data on CD.	
22.14	Complete back-up of hard disk on CD and clear written Instructions (3 copies) to take back-up and reloading of a new hard disk	
22.15	Complete Master List of parts used in the machine shall be submitted by the vendor.	
22.16	One additional set of all the above documentation on CD ROM, wherever possible.	
23.0	PACKING: Sea worthy & rigid packing for all items of complete machine, CNC System, all Accessories and other supplied items to avoid any damage/loss in transit. When machine is despatched in containers, all small loose items shall be suitably packed in boxes	Vendor to confirm
24.0	GUARANTEE: The vendor shall guarantee the machine with all its systems and sub-systems for 24 months from the date of acceptance of the machine at BHEL	Vendor to confirm
25.0	GENERAL	
25.1	Machine Model:	Vendor to specify

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Clause	PARTICULARS AND BHEL SPECIFICATION	BIDDERS OFFER With Technical Details
25.2	Total connected load (KVA):	Vendor to specify
25.3	Floor area required (Length, Width, Height) for complete machine & accessories:	Vendor to specify
25.4	Painting of Machine / Electrical Panels : RAL 6011 Apple Green (Polyurethane Paint)	Vendor to confirm
25.5	Total weight of the machine:	Vendor to specify
25.6	Weight of heaviest part of machine:	Vendor to specify
25.7	Weight of the heaviest assembly / sub-assembly of the Machine:	Vendor to specify
25.8	Dimensions of largest part/ sub-assembly/ assembly of the machine:	Vendor to specify

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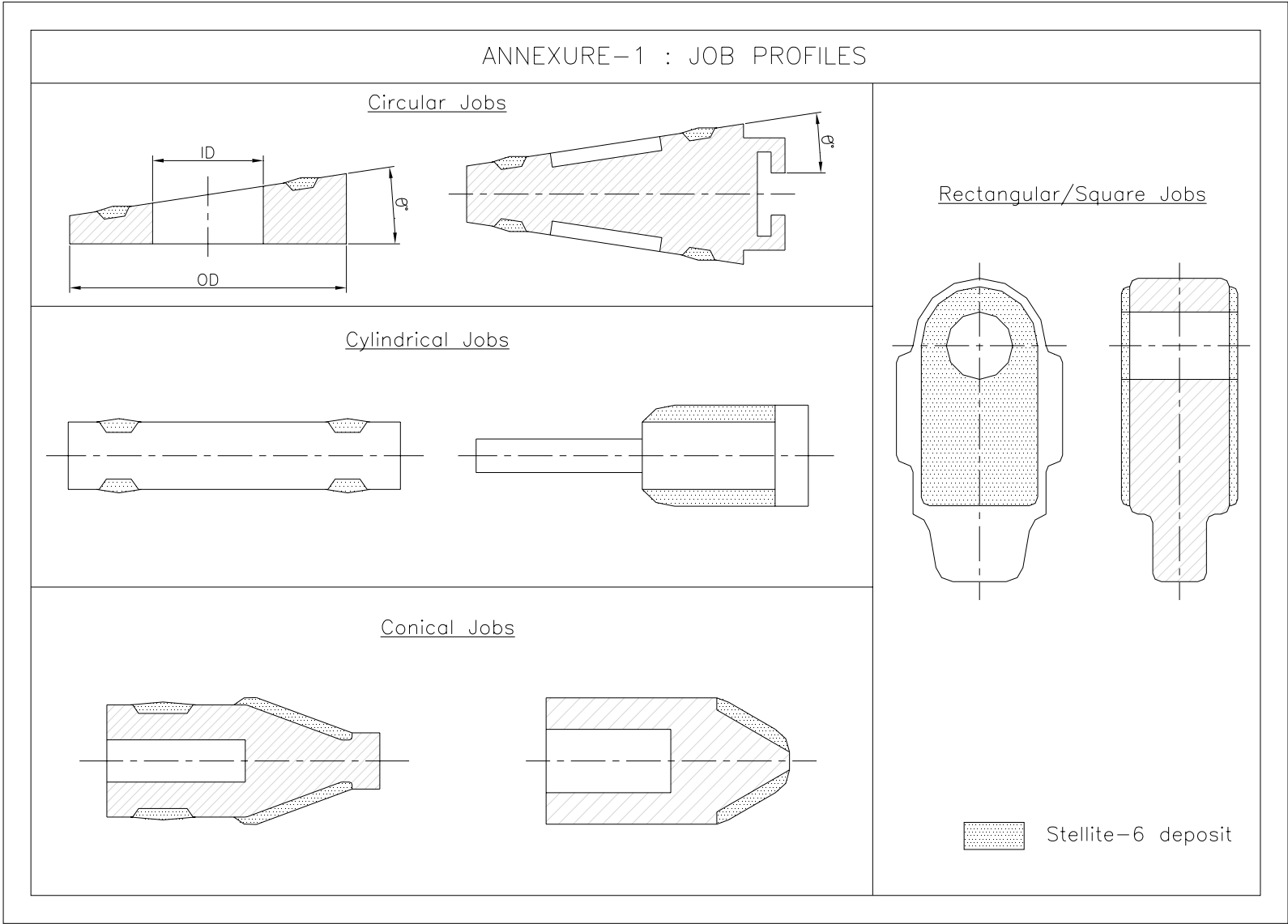
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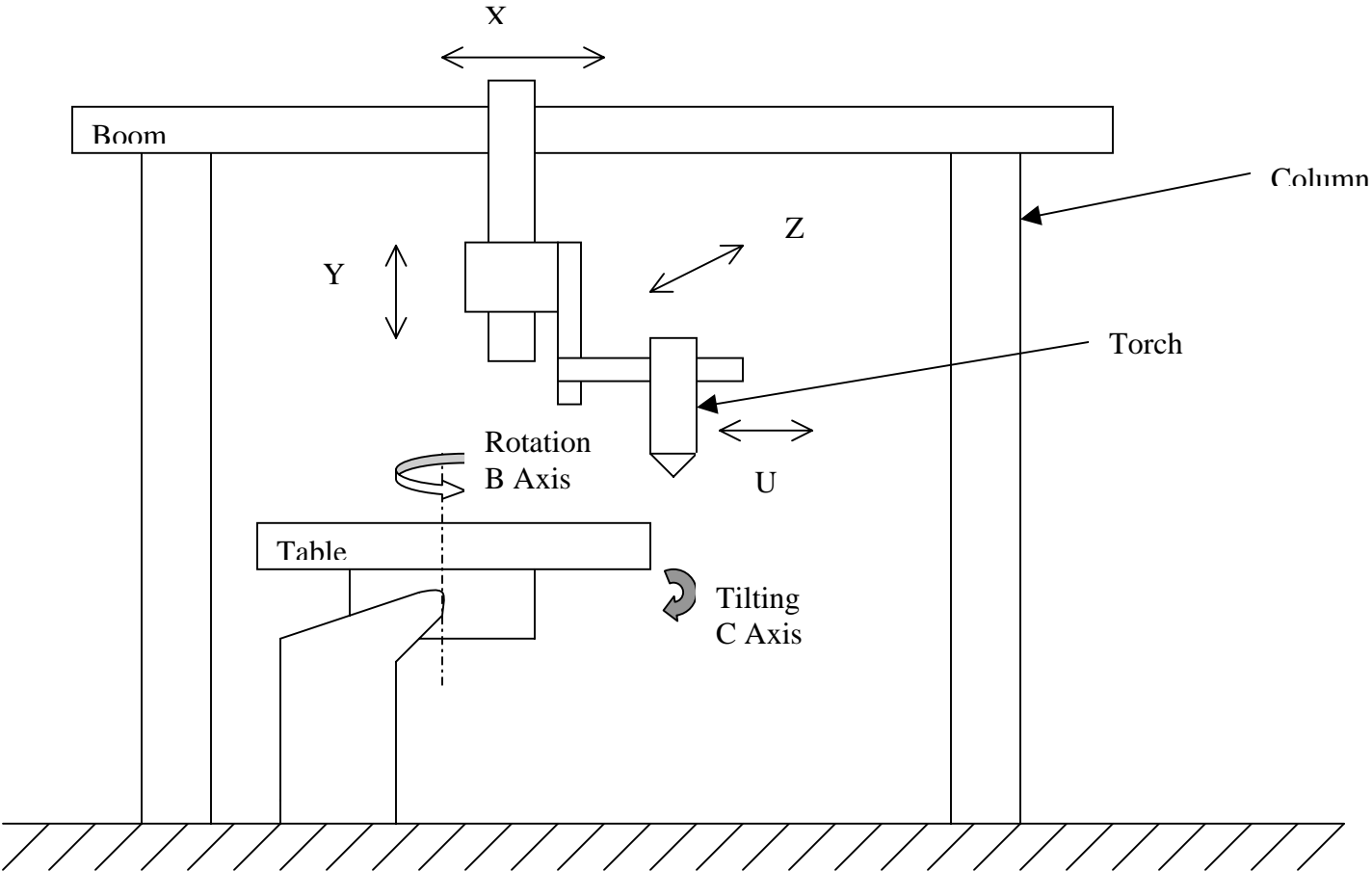
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Annexure-2: Indicative Configuration of PTA Welding Machine.



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