

# **TECHNICAL SPECIFICATION OF CNC EDM WIRE CUT MACHINE**

## **NOTE:-**

1. The vendors must submit complete information against all the clauses of the Pre-Qualifying conditions (attached separately as Pre-Qualifying conditions for CNC EDM Wire cut Machine). The offers from the vendors meeting all the clauses of Pre-Qualifying Requirements would only be processed.
2. The vendors should offer all the specified requirements mentioned in the specifications and scope of supply below, confirm compliance in their offer against all clauses and in case of "Deviation", it should be mentioned clearly in the column provided. Duly filled specifications with compliance against all clauses should be submitted along with the offer. Inadequate, incomplete, ambiguous or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance.
3. The offer and all the documents enclosed with the offer should be in English language only.

## **SPECIFICATIONS & SCOPE OF SUPPLY OF CNC EDM WIRE CUT MACHINE**

SN.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	ACCEPTED (YES/NO)	DEVIATION	REMARKS
1.0	<b>PURPOSE:</b>				
	EDM wire cut machine with 4 axis or more, Linear & servo/stepper motor drive; with latest software, pulse generator and dielectric system. This machine is required for Tool Room applications like manufacturing of gauges, templates, gears, cams & tools etc.	Vendor to offer			
2.0	<b>WORKPIECE SIZE:</b>				
2.1	Workpiece Length: 700mm or more	Vendor to offer & provide details			
2.2	Workpiece Width: 400mm or more	Vendor to offer & provide details			
2.3	Workpiece Height: 200mm or more	Vendor to offer & provide details			
2.4	Workpiece Weight 500kg or more	Vendor to offer & provide details			
3.0	<b>TECHNICAL SPECIFICATIONS:</b>				
3.1	<b>AXIS TRAVERSES:</b>				
3.1.1	X Axis Travel 400mm or more	Vendor to offer & provide details			
3.1.2	Y Axis Travel 500mm or more	Vendor to offer & provide details			
3.1.3	U Axis Travel 60mm or more	Vendor to offer & provide details			
3.1.4	V Axis Travel 60mm or more	Vendor to offer & provide details			
3.2	<b>Resolution</b>				
	0.001mm or lesser	Vendor to offer			
3.3	<b>Dimensional Accuracy</b>				
	± 0.007mm or better	Vendor to offer			
3.4	<b>Taper Angle</b>				
	± 15°/100 mm or more	Vendor to offer			
3.5	<b>Cutting Speed</b>				
	150mm sq/min. or more	Vendor to offer			
3.6	<b>Table positioning accuracy</b>				
	0.01 mm or better	Vendor to offer			
3.7	<b>No. of working Axes</b>				
	4 Axis or more	Vendor to offer			
3.8	<b>Job setting positioning accuracy</b>				
	0.01 mm or better	Vendor to offer			
3.9	<b>Least Input Increment</b>				
	0.001mm or better	Vendor to offer			
3.10	<b>Least Command Input</b>				
	± 0.001mm or better	Vendor to offer			
4.0	<b>TECHNICAL FEATURES:</b>				
4.1	<b>CNC System:</b> LCD column monitor with high speed & high precision CNC system with PC based control system (along with all essential accessories) with following features:	Vendor to offer			
4.1.1	Auto wire verticality, edge finding and centre finding	Vendor to offer			
4.1.2	On line edit facility and directory option	Vendor to offer			
4.1.3	Rotation of program	Vendor to offer			
4.1.4	Single block execution	Vendor to offer			
4.1.5	Resumption of cutting from "power failure" position	Vendor to offer			
4.1.6	Program transfer through USB Port and RS 232 interface	Vendor to offer			
4.1.7	Program memory (500GB or more)	Vendor to offer			
4.1.8	Data Input & Output system: USB Port with QWERTY keyboard & optical mouse, compatible with latest version of Autocad DXF/DWG files,	Vendor to offer			
4.1.9	<b>Processing &amp; Data entry:</b> Background data entry/ program entry should be possible while other program is under execution.	Vendor to offer			
4.1.10	<b>Display:</b> Graphic display of part showing wire position.	Vendor to offer			
4.1.11	<b>Interpolation:</b> Linear & Circular	Vendor to offer			
4.2	<b>Axes drive and Feedback (X, Y, U &amp; V)</b>				
4.2.1	LM guide ways for X & Y axes and Fine pitch lead screws for U & V Make, size etc. to be informed.	Vendor to offer & provide details			
4.2.2	AC servo/DC servo/stepper/linear motors with encoder feedback of suitable rating of all axes (Make, Rating, Model etc. to be informed)	Vendor to offer & provide details			
4.3	<b>Lubrication system:</b> Centralised recirculating lubrication system for complete machine.	Vendor to offer & provide details			
4.4	<b>Pulse Generator system:</b> of suitable rating to meet the required cutting speed and for stable machining without wire breakages & also with use of higher cutting speed on smaller thickness jobs.	Vendor to offer & provide details			
4.5	<b>Dielectric system:</b> Demineralized water with the following specifications:	Vendor to offer & provide details			
4.5.1	Tank with minimum capacity of 150 litre or more	Vendor to offer & provide details			

4.5.2	Filtration system to avoid contamination & degradation of dielectric medium	Vendor to offer & provide details			
4.6	<b>Wire feeding system</b> with the following features :	Vendor to offer & provide details			
4.6.1	To load wire spool. 6KM (in term of length) or more.	Vendor to offer & provide details			
4.6.2	To work with wire diameter of 0.20 mm or lesser	Vendor to offer & provide details			
4.6.3	Wire feed rate : 0 - 14 m/min	Vendor to offer & provide details			
4.6.4	Wire tension as required to achieve the surface finish of 1.6 Ra on wire cut surface.	Vendor to offer & provide details			
4.6.5	There should not be any requirement of changing wire guides for different wire diameter	Vendor to confirm			
4.7	<b>Work Table:</b> Leak proof, non-corrosive, Cast Iron work table				
4.8	<b>Part program Software:</b> Windows based licensed copy of the re-installable software for development of part program to be installed on the PC provided by BHEL. Software should have all required features including following features. Vendor to provide specifications of required PC.	Vendor to offer & provide details			
4.8.1	Graphics simulation	Vendor to offer & provide details			
4.8.2	Taper and offset change	Vendor to offer & provide details			
4.8.3	Direct conversion of Autocad drawing to part program	Vendor to offer & provide details			
4.8.4	LAN connection provision for communication with PC to machine	Vendor to offer & provide details			
4.9	<b>Operator Panel/Desk</b> with all the necessary switches required to operate the machine by single operator.	Vendor to offer & provide details			
4.10	<b>Pre wired Electrical Panel:</b> Air cooled Pre wired with CNC controller, Generator and other modules, LED light for illumination, 220V, 5 Amp service socket/switch and other switchgear including motor pump starter for dielectric unit etc. All solenoid, contactor, lamp etc. Outputs are to be routed through Phoenix/ Schneider like company makes channel relay boards and solenoids valves with fuses in series also.	Vendor to offer & provide details			
4.11	<b>Electrical cables:</b> Cables for the whole machine including all power cables for motors, control & signal cables for clutches, pneumatic valves, pressure switches, indicating bulbs, limit switches etc. The cables and wiring is required to be of reputed make company.	Vendor to offer & provide details			
5.0	<b>ACCESSORIES, TOOLINGS AND ATTACHMENTS:</b>				
5.1	The EDM Wire Cut Machine should be complete with standard accessories and toolings including coolant pump, tank & machine lamp (for sufficient illumination of work area).	Vendor to offer			
5.2	Cables and hoses including input cable, earthing cable, coolant hoses and also starter, switches, connectors, should be provided with safe conduits.	Vendor to offer			
5.3	Tool box (2 Nos.) containing tools required for day-to-day operation and maintenance of the machine such as Wrench, spanner, allen key, pliers, hand tools etc. List to be submitted with quantity.	Vendor to offer			
5.4	Set (01 No.) of instruments required for setting of job & wire.	Vendor to offer			
6.0	<b>SAFETY &amp; PROTECTION:</b> Machine must be equipped with safety and protection system as per the following:				
6.1	For CPU system, measuring circuits servo overload system, over travel limits, voltage fluctuation etc.	Vendor to offer			
6.2	All essential safety features for machine & machine operator.	Vendor to offer			
6.3	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, workpiece and the operator due to the malfunctioning or mistakes.	Vendor to confirm			
6.4	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			
6.5	Emergency Switches at suitable locations should be provided.	Vendor to confirm			
7.0	<b>ADDITIONAL INFORMATION:</b> Following information shall be supplied with the offer:				
7.1	Machine Model No.	Vendor to inform			
7.2	Total connected load (KVA)	Vendor to inform			
7.3	Space required (Length, Width, Height) for complete machine & accessories	Vendor to inform			
7.4	Catalogue of the machine	Vendor to submit			
7.5	Total weight of the machine	Vendor to inform			
8.0	<b>SPARES:</b>				
8.1	Vendor to provide the complete list of spares for machine and all accessories, along with specification/type/model and name & address of spare suppliers (including all bought out items) shall be furnished along with documentation to be supplied with machine.	Vendor to confirm			
8.2	One no. of each type of Drive Modules including controller cards (if any) and AC servo/DC servo/linear/stepper motors as used on the machine.	Vendor to offer			
8.3	One no. of Handheld unit/Handwheel (if any) as used on the machine for manual operation.	Vendor to offer			
8.4	One no. of each type of Electronic PCBs (including all Add-On PCBs viz. interfacing with scales or encoders, I/O Boards etc. installed inside industrial CPU), I/O modules and power supply unit as used on the machine.	Vendor to offer			
8.5	One no. of each type of linear scales/rotary encoders (if any) as used on the machine.	Vendor to offer			
8.6	Set of Indicating lamps & push buttons - 2 Nos. of each type as used on the machine.	Vendor to offer			
8.7	Set of Relays, starters & contactors - 1 No. of each type as used on the machine.	Vendor to offer			
8.8	Set of limit switches, proximity switches & pressure switches - 2 Nos. of each type as used on the machine.	Vendor to offer			
8.9	Set of Pumps used in hydraulic, lubrication and coolant circuit of machine - 1 No. of each type as used on the machine.	Vendor to offer			
8.10	One set of each type of Filters as used on the machine.	Vendor to offer			
9.0	<b>CONSUMABLE ITEMS:</b> Machine must be supplied with the following:				
9.1	2 sets of wire spools (at least 6 KM each.) of each dia.	Vendor to confirm			
9.2	First filling of oil and dielectric fluid.	Vendor to confirm			
10.0	<b>WORKING CONDITION:</b>				
10.1	<b>Input Power Supply:</b> 3 Phase, 415V $\pm$ 6%, 50 Hz $\pm$ 3% variation	Vendor to confirm			
10.2	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, voltage stabilizer, isolation transformer, control cabinets etc. shall be supplied by the vendor (if required).	Vendor to confirm			
10.3	<b>Ambient Condition:</b>				
10.3.1	Ambient temperature 2°C to 45°C.	Vendor to confirm			

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10.3.2	Relative humidity up to 95%.	Vendor to confirm			
11.0	<b>GENERAL REQUIREMENTS:</b>				
11.1	All motors should be of make of reputed company	Vendor to confirm			
11.2	Circuit breakers, relays & related electrical items should be of make of reputed company	Vendor to confirm			
11.3	All bearing should be of make of reputed company	Vendor to confirm			
11.4	Vendor should quote all the items required for satisfactory operation of the machine even if it is not specified in tender specifications.	Vendor to confirm			
12.0	<b>DOCUMENTATION: Hard Copies (03 Nos.) of machine operation, programming &amp; maintenance related manuals (in English language) to be provided consisting of (clause no. 12.1 to 12.8):</b>				
12.1	Operating & maintenance instructions with mechanical diagrams & bill of material of all machine items with their part numbers/specification alongwith operator & maintenance checklists.	Vendor to confirm			
12.2	Dos and Don'ts on the machine	Vendor to confirm			
12.3	Trouble shooting & remedies related to machine operation, programming and maintenance	Vendor to confirm			
12.4	Details of different types of settings required in the machine	Vendor to confirm			
12.5	Electrical circuit & wiring diagram of the machine (including electrical circuit and wiring diagram for all PC based electronic and electrical items used on the machine)	Vendor to confirm			
12.6	Circuit diagram of all mechanical components/ Hydraulic, Pneumatic & coolant circuit diagram, whichever is applicable.	Vendor to confirm			
12.7	Hard copy of PLC Program/Ladder diagram along with cross reference & comments in English language only. In case PLC is not used, machine logic should be provided with comments in English language & preferable cross reference	Vendor to confirm & provide information			
12.8	User manual for machine softwares with provision for software reinstallation as & when required. Also detailed instruction for Backup & restoration of complete system to be provided for all software based units.	Vendor to confirm			
12.9	Licensed copy of softwares & installation CDs/ DVD (with bootable CD/files), Floppy disks (if any) for system restoration and communication cables for data backup, restoration and diagnostics.	Vendor to confirm			
12.10	Soft copy of all of the above documentation (clause no. 12.1 to 12.8) including softwares (clause no. 12.9) should be provided in Portable USB hard disk (min. 500GB) to be supplied along with the machine.	Vendor to confirm			
12.11	Ghost back-up on Portable USB hard disk should be provided alongwith clear written instructions to take back-up and to restore it.	Vendor to confirm			
13.0	<b>ACCURACY TESTS:</b>				
13.1	All the Geometrical & positioning accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors's works as well as at BHEL's works.	Vendor to note & accept			
13.2	Repeatability of measured values shall be proved by the vendor at Vendor's works and subsequently at BHEL.	Vendor to note & accept			
13.3	During accuracy tests at BHEL Works, complete set of testing and calibration tools are to be brought by the vendor on returnable basis for test as mentioned in clause 13.1 & 13.2.	Vendor to note & accept			
14.0	<b>PRE DISPATCH INSPECTION: Pre dispatch inspection will be carried out by BHEL/ BHEL nominated agency at vendor's works before dispatch of machine. BHEL persons (deputed for PDI) will be doing pre-acceptance at vendor's works and give dispatch clearance after satisfaction from all angles. During pre-acceptance, all activities mentioned at clause nos. 14.1 to 14.8 shall be witnessed by the team. During PDI BHEL team shall verify the followings:</b>	Vendor to note & accept			
14.1	Specification of machine & supplies	Vendor to note & accept			
14.2	Total supplies	Vendor to note & accept			
14.3	Accuracy test as per clause 13.0.	Vendor to note & accept			
14.4	Operation of machine in compliance to specified requirements	Vendor to note & accept			
14.5	Machining of test piece with CNC program execution for linear as well as circular interpolation	Vendor to note & accept			
14.6	Use of software & accessories.	Vendor to note & accept			
14.7	Demonstration of CNC & other features.	Vendor to note & accept			
14.8	Training to BHEL team (deputed for PDI) in programming, operation & maintenance (electrical, electronics & mechanical) of machine.	Vendor to note & accept			
14.9	Vendor shall inform BHEL atleast 30 days before date of PDI. Travel, Boarding & Lodging expenses of BHEL team shall be borne by BHEL.	Vendor to note & accept			
15.0	<b>ERECTION, COMMISSIONING &amp; JOB-PROVING: Erection, commissioning and job proving at BHEL works should be carried out by vendor. Supplier to take full responsibility for carrying out the erection, start up, testing of machine, its control &amp; all types of other supplied accessories/ attachment and job proving. During commissioning of machine following activities shall be carried out:</b>	Vendor to confirm			
15.1	Verification of specification of machine & supplies.	Vendor to confirm			
15.2	Verification of total supplies as per PO.	Vendor to confirm			
15.3	Accuracy test as per clause 13.0.				
15.4	Demonstration of the accuracies of the machines mentioned at clause no. 3.0 (from 3.1 to 3.10) after machine erection/commissioning.	Vendor to accept & confirm			
15.5	Operation of machine in compliance to specified requirements	Vendor to confirm			
15.6	Machining total 4 component of BHEL (Template, gauges etc.) using all consumables & CNC program provided by vendor as per component drawing requirement.	Vendor to confirm			
15.7	Use of software & accessories.	Vendor to confirm			
15.8	Demonstration of CNC & other features.	Vendor to confirm			
15.9	Training to machine's operator, programmer & maintenance staff of BHEL in operation, programming & maintenance of machine	Vendor to confirm			
16.0	<b>FINAL MACHINE ACCEPTANCE: Final acceptance shall be made by BHEL Haridwar after successful completion of all the activities mentioned at clause no. 15.0.</b>	Vendor to accept & confirm			
17.0	<b>FOUNDATION:</b>				
17.1	Foundation items like foundation bolts, clamps, washers etc. to be provided by the vendor.	Vendor to confirm			
17.2	Foundation design drawing/details with electrical connection details to be provided by vendor in case of order. BHEL shall construct foundation as per details/design sent by vendor. Vendor should send details/design in time to enable BHEL to construct foundation prior to receipt of machine at site. BHEL shall provide one electrical supply connection and compressed air supply point near the machine. All cables, connections, pipe etc. for complete machine shall be in scope of vendor.	Vendor to offer			

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18.0	<b>GUARANTEE:</b> Guarantee for 1 year for complete machine from date of acceptance for trouble free operation.	Vendor to offer			
19.0	<b>PACKING:</b> Road worthy packing for all items of complete machine to avoid any damage/ loss during transit.	Vendor to confirm			
20.0	<b>MISCELLANEOUS REQUIREMENT:</b>				
20.1	Complete Job holding/clamping kit.	Vendor to offer			

*[Signature]*  
(HARSHIT, E2  
TOOL ROOM TECH.)

*[Signature]*  
(Ankur Singh)  
Mgt - TLM.

*[Signature]*  
16/9/17  
Tennin R.  
Stronger/Wex

21/9/17  
11/9/17  
(GAGAN KUMAR)  
Manager / ITE

*[Signature]*  
18/9/17  
(Rishabh Gupta)  
Dy. Mgr.  
(WEX/CNC-Blades)

Pre-Qualifying Requirements for CNC EDM Wire Cut Machine		
	QUALIFYING CRITERIA	REMARKS
1.0	The supplier should be Original Equipment Manufacturer (OEM) or their authorised dealer/distributor or Indian subsidiary of foreign principal. In case of authorised dealer/distributor or Indian subsidiary of foreign principal, valid authorisation letter/documentary evidence (clearly mentioning the official/registered address of authorised dealer/distributor/Indian subsidiary and validity date) is to be submitted to certify the status.	Vendor to confirm and submit
1.1	Established after sales service centre of OEM should exist in India for providing services during warranty period, and thereafter. Vendor should provide the contact details and address of the service centre.	Vendor to confirm and submit
1.2	The OEM should be in business of manufacturing the CNC EDM wire cut machine for atleast 5 years. Reference list of machines supplied in last 5 years in India (year wise) with machine model and name of customer should be submitted.	Vendor to confirm and submit
2.0	Referred agency, in S No. 1.0 above, should have supplied and commissioned at least 2 Nos. CNC EDM wire cut machine to two different customers (Machines having similar/higher specs as mentioned at clause nos. 2.0, 3.1, 3.2, 3.3 & 3.4 of technical specifications) in the past 5 years (on the date of tender opening). These machines should be working satisfactorily for more than one year prior to date of tender opening. One year period will be calculated on the basis of commissioning certificates provided. The following information is to be submitted by the vendor about the companies where similar machines have been supplied. This is required from all the vendors for qualification of their offer.	Vendor to confirm and submit
3.1	Name and address of the customer/company where referred machines (in S No. 2.0 above) are installed.	Vendor to submit
3.2	Month & Year of Commissioning of referred machines (in S No. 2.0 above).	Vendor to submit
3.3	Name, Designation, Contact details including email-ids of the contact person of vendor's customers where referred machines (in S No. 2.0 above) are installed.	Vendor to submit
3.4	Performance certificate (mentioning make & machine model) from the referred customers in original or by direct email regarding satisfactory performance of referred machines (in S No. 2.0 above) supplied to them.	Vendor to submit
4.0	BHEL reserves the right to verify the information and performance of referred machines as provided by the vendor. In case, the information provided by vendor is found to be false/ incorrect or performance is not found to be satisfactory, the offer shall be rejected.	Vendor to confirm

25/9/17  
(Ankur Meshram)  
MGR, TLM

(HARSHIT E2)  
(TOOL ROOM TECH.)

20/11/17  
11/9/17  
(GAGAN B.)  
Manager/STE  
Sr. mgr (WEX-913)

Rishabh  
18/9/17  
(Rishabh Gupta)  
dy. Mgr.  
(WEX/CNC-Blades)