	BHARAT HEAVY ELECTRICAL LIMITED						
	C.S.U. Third Floor, Room No.305, Corporate office New Delhi					Tender No.	
	UNIT'S PHONE NOS. 011-26492590, 011-26492513					Due Date :	
	CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL. V.P.N.SINGH, Purchase Officer, 011-26492513, varun@bhel.co.in Fax: 011-26001150, 26001167					Vendor Qtn. Date :	
Specification No: CSU/Spec/Equip/04 - Rev 02 <u>SPECIFICATION CUM COMPLIANCE CERTIFICATION FOR DIE GRINDING MACHINE</u>							
NOTE:- 1. Vendor must submit complete information against all clauses. 2. The "Offered" Column and where applicable, the "Deviations" & "Remarks" Column of this format shall be filled in by the Vendor and submitted along with the offer. Inadequate / incomplete, ambiguous, or unsustainable information against any of the clauses of the specifications/requirements shall be treated as non-compliance. 3. The offer and all documents enclosed with offer should be in English language only.							
NAME & ADDRESS OF THE Vendor :				NAME & ADDRESS OF THE INDIAN AGENTS (If Any) :			
TELEPHONE NOS.:				TELEPHONE NOS.:			
FAX NOS.:				FAX NOS.:			
E-MAIL ADDRESS :				E-MAIL ADDRESS :			
DUNS NO (Of Duns & Bradstreet of USA)							
SCOPE: SUPPLY, INSTALLATION & COMMISSIONING OF DIE GRINDING MACHINE COMPLYING WITH SPECIFICATION AS BELOW							

S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION	REMARKS	
1.0	PURPOSE & WORK PIECE MATERIAL					
1.1	The Grinding Machine will be used for grinding of dies used for production of laminations from electrical sheet steel for rotating electrical machines.	Vendor				
1.2	The die face will normally be of tool steel. The material removal will be low as the dies will be ground for sharpening the cutting edges.	Vendor				
1.3	The capacity and size of the grinding machine has been finalised based on the size of dies which are proposed to be ground on the grinding machine. A partial list of such large dies is given in Sketch No CSU/STA/07 Rev 00 and CSU/STA/08 Rev 00. The Vendor shall check and confirm that it will be possible to grind these dies with the required accuracy on the proposed Grinding Machine.	Vendor				
2.0	SPECIFICATION:					
2.1	CAPACITY & SIZE :					
2.1.1	Work Piece Details					
2.1.1.1	Work Piece Width, max	1600 mm				
2.1.1.2	Work Piece Length, max	3000 mm				
2.1.1.3	Work Piece Height	100 to 400 mm				
2.1.1.4	Work Piece Weight, Max	3500 kg				
2.1.1.5	Grinding Width, max	1350 mm				
2.1.1.6	Grinding Length, max	2600 mm				
2.1.2	Reciprocating Table					
2.1.2.1	Table Width, Min	1350 mm				
2.1.2.2	Table Length, Min	2600 mm				
2.1.2.3	Height of cross rail above table top, min	800 mm				
2.1.2.4	Height of cross rail above magnetic table top, min	500 mm				
2.1.2.5	Distance between columns, min	1700 mm				
2.1.2.6	Weight on Table, Max	Vendor				
2.1.2.7	Weight on Table, over magnetic chuck, Max	Vendor				
2.1.2.8	Table Speed	2 to 20 M/Min				
2.1.2.9	No of table speed changes	Stepless				

S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION	REMARKS	
2.1.2.10	Longitudinal Travel, min	Vendor				
2.1.2.11	Cross Travel, min	Vendor				
2.1.2.12	Vertical Travel over top of Table	Vendor				
2.1.2.13	Vertical Travel over magnetic chuck, min	400 mm				
2.1.3	Horizontal Axis Tool Spindle					
2.1.3.1	No of Spindles	1				
2.1.3.2	Type of spindle	Fixed. No swivelling				
2.1.3.3	Spindle drive capacity, min	12 kW				
2.1.3.4	Spindle Speed (Variable)	1000 to 2000 rpm				
2.1.3.5	Outside Dia of grinding stone	400 to 510 mm				
2.1.3.6	Vertical Feeds	0.001 to 0.1 mm/Stroke				
2.1.3.7	Vertical feed speed	2 to 500 mm/Min				
2.1.3.8	Horizontal feeds	0.002 to 50 mm/Stroke				
2.1.3.9	Horizontal feed speed	10 to 1500 mm/Min				
2.2	CONSTRUCTION					
2.2.1	The precision surface grinding machine shall be with reciprocating table and single horizontal axis grinding head. The body frame shall be rigid and the cross rail shall be fixed type.	Vendor				
2.2.2	The machine bed shall be sturdy and shall have high precision guideways. The table drive system shall be with a variable AC drive motor and shall be suitable for all speeds and feeds. Proper lubrication of table guideways shall be provided	Vendor				
2.2.3	The crossrail shall be fixed to two sturdy uprights. The grinding head shall move in the guideways provided in the cross rail. Absolute squareness of the transverse guideways to the longitudinal table travel and to the vertical movement of the wellhead shall be ensured for accurate positioning and repeatable accuracy. The movement of grinding head in the cross rail shall be by variable speed AC motor.	Vendor				
2.2.4	The vertical movement of the grinding head shall be in liner guideways of high accuracy. The movement shall be by variable speed AC motor.	Vendor				
2.2.5	The grinding wheel motor shall be mounted on the spindle which shall be supported on both ends by high precision bearings.	Vendor				

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2.2.6	An electro-permanent magnetic chuck shall be supplied for mounting on the table. The dimensions of the chuck shall be same as the dimensions of the table. The dies will normally be mounted on the chuck for grinding.	Vendor				
2.2.7	The magnetic chuck shall be magnetised by a single shot of electrical power so that there is no heat built up even when the chuck is left on for a long periods of time. Power supply and control panel for magnetising and demagnetizing of the chuck shall be provided.	Vendor				
2.2.8	Splash guards shall be provided for working table. Splash and dust proof lights shall be provided in the working area.	Vendor				
2.2.9	Metallic telescopic covers of rust resistant material shall be provided with wipers for guideways. Joints of covers shall be sealed properly to avoid mixing of coolant and lubricating oil.	Vendor				
2.2.10	A dynamic balancing system for grinding wheel during its rotation shall be provided along with the machine.	Vendor				
2.2.11	A set of dressing diamond/diamond roll dressing unit shall be provided along with the machine.	Vendor				
2.3	Feed and Drive System					
2.3.1	Feed drive motors shall be AC servo motors.	Vendor				
2.3.2	Maximum feed force for all axes shall be specified by the Supplier.	Vendor				
2.3.3	Feedback system shall be with linear scales.	Vendor				
2.3.4	Mechanism for locking of all axes shall be provided. Details shall be specified.	Vendor				
2.4	OPERATION AND CONTROL SYSTEM:					
2.4.1	OPERATOR'S PANEL:					
2.4.1.1	Swivelling and sliding type operator's panel having complete CNC and machine control system with TFT of required configuration shall be provided on the operators platform for safe, convenient and efficient operation. All switches should be within reach of operator of average height (Indian) for easy operation. All displays/indications should also be conveniently placed accordingly. Layout showing complete details should be submitted.	Vendor				
2.4.2	CNC SYSTEM & FEATURES :					
2.4.2.1	Make : Fanuc or Siemens.	Vendor				
2.4.2.2	Type : PC based latest version	Vendor				

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2.4.2.3	Model: (Latest version should be supplied)	Vendor				
2.4.2.4	Details of Standard features	Vendor				
2.4.2.5	Details of optional features, recommended by Vendor.	Vendor				
2.4.2.6	The system should have full alphanumeric keyboard/ touch screen, TFT color display (10.4" or more), RS232C serial interfaces, parallel interface for printer, network ready with LAN, CD/USB Drive unit for data input/output, hard disk of sufficient capacity, preinstalled system software & other required software etc. (Details should be submitted by Vendor)	Vendor				
2.4.2.7	Programmable logic controller with a standard industrial PC to be provided for control system.	Vendor				
2.4.2.8	Digital read out to be provided for digital measure- ment of grinding	Vendor				
2.4.2.9	The input shall be by means of soft keys/ alphanumeric keyboard. During the different operating modes such as set-up, automatic continuous run or tool change, the operator shall be guided step-by-step.	Vendor				
2.4.2.10	The maintenance messages generated by the machine control system shall inform the operator by flashing of a maintenance symbol that maintenance work is due to be carried out. Provision for bypassing the message by authorized personnel shall also be provided.	Vendor				
2.4.3	MANUAL CONTROL :					
2.4.3.1	Complete manual control of machine with required switches / keys should be provided on operator's panel.	Vendor				
2.5	UPS FOR CNC SYSTEM:					
2.5.1	UPS of sufficient capacity for CNC system with inbuilt cooling and charging shall be supplied for controlled shut down possibilities. (Battery charging /discharging time should be specified by Vendor)	Vendor				
2.6	MACHINE LIGHTS:					
2.6.1	Machine Lights for sufficient illumination of complete working area on both sides of operator's platform should be provided for clear visibility.	Vendor				
2.6.2	A magnetic base portable spot light with sufficiently long cable should also be provided.	Vendor				
2.6.3	Any lights required in the foundation/ pit area shall also be foreseen and supplied by the Vendor.	Vendor				
2.6.4	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents. i.e. they shall be replaceable by their equivalents available in Indian market.	Vendor				

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2.7	AIR CONDITIONERS:					
2.7.1	Air Conditioners with Dehumidifiers of suitable / sufficient capacity to be provided for all Electrical / Electronic Panels / Cabinets considering specified ambient conditions. Detailed specifications of the same are to be submitted.	Vendor				
2.8	HYDRAULIC SYSTEM : Details should be Submitted by the Vendor					
2.8.1	The System should be centralised. Hydraulic Tank shall preferably be located at floor level	Vendor				
2.8.2	Make Rexroth / Vickers Sperry or equivalent from a reputed manufacturer. (Details to be submitted)	Vendor				
2.8.3	Filtration System, Details should be submitted.	Vendor				
2.8.4	Failure indication	Required				
2.8.5	Automatic shut off provision, Details should be submitted.	Vendor				
2.8.6	Refrigerated type cooling and electric heating (Electric heating only if required) system of sufficient capacity to maintain complete Hydraulic System, including lubrication oil, hydrostatic oil and gearbox oil, etc. at a temperature not exceeding 40 deg C irrespective of the ambient conditions. Complete details should be submitted.	Required				
2.8.7	Hydraulic pump capacity (flow / pressure)	Vendor				
2.8.8	Each pump should have an independent motor. Tandem pumps should not be used	Vendor				
2.9	ELECTRICAL :					
2.9.1	Power Supply: 415 V: - 10%, +10%, 50 Hz: $\pm 3\%$, 3 phase AC(3 wire supply without neutral). Source will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be in the scope of the 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				
2.9.2	All electrical / electronic equipment shall be tropicalized	Vendor				
2.9.3	All electrical & electronic control cabinets & panels should be dust and vermin proof	Vendor				
2.9.4	Motors shall conform to IEC or Indian Standards	Vendor				
2.9.5	Oil-proof cables shall be used for power and control supply. Connection lines between control cabinet and press shall be of plug-in type. Main drive cables shall be routed via terminal boards.	Vendor				

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2.9.6	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				
2.9.7	Vendor should ensure double earthing for the machine and its peripherals.	Required				
2.9.8	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents. i.e. they shall be replaceable by their equivalents available in Indian market.	Required				
2.10	SAFETY ARRANGEMENTS:					
	Following safety features in addition to other standard safety features should be provided on the machine:					
2.10.1	Machine should have adequate and reliable safety interlocks / devices to avoid damage to the machine, work piece and the operator due to the malfunctioning or mistakes. Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on CNC display and panels) should be available.	Vendor				
2.10.2	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor.	Vendor				
2.10.3	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				
2.10.4	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.	Vendor				
2.10.5	Emergency Switches at suitable locations as per International Norms should be provided.	Vendor				
2.10.6	Oil & water pipe lines should not run with electrical cable in the same tray / trench.	Vendor				
2.10.7	Safety and splash guards shall be installed at suitable locations as required.	Vendor				
2.11	ENVIRONMENTAL PERFORMANCE OF THE MACHINE :					
	The Machine should conform to following factors related to environment :					
2.11.1	The maximum noise level shall be 85 dBA under normal load condition, 1 M away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like DIN 45635-16. Vendor to demonstrate compliance to noise level, if so required.	Vendor				
2.11.2	There shall not be any harmful emissions from the machine, the machine shall not produce any harmful effluents and no hazardous chemicals shall be used in the machine.	Vendor				

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2.11.3	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 Vendor and details shall be given in the offer	Vendor				
2.11.4	No hazardous chemicals shall be required to be used in the machine.	Vendor				
2.11.5	If any safety / environmental protection enclosure is required it should be built in the machine by the Vendor and details shall be given in the offer	Vendor				
2.11.6	Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.	Vendor				
2.12	FIRST FILL OF OILS AND GREASES					
2.12.1	First filling of all required lubricating oils & grease etc. shall be supplied by Vendor. Indian source or Indian equivalent and specifications of oils/ greases are also to be provided by the Vendor.	Vendor				
2.13	TOOLING					
2.13.1	Complete description of the tooling system shall be given.	Vendor				
2.13.2	All types of Cutting Tools, tool holders, adaptors, sleeves, arbors etc. required for the machine proving shall be supplied.	Vendor				
3	COOLANT SYSTEM					
3.1	Recirculating type flood coolant system with nozzles around spindle shall be provided.	Vendor				
3.2	Coolant collection and recirculation system should be leakproof & perfect to avoid any spillage on shop floor, trenches for cables & foundation pit of the machine etc.	Vendor				
3.3	Coolant Filtration System: Recirculating type coolant system with centrifugal Hydrocyclone System/ Vacuum Rotary drum type System/ Cartridge Type Filtration System and magnetic separator shall be supplied. (Type of system to be specified by Indentor).	Vendor				
3.4	Coolant Flow Diagram showing filters, pumps, valves, tanks etc. to be submitted with the offer.	Vendor				
3.5	Pressure & rate of flow of coolant for different variants should be furnished in the offer. The Pressure should be sufficient for the coolant to reach the tool tip at full pressure.	Vendor				
3.6	Coolant Tank Capacity (Any specific requirement, like Deep Hole Drilling etc. to be specified by indentor)	Vendor				

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3.7	For finer control of Pressure and Coolant Flow Rate, after its activation through program or switches, Rotary/ potentiometer switches shall be provided on the Operator's Panel.	Vendor				
3.8	Coolant pump & motor details for all variants of coolant system are to be submitted with the offer.	Vendor				
3.9	Magnetic filter and separator shall be provided for wheel grit and metal particles in the coolant.	Vendor				
4	SERVO VOLTAGE STABILIZER:					
4.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc with no undesirable Harmonics in the stabiliser output shall be supplied.	Required				
4.2	Model & Rating	Vendor				
4.3	Spares for the Voltage Stabiliser for 2 years working should also be offered.	Vendor				
4.4	Catalogue of the Voltage Stabiliser shall be submitted with the offer.	Vendor				
5	ULTRA ISOLATION TRANSFORMER					
5.1	Indian make Ultra Isolation Transformer suitable for complete machine , its drives, controls, PLC etc. shall be supplied	Required				
5.2	Model and Rating	Vendor				
5.3	Spares for the Ultra Isolation Transformer for 2 years working should also be offered.	Vendor				
5.4	Catalogue of the Ultra Isolation Transformer shall be submitted with the offer.	Vendor				
6	PNEUMATIC SYSTEM:					
6.1	COMPRESSED AIR					
6.1.1	The compressed air supply will be available at one point near the machine at a maximum pressure of 0.50 N/mm ² . Air required for operation of the machine at a pressure higher than the above shall be obtained by providing booster compressor at a suitable location. The booster compressor of suitable capacity with refrigerator, dryer & filters shall be in the scope of the Vendor.	Vendor				
6.1.2	Make & Model of Air Compressor	Vendor				
6.1.3	Make & Model of Refrigerated Air Dryer	Vendor				
6.1.4	Capacity (Flow, Pressure & KW)	Vendor				
7	LEVELLING & ANCHORING SYSTEM					

S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION	REMARKS	
7.1	Complete anchoring system including foundation bolts, anchoring materials, fixators, levelling shoes etc should be supplied	Vendor				
8	TOOLS FOR INSTALLATION, OPERATION & MAINTENANCE :					
8.1	Special tools/equipments etc. required for the maintenance of the machine, including DRO/CNC system etc. shall be included in the scope of supply and details of such equipments shall be given in the offer.	Vendor				
9	ACCESSORIES:					
9.1	Two grinding wheels, one complete wheel holder assembly, one extractor for wheel holder assembly and wheel balancing equipment shall be supplied.	Vendor				
9.2	A suitable wheel dresser mounted on the spindle shall also be supplied.	Vendor				
9.3	Any additional items/ accessories, recommended by the vendor for improved performance of the machine shall be described in the offer with complete details.	Vendor				
10	SPARES:					
10.1	Itemised price break-up of mechanical, hydraulic, electrical and electronic spares in sufficient quantity as per recommendation of Vendor for 2 years of operation should be offered by Vendor.	Vendor				
10.2	All types of spares for total machine and accessories should be available for atleast 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 & Vendors to enable BHEL to procure these in advance, if required	Vendor				
10.3	Complete list of spares for machine and accessories, along with specification / type / model, and name & address of the Vendor shall be furnished along with documentation to be supplied with the machine.	Vendor				
11	DOCUMENTATION:					
11.1	Descriptive leaflets, technical literature, drawings, schematic diagrams, electrical wiring diagram, hydraulic circuit diagrams, spare parts manuals, Installation and commissioning drawing etc shall be supplied.	Vendor				
11.2	Layout drawing, major assembly drawings, schematic diagrams, control philosophy etc shall be subject to approval of BHEL. Approval of drawings/ documents by BHEL will not relieve the Vendor of his responsibility of meeting the requirements of the specification.	Vendor				

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11.3	The technical documentation shall include documentation of outsourced items also.	Vendor				
11.4	All Specifications and Design Documents shall be neatly printed on A4 size paper. All drawings shall be of standard sizes (A0 ,A1, A2 etc). The title block shall be as approved by BHEL.	Vendor				
11.5	Upon completion of construction, the design drawings shall be revised to reflect accurately the facilities as built. The drawings shall be issued under the appropriate revision and marked "AS BUILT".	Vendor				
11.6	The number of copies of design documents and drawings required to be submitted should be as follows: -					
11.6.1	For approval :					
	Design Calculations / reports / documents	3				
	Drawings / documents required for Construction/ Procurement	3				
11.6.2	After completion of work:					
	Drawings ("As Built")	3				
	Drawings in Soft copies in CD	2				
11.7	OPERATING AND MAINTENANCE MANUALS:					
11.7.1	The O & M manual shall include the following:					
	Operating manuals of Machine & CNC system	Vendor				
	Programming Manuals of Machine & CNC system	Vendor				
	Detailed Maintenance manual of machine with all drawings of machine assemblies/sub-assemblies/parts including Electrical / Pneumatic/ Coolant / Hydraulic circuit diagrams. All Assembly/ Sub Assembly Drawings shall be supplied with the part list also.	Vendor				
	Maintenance, Interface & commissioning manuals for CNC system	Vendor				
	Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.	Vendor				
	Detailed specification of all rubber items and hydraulic / lube fittings	Vendor				
	PLC program print-outs with comments in English.	Vendor				
	PLC program on CD, NC data & PLC data on CD.	Vendor				
	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.	Vendor				
	Complete Master List of parts used in the machine along with part numbers and ordering numbers.	Vendor				

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11.7.2	The Operating and maintenance Manuals shall be in English Language and shall be supplied in five copies. One additional set of all the above documentation shall be supplied on CD ROM, wherever possible.	Vendor				
12	TRAINING					
12.1	TRAINING AT BHEL PLANT					
12.1.1	The Vendor shall undertake training of Mechanical, Electronics & Control persons in operation and maintenance of the machine at BHEL's works for a period of 2 weeks. The training program shall be as follows:	Vendor				
	Construction and functioning of the system					
	Safety instructions					
	Setting up of system					
	Demonstration of machine in operation					
	Resetting of system					
	Operator control of system in all operating modes					
	Programming of all required data					
	Going through all operating instructions					
	Display and control system					
	Fault location by means of programming unit					
	CNC Part Programming/ Technology, Use of all CNC Features.					
	Electrical, Electronic & CNC maintenance for machine & other supplied equipments					
	Mechanical & Hydraulic maintenance of the machine & other supplied equipments					
12.2	TRAINING AT VENDOR'S WORKS					
12.2.1	The Vendor shall undertake training of 3 persons in operation and maintenance of the machine at Vendor's works for a period of 2 week. The training program shall include construction and operational features of the machine, it's operational requirements, programming and fault analysis etc.	Vendor				
12.2.2	The training shall include: - CNC Part Programming/ Technology, Use of all CNC Features, Programming for Measuring Systems & supplied accessories etc. - Electrical, Electronic & CNC maintenance for machine & other supplied equipments - Mechanical & Hydraulic maintenance of the machine & other supplied equipments - Operation of the machine & other supplied equipments.	Vendor				

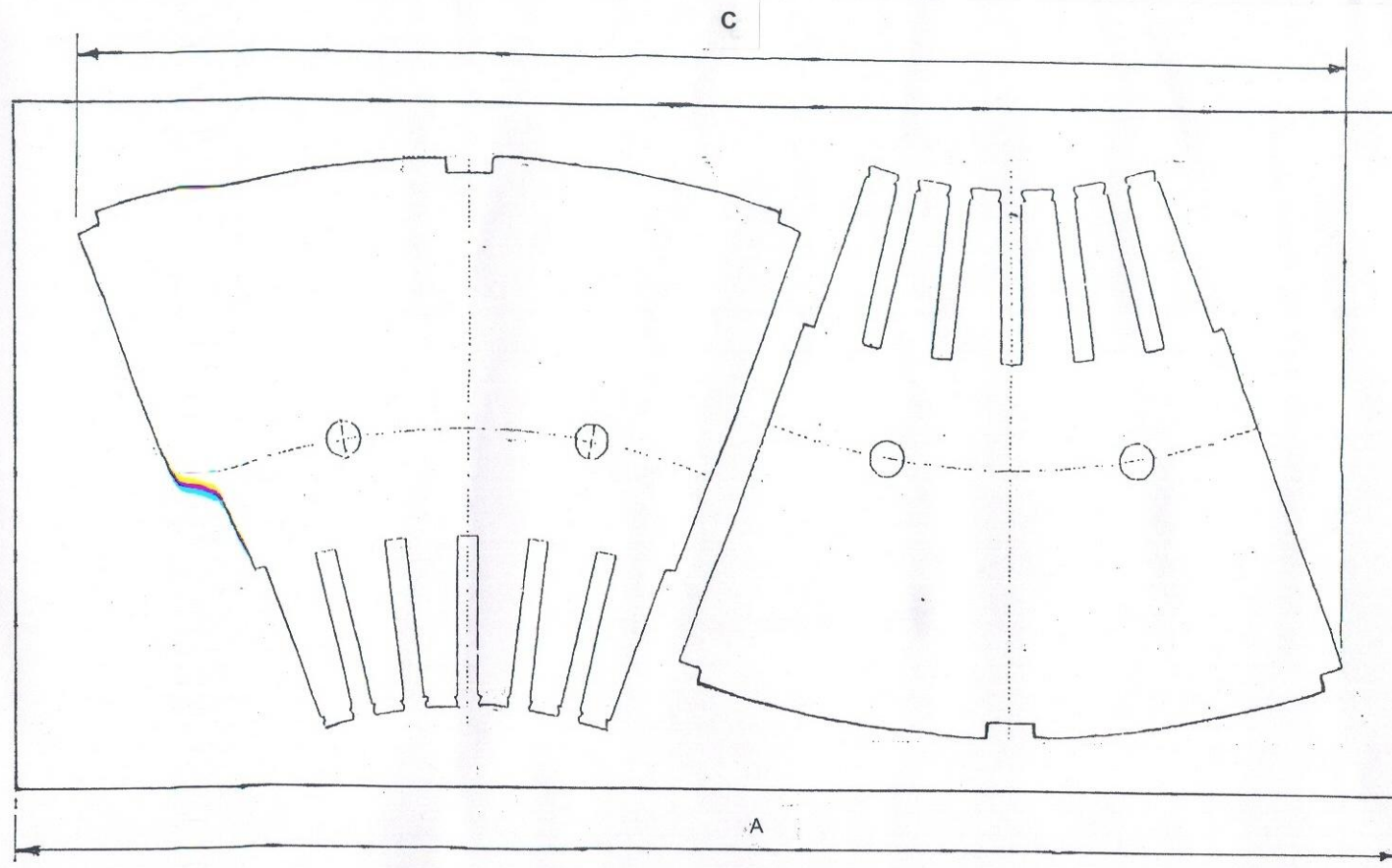
S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION	REMARKS	
12.2.3	Air-fare, boarding & lodging for the trainees shall be borne by BHEL. All training expenses shall be born by the Vendor.	Vendor				
12.2.4	Competent, English speaking experts shall be arranged by the Vendor during training for satisfactory & effective training of BHEL personnel.	Vendor				
13	FOUNDATION :					
13.1	(a) Vendor shall submit the priliminary layout drawings and static/dyanamic loading details. (b) Civil work/Foundation will be done by BHEL as per the details given by Vendor. (c) Vendor may supervise the construction of foundation if he so desires.	Vendor				
13.2	The Vendor shall also indicate detailed specifications of grouting compound and grouting procedure etc. for foundation bolts of the machine.	Vendor				
14.0	INSTALLATION & COMMISSIONING					
14.1	Vendor shall be fully responsibility for carrying out the Installation, start up, testing and commissioning of machine, it's control system & all other supplies etc. Service requirement like 10 T EOt crane, power, air & water shall be provided by BHEL at only one point to be indicated by Vendor in their foundation/layout drawings. Details of these requirements should be informed by Vendor in advance.	Vendor				
14.2	Successful completion of performance tests shall also be part of commissioning tests.	Vendor				
14.3	Tools, Tackles, instruments and other necessary equipment including Laser equipment required to carry out Installation and commissioning activities should be arranged by the Vendor.	Vendor				
14.4	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought/ arranged by the Vendor.	Vendor				
14.5	if any paint on the machine has rubbed off or peeled during transit or Installation the area should be repainted and merged with the original surrounding paint by the . For this purpose, the Vendor should supply sufficient quantity of touch-up paint of various colours of paint used.	Vendor				
14.6	Schedule of Installation and Commissioning shall be submitted with the offer.	Vendor				
14.7	Charges, duration, terms & conditions for Installation & Commissioning should be furnished in detail by Vendor along with offer.	Required				

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14.8	TESTING AT VENDOR'S WORKS					
14.8.1	The machine shall be tested at Vendor's works. BHEL Engineers may witness the test of the machine at Vendor's works.	Vendor				
14.8.2	Tests shall be performed to show that the machine meets the requirement of the specifications.	Vendor				
14.8.3	The Machine shall be dispatched only after acceptance of tests and clearance for dispatch in writing by BHEL	Vendor				
15	ACCURACY TESTS:					
15.1	GEOMETRICAL ACCURACIES :					
15.1.1	Geometrical Accuracy Tests shall be in accordance with ISO 3070 or equivalent international 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				
15.1.2	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors works and during Installation & Commissioning at BHEL Works.	Vendor				
15.2	MACHINE POSITIONING ACCURACIES & REPEATABILITY:					
15.2.1	Positioning accuracy in X axis	Vendor				
15.2.2	Positioning accuracy in Y axis	Vendor				
15.2.3	Positioning accuracy in Z axis	Vendor				
15.2.4	Standard for measuring of positioning accuracy should be submitted.	Vendor				
15.2.5	All the above accuracies should be demonstrated to BHEL engineers during pre-acceptance at Vendors works and during Installation & Commissioning at BHEL Works	Vendor				
16	AMBIENT CONDITIONS & THERMAL STABILITY :					
16.1	The machine including CNC system and all supplied items should work trouble free and efficiently under following operating conditions.	Vendor				
16.2	Power Supply:					
16.2.1	Voltage: 415 V - 10%, +10%	Vendor				
16.2.2	Frequency: 50 Hz +3%, - 3%	Vendor				
16.2.3	No. of phases = 3 (3 wire supply without neutral)	Vendor				
16.3	Control Power Supply:					
16.3.1	AC - 220 V +10%, -10%	Vendor				

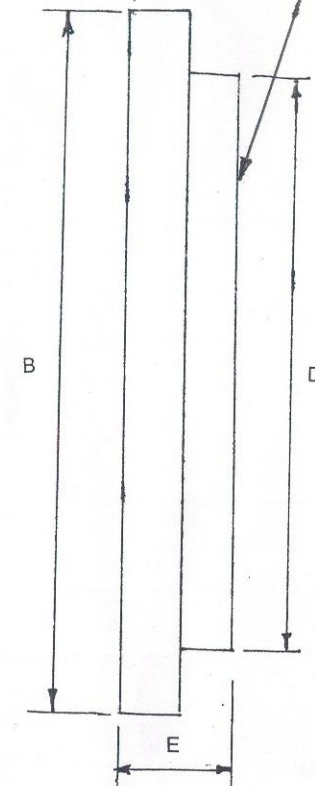
S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION	REMARKS	
16.3.2	DC - 24 V +10%, -10%	Vendor				
16.4	Ambient Conditions: Temperature = 5 to 45 degree Celsius	Vendor				
16.5	Relative Humidity = 95% max.	Vendor				
16.6	Altitude: 600 M above Mean Sea Level	Vendor				
16.7	Weather conditions are tropical, Atmosphere may be dust laden during some part of the year. Machine shall be kept in the normal shop floor condition. Max. temperature variation is up to 25 deg Celsius in 24 hours.	Vendor				
16.8	Thermal Stability of the complete machine keeping in view specified Ambient Conditions and accuracy requirements of BHEL components and trouble free operation of the machine should be ensured by Vendor.	Vendor				
16.9	The machine, including attachments and accessories, should be suitable for 24 hrs. continuous operation with stoppages for planned maintenance schedules throughout the year.	Vendor				
17	PROVEOUT OF BHEL COMPONENTS :					
17.1	Sketch showing the various components to be ground on the machine is attached. Proveout to be done on any one of the components to be specified by BHEL. Vendor to submit preliminary process, time study & tool list recommended by them along with the offer. Change in process/tools may be mutually discussed and agreed. Complete process of proveout components shall be done by the vendor at BHEL works to the specified design accuracy, using cutting tools and CNC programs (to be provided by the vendor to prove the machine after complete erection & test.) Material for the proveout components shall be provided by BHEL. Vendor should submit the CNC programs, setting schemes, process sheets, tooling layouts, time studies etc. in advance for the proveout components. Vendor shall be fully responsible for proveout of the components as per drawing, speed of operation for various component and other requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by Vendor, regarding accuracy requirements of the proveout components, whether specified or not, should be discussed and cleared by vendor during initial technical discussions.	Vendor				
17.2	Vendor shall be responsible for any deviation/rejection in proveout component due to malfunctioning of the machine during proveout and also for the delay due to improper recommended tooling etc.	Vendor				
18	MACHINE ACCEPTANCE: (Tests/Activities to be Performed by Vendor)					
18.1	Tests/Activities to be carried out at Vendor's works on the machine before dispatch :					

S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION	REMARKS	
18.1.1	Geometrical & Positioning accuracies as per test chart.	Vendor				
18.1.2	Demonstration of all features of the machine, control system & accessories	Vendor				
18.2	Tests/Activities to be carried out at BHEL works while commissioning the machine :					
18.2.1	Re-checking of Geometrical & Positioning accuracies as per test chart.(if required)	Vendor				
18.2.2	Full load test to demonstrate the maximum power & cutting capacity of the machine.	Vendor				
18.2.3	The machine should be tested for continuous working of 48 hrs. Including planned stoppages of machine such as for changing of dies etc.	Vendor				
18.2.4	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine	Vendor				
18.2.5	Job prove out	Vendor				
18.2.6	Training of BHEL machine operators in operation of complete machine & accessories etc by the Vendor's experts / engineers during their stay at BHEL works	Vendor				
18.3	PERFORMANCE GUARANTEE					
18.3.1	The supplier shall guarantee the performance of the machine on continuous basis under shop floor working conditions as follows:	Vendor				
	Operating parameters - Feed (mm/stroke) and operating speed (mm/min) in all three axes.					
	Geometric accuracies and repeatability					
19	PROGRESS REPORTS					
19.1	The Vendor shall submit monthly progress reports showing progress of design, material procurement, manufacturing, assembly etc and any advancement/ delays with respect to the scheduled delivery date.	Vendor				
20	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 shall be provided. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes.	Vendor				
21	PAINTING:					
21.1	All the machine components shall be painted with high quality Polyurethane Paint. The paint shall have good protection against corrosion and high resistance against chemicals and oil.	Vendor				

S.NO.	DESCRIPTION FOR BHEL REQUIREMENT	SPECIFIED / TO BE CONFIRMED BY	OFFERED	DEVIATION	REMARKS	
21.2	Main Machine / Electrical panels: RAL 6018 Yellow green	Vendor				
21.3	Safety equipment: RAL 1023 Traffic Yellow	Vendor				
21.4	Operator console: Light grey	Vendor				
	22 GENERAL :					
22.1	Machine Model No.	Vendor				
22.2	Total connected load (KVA):	Vendor				
22.3	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor				
22.4	Total weight of the machine	Vendor				
22.5	Weight of heaviest part of machine	Vendor				
22.6	Dimensions and weight of largest piece for shipment	Vendor				
22.7	Weight and Dimensions of the heaviest assembly / sub-assembly of the Machine	Vendor				
22.8	Dimensions and weight of heaviest piece for shipment	Vendor				
22.9	Vendor to submit, along with offer, reference list of customers where similar machines have been supplied mentioning broad specifications of the supplied machine i.e. Speed of operation, bed size, Load Capacity, etc	Vendor				
22.10	Drawing showing overall dimensions of the machine	Vendor				
22.11	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.	Required				
22.12	Hydraulic, Pneumatic & oil piping should be preferably metallic except places where flexible piping are essential. All the pipes required for the same shall be included in the standard scope of the machine.	Vendor				
	23 QUALIFICATION REQUIREMENTS:					
23.1	Only those vendors who have supplied at least one similar type of Machine in past ten years shall quote.					
23.2	Month & year of Commissioning of similar type of machine supplied					
23.3	Vendor shall submit performance certificate of the similar type of machine supplied and commissioned.					



SURFACE TO BE
GROUND



ITEM	OVERALL SIZE			GRINDING SURFACE		Remarks
	A	B	E	C	D	
	mm	mm	mm	mm	mm	
	2200.00	1200.00	230.00	1715.00	820.00	
	2050.00	1200.00	220.00	1513.00	807.00	
	2500.00	1170.00	220.00	2079.00	706.00	
	2450.00	950.00	180.00	2036.00	519.00	

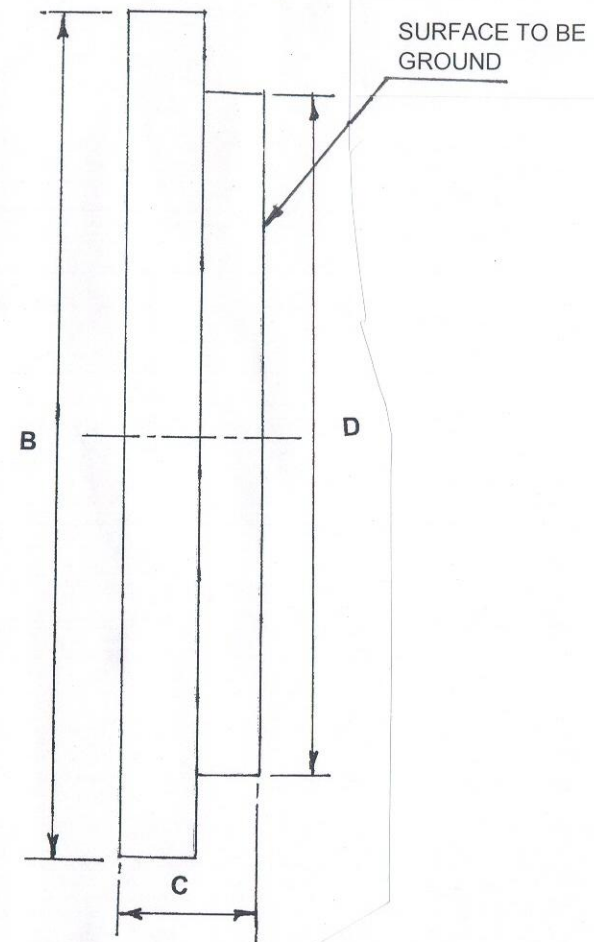
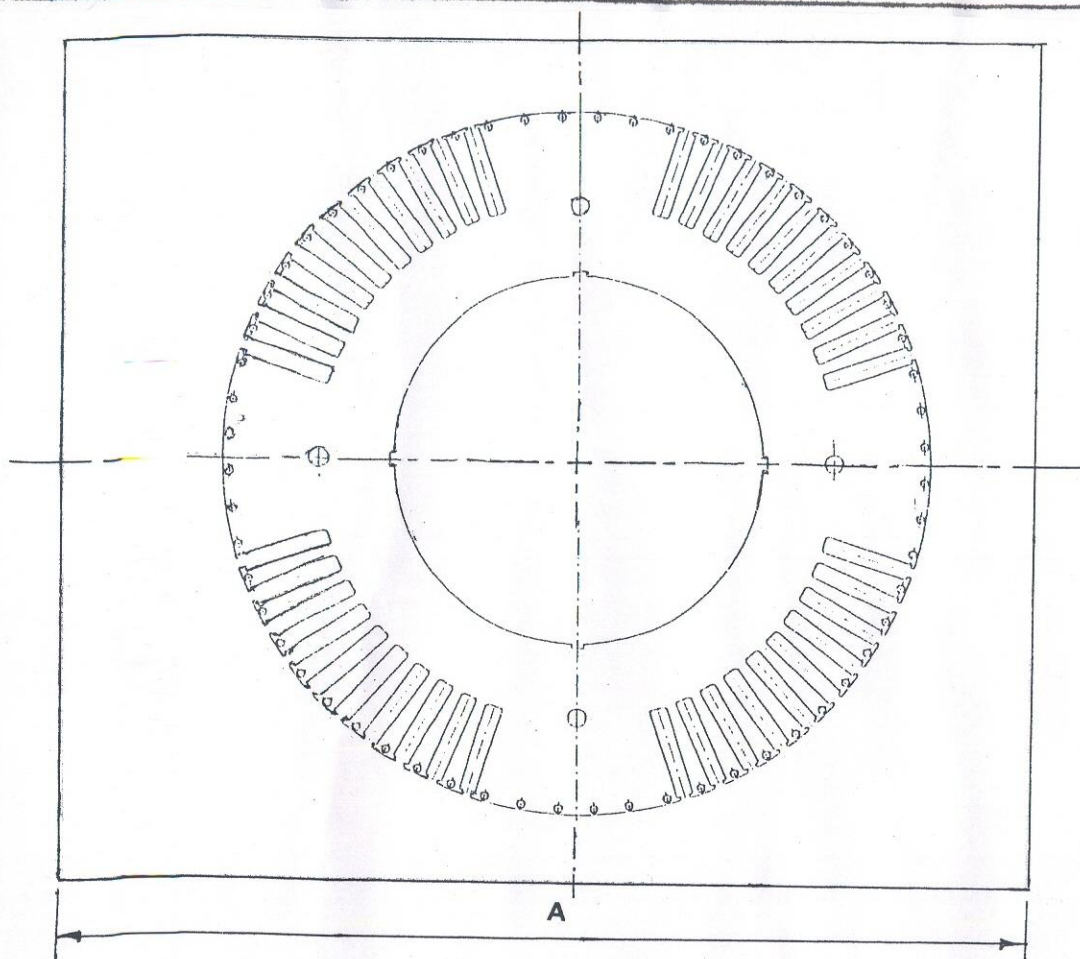
For Tender Purpose Only

Rev: 00

Date of Issue: 16 Sept 08

Sketch No

CSU/STA/07



ITEM	OVERALL SIZE			GRINDING SURFACE
	A	B	C	Diameter, D
	mm	mm	mm	mm
1	1700	1600	220	1240
2	1400	1300	180	920
3	1500	1400	200	1040
4	1350	1250	180	870
5	850	800	150	450

For Tender Purpose Only

Rev: 00

Date of Issue: 16 Sept 08

Sketch No

CSU/STA/08