

	<b><u>BHARAT HEAVY ELECTRICAL LIMITED</u></b>			Enquiry No. :	
	<b><u>RAMACHANDRAPURAM, HYDERABAD</u></b>			Due Date :	
	<b><u>ANDRAPRADESH INDIA</u></b>			Supplier Qtn.	
	<b><u>UNIT'S PHONE NOS.</u></b>			Date :	
	<b><u>CONTACT PERSON'S NAME/DESIGN./PHONE NO./E-MAIL (FROM PURCHASE DEPTT.) :</u></b>				
<b><u>ROEBEL BAR MANUFACTURING CENTER WITH CONDUCTOR CUTTING, SKINNING, SINGLE / TWO PLANE BENDING AND 540°TRANSPOSITION MACHINE</u></b>					
	<b>NOTE:-</b>				
	1. Vendor(OEM) must submit complete information against clause no. 23.0 The offer meeting this clause would only be processed.				
	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.				
<b>ADDRESS OF THE SUPPLIER :</b>		<b>ADDRESS OF THE INDIAN AGENTS :</b>			
<b>TELEPHONE NOS.:</b>		<b>TELEPHONE NOS.:</b>			
<b>FAX NOS.:</b>		<b>FAX NOS.:</b>			
<b>E-MAIL ADDRESS :</b>		<b>E-MAIL ADDRESS :</b>			
<b><u>SCOPE: SUPPLY, ERECTION &amp; COMMISSIONING OF ROEBEL BAR MANUFACTURING CENTER WITH CONDUCTOR CUTTING, SKINNING, SINGLE / TWO PLANE BENDING 540° TRANSPOSITION MACHINE.</u></b>					
<b>Sl.No</b>	<b>DESCRIPTION FOR BHEL REQUIREMENT</b>	<b>SPECIFIED / TO BE CONFIRMED</b>	<b>OFFERED</b>	<b>DEVIATION S</b>	<b>REMARKS</b>
	Specification No.S-EMT-226/00 Dt.19.06.2012				
<b>1.0</b>	<b><u>PURPOSE</u></b>				
1.1	Roebel Bar Manufacturing center will be used for the Production of Stator Winding Bars with single & double plane bending and 540° Transposition of Turbo Generators.				

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2.0	<b><u>SCOPE OF SUPPLY:</u></b>				
	The scope of supply includes design, manufacturing,supply,erection, commissioning and proving of the installation at BHEL works.It will consists of:				
3.0	<b><u>TECHNICAL SPECIFICATION</u></b>				
3.1	<b>Operations to be Performed on the Installation :</b>				
3.1.1	<b>Straightening</b> of insulated elementary solid and hollow Copper Conductor in both Horizontal and Vertical planes.				
3.1.2	<b>Stripping (Removal of Insulation)</b> of insulated elementary solid and hollow Copper Conductor at the both ends in specified length.				
3.1.3	<b>Cutting</b> of elementary solid and hollow Copper Conductors as per required length.				
3.1.4	<b>Bending</b> of insulated elementary Copper Conductor				
3.1.4.1	<b>Single Plane Bending</b> of individual solid / hollow Copper Conductor at two specified locations for 360° transposition of conductor as shown in attached Annexure-I, as typical illustration.				
3.1.4.2	<b>Single plane bending</b> of individual solid / hollow copper conductor at three specified locations for 540 degree transposition of conductor as shown in attachment Annexure-II, as typical illustration.				
3.1.4.3	<b>Two plane bending</b> of individual solid copper conductor at three specified locations for 540 degree transposition of conductor as shown in attached Annexure-III, as typical illustration.				
3.2	<b>Size of the conductors</b>				
3.2.1	Insulated solid copper conductor Thickness (T): 1.0 mm minimum; 4.0 mm maximum Width (W): 3.0 mm minimum; 15.0 mm maximum				

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3.2.2	Insulated hollow copper conductor Thickness (T): 4.5 mm minimum; 6.0 mm maximum Width (W): 7.0 mm minimum; 10.0 mm maximum Wall thickness: 1.5 mm, minimum, 1.8 mm maximum				
3.2.3	Bare stainless steel tube Thickness (T): 4.5 mm minimum; 6.0 mm maximum Width (W): 7.0 mm minimum; 10.0 mm maximum Wall thickness: 1.5 mm, minimum, 1.8 mm maximum				
3.3	Length of conductor: 1300 mm, minimum; 12000 mm maximum				
3.4	<b>Type of insulation of elementary copper conductor:</b>				
3.4.1	Double layers glass epoxy insulation in lap				
3.4.2	Enamel coating and single layer glass epoxy insulation in lap.				
3.5	Stripped length of conductor: 60 mm, minimum; 500 mm maximum at both ends.				
3.6	Feeding speed of the conductor during straightening mode of the installation : Minimum 100 mm / sec; maximum 1400 mm / sec.				
3.7	Feeding speed of the conductor during stripping mode of the installation : Minimum 50 mm / sec; maximum 140 mm / sec.				
3.8	<b><u>CONSTRUCTIONAL &amp; FUNCTIONAL FEATURES OF THE INSTALLATION.:</u></b> Offered machine shall have one set of de-rolling station (3.8.1), feed in station (3.8.2), straightening station (3.8.3), stripping station (3.8.4), drive in station (3.8.5) and conductor cutting station (3.8.6), Conductor collection station (3.8.7), shaping station (3.8.8) and assembly table (3.8.9). Stations as mentioned in (3.8.1) to (3.8.6) shall have two independent lines so as to switch over from first line to second line as and when required by the set programmed in AUTO MODE.				

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3.8.1	<p><b><u>DE- ROLLING STATION - SIGNLE DEREELERS:</u></b> Qty 2 nos.</p> <p>(A) Each de- rolling station will be equipped with single dereeler for loading the copper drum of gross weight 150 Kg. Each of both de-rolling station will have provision for loading of one copper drum as above at a time.</p> <p>De-rolling station should be designed for maximum weight of copper bobbin: 500 Kg.</p> <p>Maximum outer diameter of copper bobbin: 1000 mm.</p> <p>(B) Semi automatic loading system for loading &amp; un loading the copper drum on both the de rolling stations.</p>				
3.8.2	<p><b><u>FEED-IN STATION:</u></b> Qty 2 nos.</p> <p>Feed - in station shall have provision for pull / push of the conductor in the driving system through the straightening and stripping station.</p>				
3.8.3	<p><b><u>STRAIGHTNING STATION:</u></b> Qty 2 nos.</p> <p>Straightening station will have multi-roller sections separately for straightening the conductors in both horizontal and vertical plane. Provision shall be made to adjust the gap between the rollers to accommodate different size of conductor as specified at Sl.No.3.2.1 and 3.2.2 above. The rollers shall be universal. The quality of the rollers shall be such that neither the rollers nor the conductors are damaged during straightening operation of the conductor. Feeding speed of the conductor will be as per sl.no.3.6 above.</p> <p><u>Feeding speeds should be freely programmable.</u></p>				

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3.8.4	<p><b><u>STRIPPING STATION:</u></b> Qty 2 nos.</p> <p>Each stripping station shall have two independent stripping units - first unit for horizontal plane and second unit for vertical plane. Each of these units shall have arrangement of one pair of steel wire brush for effective removal of insulation (covered in Cl.3.4 above) from the elementary solid and hollow copper conductor. Stripped length and the feeding speed of the conductor during stripping operation, shall be as per sl.no. 3.5 &amp; 3.7 respectively. Stripping length shall be freely programmable.</p> <p>The stripping station must be enclosed in a leak proof steel housing with connection to a suitable suction device ( Dry type ) . This system must be complete with effective settling of insulating material dust in the collection box to ensure that surrounding environment is not polluted with dust.</p> <p>Suction system should be of high capacity, low noise level &lt;79dB (A) and leakage free to ensure effective stripping operation. The filtered air will be released in shop without any pollution.</p> <p>Qty 1 no.</p> <p>NOTE: The noise level shall be demonstrated during proving of the machine at BHEL.</p>				
3.8.5	<p><b><u>DRIVE IN STATION:</u></b> Qty 2 nos.</p> <p>The drive-in station will be equipped with double rubber belt drive in system. Advancing speed will be freely programmable. The station can be laterally moved by hand to use the total width of the belt.</p>				
3.8.6	<p><b><u>CONDUCTOR CUTTING STATION:</u></b> Qty 2 nos.</p> <p>The conductor is to be cut at the mid point of stripped length. Programmable motorized shearing device with special profile and hardened cutting tool is to be provided for this purpose. Cutting tool shall cut perpendicular to the conductor avoiding formation of sharp edge at cut ends of the conductor.</p> <p>Accuracy of the cutting in length should be within 2 mm over the set length.</p>				

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3.8.7	<p><b><u>CONDUCTOR COLLECTION STATION</u>: 1 set</b></p> <p>Before the conductor is cut, the free end of the conductor is to be held by a clamp fixed on movable carriage. The clamp will pull the conductor as per set length. After cutting of conductor, each conductor is transferred in the feed in unit of the crimping station with the help of manipulator (5 no's ) and automated carriage. After positioning the conductor, the clamp will return with high speed to its initial position for clamping the next conductor. The manipulator will hold previous conductor and transfer this conductor in one of slots of output magazine.</p>				
3.8.8	<p><b><u>SHAPING STATION AND STORING MAGAZINE</u> : 1 set</b></p> <p>Shaping unit will consist of 4 no's motorized programmable units. One no. unit shall be with universal jaw for clamping of conductor size (3.2.1 &amp; 3.2.2). Remaining 3 units will be for bending of conductors for 540 deg, transposition respectively. Forming shall be for single/double plane bending of conductors for 360 deg &amp; 540 deg transposition.</p> <p>Shaping station shall be automatically set as per programming to position the shaping units &amp; procedure steps, type &amp; no of bends. Shaping unit can also be parked together at a suitable location for changing forming tools. In case of 360 deg transposition the 3rd forming unit (not in operation) can be parked at a suitable location to avoid disturbance to the process.</p> <p>Complete set of specific size forming tools along with drawings for following size of conductors are to be supplied.</p> <p>(a) Hollow conductor (insulated size) 8.3x4.9x1.5 (wall thickness) - Single plane bending for 540 deg transposition.</p> <p>(b) Solid conductor (insulated size) 8.3x3.1 - single plane bending for 540 deg transposition.</p> <p>(c) Solid conductor (insulated size) 8.3x1.6 - single plane bending for 540 deg transposition.</p> <p>(d) Solid conductor (insulated size) 10.8x2.1 - Double plane bending for 540 deg transposition.</p>				

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	Storing magazine will have a tilting system , with a 90 degree travel . It includes a row of U-supports which width is adjustable according to the dimension of the wire. The manipulators unload the shaped strands in the magazine with automatic determination of the unloading level. When no. of conductors necessary to constitute a half bar is reached, the machine stops and the operator can bind manually the shaped strands by means of a bi-manual control device, he tilts the magazine in horizontal position. The operator unloads the half bar on the assembling table, then the bi-manual control device replaces the magazine in vertical position. The machine should then continue its production cycle. NOTE: Detailed manufacturing drawing of single plane and double plane forming tool for above conductor sizes shall be supplied in the manual.				
3.8.9	<b><u>ASSEMBLY TABLE:</u></b> 1 no 600 mm wide table with suitable material on top is to be provided for keeping the shaped conductors for crossing the conductors, insertion of vertical separator and assembly of two half bars for the formation of transposed bar. All these activities will be carried out manually by the operator. Rolling system with 150 mm long rollers will be provided at the end of assembly table to shift manually transposed bars for next operation.				
3.9	<b><u>MACHINE STRUCTURE &amp; GENERAL ARRANGEMENT DRAWING:</u></b> The structure of the machine will be made of sturdy welded steel profiles for protect stability of the machine. The General arrangement drawing indicating the location, construction detail and technical feature of De-rolling station, Straightening station, Skinning station, Conductor cutting station, Conductor collection station, Shaping station, Shaping tool of crimping unit, Storing magazine and Assembly table etc. is to be furnished with the offer.				

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3.10	<p><b><u>CONTROL PANEL:</u> 1 set</b></p> <p>Basic control system will consist of 2 No's of Siemens PLC S7 (or latest version) and operating panel with MMI(Man Machine Interface with Display). One number PLC S7- CPU 315 (or latest version) is meant for straightening, stripping and cutting operation. One number PLC S7- CPU 414 (or latest version) is meant for forming operation.</p> <p>The motors shall be Siemens make. Back up will be provided on CD Rom or hard disc. Three level safety pass-words will be provided in the control system.</p>				
3.11	<p><b><u>OPERATION &amp; MAINTENANCE MANUAL IN ENGLISH LANGUAGE</u></b> ( one set of following documents ( 4 sets of Hard copies + 1 set on CD ) should be supplied along with the machine):</p> <p>O&amp;M manual should have the following aspects in addition to other information:</p> <p><u>Machine manual</u>:-</p> <ul style="list-style-type: none"> <li># Electrical schematic diagram</li> <li># Pneumatic/hydraulic schematic diagram</li> <li># Wiring diagram indicating layout of cables, plugs, junction boxes, terminal strips etc.</li> <li># Ladder diagram/statement list, cross reference list, I/Q/F list.</li> <li># Alarm list &amp; fault diagnostic manual</li> <li># Operation elements of the machine</li> <li># Software operation</li> <li># Commissioning instruction</li> <li># Operation &amp; maintenance manual of all auxiliary systems/equipment/ bought out items</li> </ul>				



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	# Spare parts list along with specifications and address of manufacturer # Programming manual of PLCs # Circuit diagram of auxiliary systems/equipment's # Drawing details of roller of straightening station (cl.no.3.8.3) # Drawing details of wire brushes for stripping station (cl.no.3.8.4) # Drawing details & specification of drive-in belt (cl.no.3.8.5) # Drawing details of shearing cutter of cutting station (cl.no.3.8.6) # Manufacturing drawings of forming tools for single & double plane bending (cl.no.3.8.8) # Make & specification details of Air condition/Dehumidifier (cl.no.3.13) # Make & specification details of Air compressor (cl.no.3.19)				
	MMI & DRIVE MANUAL : # Operator's guide # Programming guide - including basic, subroutine etc. # Diagnostic guide # PLC user program # User and manufacturer documents in CD ROM # Description of supplied items/systems # Installation guide lists # Installation and planning for drives.				
3.12	ENVIRONMENT CONDITIONS : The machine shall be suitable for operation in tropical conditions with ambient temperature from 0 to 45 deg centigrade and relative humidity maximum 100 %.				
3.13	<u>AIR CONDITIONER / DEHUMIDIFIER</u> : Suitable air conditioner / dehumidifier is to be provided on control cubicle and operator panel of the machine for the trouble free operation of the installation under environment conditions mentioned in cl. no. 3.12				

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4.0	<b><u>ELECTRICAL :</u></b>				
4.1	415V (fluctuation + 10% / -10%), 50HZ (fluctuation+/-3 Hz), 3 Phase AC (3 wire system with out neutral) Power Supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding / earthing with required material details should be informed by vendor well in advance so that same could be incorporated during construction of foundation.				
4.2	<b>Tropicalisation:</b> All electrical / electronic equipment shall be tropicalized				
4.3	All electrical & electronic control cabinets & panels should be dust and vermin proof				
4.4	All electrical components in the cabinets should be mounted on DIN Rail				
4.5	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				
4.6	Motors shall conform to IEC or Indian Standards				
4.7	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.				
4.8	Vendor should ensure the proper earthing for the machine and its peripherals.				
4.9	In-cycle hour counter with reset facility.				
5.0	<b>SAFETY ARRANGEMENTS:</b>				
5.1	Following safety features in addition to other standard safety features should be provided on the machine:				

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	(i). 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 MMI ) should be available.				
	(ii). A detailed list of all alarms / indications provided on machine should be submitted by the supplier.				
	(iii). 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.				
	(iv). All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations.				
	(v). Emergency Switches at suitable locations as per International Norms should be provided.				
	(vi). Oil & water pipe lines should not run with electrical cable in the same tray / trench.				
<b>6.0</b>	<b>ENVIRONMENTAL PERFORMANCE OF THE MACHINE :</b>				
6.1	The Machine should conform to following factors related to environment :				
	(a) Maximum noise level shall be 85 dB (A) at normal load condition, 1meter 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. Supplier to demonstrate compliance to noise level, if asked for.				
	(b) There shall not be any emissions from the machine except fumes of cutting fluid during machining.				
	( c) There should not be any effluent from the machine. In case there are any effluents from the machine, requisite effluent treatment plant or pollution control device should be built into the machine by the supplier.				
	(d) No hazardous chemicals shall be required to be used in the machine.				

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	(e) If any safety / environmental protection enclosure is required it should be built in the machine by the vendor.				
	(f) Paint of the machine should be oil / coolant resistant and should not peel off and mix up with coolant.				
<b>7.0</b>	<b>SERVO VOLATGE STABILIZER:</b>				
7.1	Indian make Oil / Air Cooled servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc. with no undesirable Harmonics in the stabilizer output.				
7.2	Make				
7.3	Model & Rating				
<b>8.0</b>	<b>ULTRA ISOLATION TRANSFORMER :</b>				
8.1	Indian make Ultra Isolation Transformer suitable for complete machine , its drives, controls, PLC etc. shall be supplied				
8.2	Make				
8.3	Model and Rating				
<b>9.0</b>	<b>PNEUMATIC SYSTEM:</b>				
<b>9.1</b>	<b>AIR COMPRESSOR:</b>				
9.1.1	Independent Air Compressor (of reputed Indian make) with refrigerated type Dryer & Filter of suitable capacity for the total compressed air requirements of the machine & accessories and to suit required air quality should be supplied. The system should be so designed to have additional provision and required accessories so that BHEL compressed air supply having pressure 5 bar could be used as and when required. The compressor unit should be suitable for continuous duty.				
9.1.2	Make & Model of Air Compressor				
9.1.3	Make & Model of Refrigerated Air Dryer				
9.1.4	Capacity (Flow, Pressure & KW)				

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10.0	<b>COMPRESSED AIR POINTS:</b>				
10.1	Compressed Air Point with manually ON/ OFF Valve and flexible pipe of suitable length for work piece cleaning.				
11.0	<b>DIAGNOSTIC SYSTEM :</b>				
11.1	<b>TELE-DIAGNOSTIC SERVICE :</b>				
11.1.1	Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied MMI system for remote diagnosis and correction of the problems in both MMI System and PLC of the machine. This should be provided free of charge for the guarantee period. Terms and conditions for the service after guarantee period should be informed by vendor. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.				
11.2	<b>FAULT DIAGNOSTIC SYSTEM:</b>				
11.2.1	Supplier's own diagnostic system with required hardware and software should be supplied and installed on the system. This should include customized diagnostic system with supporting hardware and software which shows detailed cause and remedy for the fault on the display with full video diagnostic help for faults related to mechanical and electrical maintenance.				
11.2.2	Help guide should be provided to use both diagnostic systems				
12.0	<b>LEVELING &amp; ANCHORING SYSTEM</b>				
12.1	Complete anchoring system including foundation bolts, anchoring materials, fixtures, leveling shoes etc. should be supplied				
13.0	<b>TOOLS FOR ERECTION, OPERATION &amp; MAINTENANCE :</b>				
13.1	Special tools and equipment required for erection of the machine shall be brought by the vendor. Necessary tools like Torque Wrench, Spanners, Keys, grease guns etc. for operation and maintenance of the machine should be supplied. List of such tools should be submitted with offer				

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14.0	<b>SPARES:</b>				
14.1	Itemized breakup of mechanical, hydraulic, 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.				
14.2	Recommended set of spares for all attachments are to be offered with details.				
14.3	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				
15.0	<b>FOUNDATION :</b>				
15.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI) / P.O. Soil condition data will be furnished by BHEL along with the approval. Complete Foundation Design including details viz. static / dynamic load details etc. and Final Layout drawings shall be submitted by the supplier within three months after getting BHEL's approval. The layout should consist of all requirements pertaining to complete machine including space requirement for Voltage Stabilizer, Isolation Transformer, Air compressor, Chip Bin & any other accessories. BHEL shall construct complete foundation for the machine under supervision of supplier and at supplier's responsibility. Vendor should arrange equipment's required for the testing of foundation, if required by the vendor. The vendor shall also indicate detailed specifications of grouting compound and Grouting procedure etc. for foundation bolts of the machine.				

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16.0	<b>ERECTION &amp; COMMISSIONING</b>				
16.1	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control & all types of other supplied equipment , machining of test pieces etc. 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. Other requirements like crane and helping personnel shall also be provided by BHEL. Details of these requirements should be informed by vendor in advance.				
16.2	Erection & Commissioning of Voltage stabilizer, Isolation Transformer & Air Compressor shall also be responsibility of the vendor.				
16.3	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests, as mentioned at <b>Sl. No. 19.0</b> (Machine Acceptance) shall form part of the commissioning activity.				
16.4	Tools, Tackles, Test Mandrels, instruments and other necessary equipment including Laser equipment if required to carry out all above activities should be brought by the supplier.				
16.5	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis.				
16.6	All Cover Plates required for the machine and its peripherals including pits, if any, shall be supplied and installed by the vendor. The plates should be sourced from India.				
16.7	Portion, if any, of the machine, accessories and other supplied items where paint has rubbed off or peeled during transit or erection should be repainted and merged with the original surrounding paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colors of paint used.				
16.8	Schedule of Erection and Commissioning shall be submitted with the offer.				
16.9	Charges, duration, terms & conditions for E&C should be furnished in detail separately by vendor along with offer.				

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17.0	<b>OPERATING CONDITIONS :</b>				
17.1	Total machine including MMI system and all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Power Supply: Voltage: 415 V - 10%, +10% Frequency: 50 Hz +3%, - 3% No. of phases = 3 Ambient Conditions: Temperature = 0 5 to 45 degree Celsius Relative Humidity = 95% max. (Vendor to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)				
17.2	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 to confirm that machine is suitable for above and details of provisions on the machine for the same are to be furnished by Vendor)				
18.0	<b>PROVEOUT OF BHEL COMPONENTS :</b>				
18.1	Drawings of prove out components are enclosed at Annexure-I, Annexure-II and annexure-III. The vendor to prove the performance of the Machine by producing 20 Generators Stator bars of each type as per Annexure-I, Annexure-II and Annexure-III. All the required inputs like tooling, MMI Programmes etc. are in the scope of vendors.				
19.0	<b>MACHINE ACCEPTANCE: (Tests/Activities to be Performed by Vendor)</b>				
19.1	<b>Tests/Activities to be carried out at supplier's works on the machine before dispatch :</b>				
19.1.1	Demonstration of all features of the machine, control system & accessories				



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19.1.2	<p><b><u>PRE-ACCEPTANCE TEST RUN AT SUPPLIER'S WORKS:</u></b></p> <p>Pre acceptance test run will be carried out at supplier's works under the presence of BHEL engineers. Minimum five conductors each of four different cross section of conductors (sl.no.3.8.8) are to be processed on installation for 540 deg. transposition with single plane bending and 540 deg. Transposition with double plane bending and single plane bending of stainless steel tube for 540 deg transposition. Following checks are to be carried out during pre acceptance of the installation. *</p> <p>Proper length of conductor cutting as per the set length</p> <p>* Proper stripped length of conductor as per set parameter</p> <p>* Proper position of bend and bent profile of the conductor as per set parameter.</p> <p>* Absence of damage of insulation of conductor at the location of bending</p> <p>* Smooth cross over the conductors at the bent position.</p> <p><b><u>NOTE:</u></b> Material for pre acceptance test run at supplier's works will be arranged by the supplier.</p>				
<b>19.2</b>	<b>Tests/Activities to be carried out at BHEL works while commissioning the machine :</b>				
19.2.1	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine				
19.2.2	Job Prove out as per Sl. No. 18.0				
19.2.3	Two weeks supervision of independent operation of machine by BHEL after job prove out				
19.2.4	Training of BHEL machine operators in operation of complete machine & accessories etc. by the supplier's experts / engineers during their stay at BHEL				
<b>20.0</b>	<b>PACKING:</b>				
20.1	Sea worthy & rigid packing for all items of complete machine, MMI System, all Accessories and other supplied items to avoid any damage / loss in transit. When machine is dispatched in containers, all small loose items shall be suitably packed in boxes				

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21.0	<b>GUARANTEE :</b>				
21.1	24 months from the date of acceptance of the machine.				
22.0	<b>GENERAL :</b>				
22.1	Machine Model No.				
22.2	Total connected load (KVA):				
22.3	Floor area required (Length, Width, Height) for complete machine & accessories				
22.4	Painting of Machine / Electrical Panels : RAL 6011 Apple Green (Polyurethane Paint)				
22.5	Total weight of the machine				
22.6	Weight of heaviest part of machine				
22.7	Weight of the heaviest assembly / sub-assembly of the Machine				
22.8	Dimensions of largest part/ sub-assembly/ assembly of the machine				
22.9	Vendor to submit , along with offer, reference list of customers where similar machines have been supplied i.e. Roebel Bar manufacturing center with two plane bending, 540° transposition.				
22.10	Detailed catalogues , sketch/ photographs of the m/c and accessories/ attachments should be submitted with the offer.				
22.11	Hydraulic, Pneumatic & oil piping's should be preferably metallic except places where flexible piping's are essential. All the pipes required for the same shall be included in the standard scope of the machine.				

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23.0	REFERENCE LIST / QUALIFYING CONDITIONS :				
23.1	Only those vendors ( <b>OEM's</b> ), who have supplied and commissioned at least one Roebel bar manufacturing center with 2-plane bending & 540° transposition for manufacturing of Roebel type stator bar with Solid and Hollow conductors for large size Generators in the past ten years (On the Date of Opening of tender) and such machine is presently working satisfactorily for more than one year after commissioning (On the Date of Opening of tender) , should quote. The following information should be submitted by the vendor about the companies where referred machines have been supplied. This is required from all the vendors for qualification of their offer.				
	1. Name of the customer / company where referred machine is installed.				
	2. Complete postal address of the customer.				
	3. Month and year of commissioning.				
	4. Parameters of machine(s) supplied and application for which the machine is supplied..				
	5. Name and designation of the contact person of the customer.				
	6. Phone, FAX no. and email address of the contact person of the customer.				

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	7. Performance certificate from the customers regarding satisfactory performance of machine supplied to them (Original certificate or Through E-mail directly from the customer).The Original performance certificate may be returned after verification by BHEL, if required.				
	8. 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.				
<b>24.0</b>	<b>OTHER FEATURES: (To be Included only if required)</b>				
<b>24.1</b>	<b>NETWORKING:</b>				
24.1.1	Machine control should have necessary hardware and software for interfacing with gigabit Ethernet Local Area Network with 100 MB/sec through UTP cables for NC program and other related data transfer. This network to be connected to wide area network/Internet. The networking should have following capabilities.				
	a) The machine shall appear as a node in the Entire Network. (Network Neighborhood)				
	b) The program transfer shall be by simple copy and paste method provided sharing access is allowed between any PC and the machine across the network.				
	c) The program transfer between MMI system and network should also be possible.				

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24.2	MACHINE MONITORING SYSTEM (MMS) SIGNALS				
24.2.1	Following MMS signals would be made available on a specifically earmarked terminal strip. These MMS signals would be sourced from a SIMATIC S-7 PLC output card separately.				
	a) Control ON				
	b) Cycle ON				
	c) Feed Active (Any of the axes moving)				