

BHARAT HEAVY ELECTRICAL LIMITED					
<u>SPECIFICATION CUM COMPLIANCE CERTIFICATION FOR ROBOTIC SHOT PEENING CENTER</u>					
<u>Qty 1 No</u>					
NOTE :-					
1. Vendor must submit complete information against clause no. 40. The offer would only be considered if complying this clause.					
2. The vendor should fill the "Offered" Column in compliance to specified requirements and also "Deviations" Column, where there is deviation from the requirement. Duly filled specification cum compliance certificate 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. Any changes made to the clauses of the specification cum compliance certificate will be treated as non-compliance and may lead to rejection of the offer.					
3. The offer and all documents enclosed with offer should be in English language only.					
SCOPE:	SUPPLY, ERECTION & COMMISSIONING OF ROBOTIC SHOT PEENING CENTER WITH SPECIFICATIONS AS BELOW :				
	No of Machines : 1 No.				
Sl. No.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
01.00	PURPOSE & WORKPIECE MATERIAL				
01.01	The Robotic Nozzle Automatic Shot Peening Centre is required for controlled shot peening in fir tree flanks of steam turbine blades to induce residual compressive stresses. No Portion of the aerofoil nor transition radius of the aerofoil to the base plate shall be shot peened. Component to be shot peened are steam turbine blades, forged out of high temperature, fatigue and creep resistant alloy steel of grades like X20Cr13, X10Cr Ni MoV 12-2-2, X5Cr Ni Cu Nb 16-4 etc. having tensile strength up to 1050 N/mm ² and hardness about 350 HBW.	Vendor to accept			
02.00	Blade sizes to be shot peened are as follows:	Min. blade length - 500mm Max. blade length - 1500mm Min. root width - 150mm Max. root width - 450mm Min. root thickness - 30mm Max. root thickness - 120mm			
02.01	Drawings of blades(clause no. 10.02) will be provided along with a sketch(spsketch001) to depict exact shot peening surfaces after the vendor has signed a non-disclosure agreement with BHEL.	Vendor to accept			
03.00	SCOPE OF THE PROCESS:				
03.01	The machine should be capable of running an automatic process of shoot peening so that following consistent result are obtained on fir-tree steam turbine blade roots.	Vendor to accept			
03.02	Surface Roughness	Better than Rz 20µm			
03.03	Compressive Stress	-Min. 500 Mpa at a depth of 0.1 mm in case of shot size S550 -Min. 450 Mpa at a depth of 0.1 mm in case of shot size S330 & Min. 250 Mpa at a depth of 0.25 mm in case of shot size S330			

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03.04	Peening intensity range	-With cast steel shot, size S550 as per AMS-S-13165 type, peening intensity range 0.45 to 0.48mm Almen A for the first 2 passes, followed by 1 pass for smoothing with an intensity of 0.25mm Almen A with 175% to 200 % coverage. -With cast steel shot, size S330 as per AMS-S-13165 type, peening intensity range 0.35 to 0.38mm Almen A with 175% to 200 % coverage.			
03.05	The machine should be capable of accommodating minimum and maximum size blades and should be able to shotpeen at least 30 blades of maximum size in a shift of 8 hours.	Vendor to accept			
03.06	The shot (S330 or S550) desired should be selectable from the machine control panel. There should not be any need to change magna valve or vibratory sieve classifier to change shot size.	Vendor to accept			
04.00	BLAST CABINET WITH ILLUMINATION, RUBBER LINING AND SHOT PEENING NOZZLE				
04.01	It should be fabricated from 3mm or more steel and should have a tubular construction. The cabinet should be rubber lined with 6mm or more thick rubber sheets. The vendor should provide acoustic panels to keep sound levels below 80dB. The cabinet should be illuminated from inside with at least one metal halide of 150W or more, which should be abrasion resistant, dust-tight and easy to maintain. One set of Pressure Gauge, Moisture Separator & Pressure Switch should be provided at the air inlet of the M/C.	Vendor to accept			
04.02	One side of the cabinet operator access door should be insulated, and should be double wall hinge type with proper sealing. The door should be electronically secured to prevent peening operation when it is open and should have at least one viewing window.	Vendor to accept			
04.03	The complete cabinet should be rubber lined with special quality natural rubber of thickness 6mm or more for protection against abrasion.	Vendor to accept			
04.04	At least one vision window at access door should be provided with toughened vision glass which is to be protected by a fine wire mesh and the glass should be easily replaceable.	Vendor to accept			
05.00	SHOT FEEDING DEVICE (1 for each shot type)				
05.01	This should include continuous blast generator and should consist of double pressure vessel, a mushroom valve, a mixing tube and automatic exhaust valve to depressurize the pressure vessel, when air supply is cut off. Pressure vessel is to be fabricated from 6mm or more thick MS Plates as per IS - 2825 and should be hydraulically tested at 250 or more psi. There should be on shot feeding device for each shot type.	Vendor to accept			
06.00	PNEUMATIC RECOVERY SYSTEM(WITH RECLAIMER AND DUST COLLECTOR)				
06.01	A hopper and screw conveyor in the floor of the blast cabinet should be provided to collect used media.	Vendor to accept			

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06.02	A bucket elevator or suitable system should be provided to deliver this used media to the shot classifier.	Vendor to accept			
06.03	A fan should be provided to remove dust into the cartridge dust collector. The cartridge dust collector should be a self cleaning system. All filter elements should be automatically cleaned with the aid of timer card through which solenoid valve are opened and certain volume of compressed air is blown into the cartridges to keep cartridges clean and thus the clean air is discharged in to the atmosphere while the dust is collected properly.	Vendor to accept			
06.04	Filter element porosity	2 Microns or better.			
06.05	Fan motor	15HP or more			
06.06	Fan Capacity	2000 or more Cfm.			
06.07	Composition of Micro fibres in filter element	Synthetic fibres with an average diameter of 0.2 Microns.			
06.08	Composition of Substrates in filter element	Blend of cellulose fibres.			
06.09	Fractional efficiency of filter element	99.999% on 0.5 Micron particles.			
06.10	Suitable PVC flexible hose for the system is to be provided.	Vendor to accept			
07.00	ONLINE VIBRATORY CLASSIFYING DEVICE UNIT WITH BUCKET ELEVATOR AND SHOT SEPERATOR (1 unit for each shot size)				
07.01	Shot Separator (For shape segregation) should be spiral separator type to separate round and broken shots.	Vendor to accept			
07.02	Classifier (For size segregation) should have a vibration screen to separate shot mix into proper, over and under size grits.	Vendor to accept			
07.03	A bucket elevator or suitable system should be provided to deliver shots from shot separator to classifier. From the classifier, usable shot sizes should be sent to the blast generator.	Vendor to accept			
07.04	Drive motor power -2 HP or more.	Vendor to accept & provide details.			
07.05	Separate classifying device should be provided for each shot size and the machine should be capable of using the correct one automatically depending on the shot size selected by the operator panel..	Vendor to accept			
08.00	6 AXIS ROBOT WITH CONTROLLER UNIT AND TEACH PENDANT				
08.01	Robot supplied should have coordinated movement with turntable to move the blast nozzle in a curved path to cover the fir tree root flanks of both concave and convex curvatures of the steam blades. All movement should be programmable.	Vendor to accept			
08.02	Robot should be of FANUC make or equivalent reputed make. Vendor should offer details of robot being supplied.	Vendor to accept			
08.03	Integrated Controller should be provided. Details of the controller to be submitted along with the technical offer.	Vendor to accept			
08.04	Teach Pendant with cable should be provided.	10 m cable length			
08.05	The robot should have high sensitivity collision detection provision.	Vendor to accept			
08.06	Special protection for the robot from dust and spray entry should be provided.	Vendor to accept			
08.07	The programmable logic controller should be built in. Details for this controller are to be provided.	Vendor to accept and provide details.			
08.08	Payload Specifications of robot	20kgs or more			

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08.09	Motion range of Robot should be sufficient enough to cover the entire root of blades mentioned in clause 10.02 for the purpose of shot peening all the flanks (both bearing and non-bearing as well as the bearing flank radius). The robot should be able to articulate easily, with the blast nozzle mounted on it.	Vendor to accept & provide details of the robot's motion range.			
08.10	Positioning repeatability of Robot should be +/- 0.08 mm or better.	Vendor to accept			
09.00	DOOR AND ROTARY TABLE FOR BLADE MOUNTING				
09.01	A hinge type door should be mounted at the front of the cabinet, which should be provided with a limit switch to prevent peening operation when door is open. A rotary table should be provided for blade mounting along with fixture and should have coordinated motion with the robot.	Vendor to accept & provide details of servo-motor & drive.			
09.02	Diameter of rotary table	600mm			
09.03	Maximum load capacity of rotary table	150kg or more			
09.04	Rotational speed of rotary table	0-20rpm or more			
09.05	Rotary table servo motor power	1.1 or more kW			
09.06	The rotational speed should be choosable from the teach pendant of the robot.	Vendor to accept			
10.00	FIXTURING				
10.01	The rotary table should be provided with an arrangement for fixtures for following blade drawings supplied with BHEL technical specification as per the following clause. The requisite fixtures to be offered item wise. Necessary masking elements to be offered item wise for all the mentioned blades. NOTE:- drawings will be provided to the vendor only after they have signed a non-disclosure agreement with BHEL.	Vendor to accept			
10.02	1.SKETCH1, SKETCH2 Material : X5CrNiCuNb16-4 2.SKETCH3, SKETCH4 Material : X10CrNiMoV12-2-2 3.SKETCH5, SKETCH6 Material : X10CrNiMoV12-2-2 4.SKETCH7, SKETCH8 Material : X10CrNiMoV12-2-2 Note-Each blade has 2 variants - left hand and right hand Profile Drawings - SKETCH9, SKETCH10, SKETCH11, SKETCH12 Root Profile Drawings - SKETCH13, SKETCH14, SKETCH15 Explanation Sketch - spsketch001 (Drawing will be provide only after vendor has signed non-disclosure agreement with BHEL)	Vendor to accept			
10.03	A suitable jib crane or equivalent loading mechanism should be provided for easy loading and unloading of the blades from the machine. There should be suitable arrangement for holding the blade during loading/unloading operation.(capacity of loading/ unloading mechanism - 150kgs or more)	Vendor to accept			
11.00	PC FOR PROGRAMMING				
11.01	A PC for programming of the machine, having suitable hardware configuration along with printer and UPS(with capacity to power the supplied computer for 30 minutes) is to be provided. The operating system should be Windows 7 based.	Vendor to accept			
12.00	SOFTWARE				
12.01	Parametric programmes for shot peening different types of blade roots as mentioned in clause 10.02 to achieve desired peening intensity are to be supplied.	Vendor to accept			

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12.02	Customized diagnostic software, example mimic diagram for monitoring, various control measurement and proper functioning of machine elements should be supplied. S-7 software to visualize PLC ladder diagram along with WINCC should also be provided. System software of robot unit should also be provided on PCMCIA Card.	Vendor to accept			
13.00	MACHINE CONTROL PANEL				
13.01	A dust & rodent proof and wired for 415V/3P/50 Hz. power control panel should be provided. It should have Start / Stop switches for all the motors in the machine, On / Off switch for operation sequence, blast nozzle, gun reciprocation and illumination. An emergency stop should also be provided. Audio visual alarm indicating cycle start , cycle completion and fault should be provided in the control panel. The control panel is to be properly illumination for maintenance purpose and should have forced cooling arrangement.	Vendor to accept			
13.02	An LCD display should be provided.	10" or more			
13.03	A membrane keyboard or touchscreen should be provided for operating the panel.	Vendor to accept			
14.00	SERVO VOLTAGE STABILIZER				
14.01	Oil / Air Cooled Servo Controlled Voltage Stabilizer suitable for complete machine, its drives, controls, PLC etc. for unbalanced load & supply conditions considering specified power supply & ambient conditions.	Vendor to offer & to provide electrical drawings for the same.			
14.02	Spares Package for Servo Voltage Stablizer, with item-wise breakup, are to be recommended and offered by the vendor in sufficient quantity for 2 years of trouble free operation considering two shifts running of the machine. Detailed list is to be submitted. Price of unit quantity of each item is to be quoted.The following should be necessarily offered along with the spares package :- Variacs-2 nos., Correcting servomotors- 4 nos., Control cards-2 nos of each type, Control Transformers - 3 no. each type.	Vendor to offer			
14.03	Make	Neel, Suvik, Servomax, Aplab or Auto Electric			
14.04	Model, Rating & Input/ Output Voltage etc.	Vendor to inform			
14.05	Monitoring device with cut-off facility for under/over output voltage, Devices for load current measurement, MCCB at input for overload/short circuit protection. (Details to be submitted)	Vendor to inform			
15.00	ULTRA ISOLATION TRANSFORMER				
15.01	Ultra Isolation Transformer suitable for complete machine , its drives, controls, PLC etc. for unbalanced load & supply conditions considering specified power supply & ambient conditions.	Vendor to offer			
15.02	Make	Neel, Suvik, Servomax, Aplab or Auto Electric			
15.03	Model, Rating & Input/Output Voltage etc.	Vendor to inform			
15.04	Monitoring device with cut-off facility for under/over output voltage, Devices for load current measurement, MCCB at input for overload/short circuit protection. (Details to be submitted)	Vendor to inform			
15.05	Catalogue of the Isolation Transformer shall be submitted with the offer.	Vendor to submit			

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15.06	Spares Package for Isolation Transformer, with item-wise breakup, are to be recommended and offered by the vendor in sufficient quantity for 2 years of trouble free operation considering two shifts running of the machine. Detailed list is to be submitted. Price of unit quantity of each item is to be quoted.	Vendor to accept and provide details.			
16.00	PLC & PROCESS SEQUENCE				
16.01	PLC for sequence and operation controls of variables to ensure repeatability of shot peening process is to be provided. Preferably Siemens make.	Vendor to accept			
16.02	The following should be displayed on operator's panel along with other relevant information:- 1.Shot Size Selection. 2.Shot Flow rate. 4.Working pressure. 5.Peening time.	Vendor to accept			
16.03	Following function should be displayed on Robot Pendant along with other relevant information :- 1.Motor Position of 6 Axis Robot 2.Position of Turntable 3.Turntable RPM	Vendor to accept			
17.00	CLOSE LOOP AIR PRESSURE REGULATOR & MAGNA VALVE.				
17.01	Close Loop Air Pressure Regulator should be supplied for regulating air pressure through PLC. Magna valve should be supplied for controlling variable flow rates through PLC. To protect magna valve against excessive wear, there should be a pinch valve above the magna valve. The controller should be capable of being recalibrated for shot type and size for higher accuracy. At the same time the Magna valve should be capable of accommodating the Cast Shot Size S330 and S550. The shot flow controller should have a large digital display, high / low alarm contacts, monitor flow in Kg / min, etc.	Vendor to accept			
17.02	The air pressure should be controlled using the control panel and values should be visible on operator's screen.	Vendor to accept			
17.03	This system is to be provided for separately for each shot size and the machine should be capable of automatically using the correct system depending on the shot size selected in the operators panel..	Vendor to accept			
18.00	COMPRESSED AIR TREATMENT EQUIPMENT				
18.01	Refrigerator Air Dryer, Compressed air vessel with pre and post filters should be provided to entrap moisture and other suspended particles to provide dry and clean air into the machine.	Vendor to accept			
18.02	The system should be IP 44 or better rated.	Vendor to accept			
18.03	A compressed air vessel is to be provided with amount ductings.	3000 Ltrs or more			
18.04	All pneumatic ducting and piping network for connecting the system to BHEL source of pneumatic point is to be supplied by vendor.	Vendor to accept			
19.00	ALMEN GAUGE, ALMEN STRIP A AND ALMEN TEST STRIP HOLDER (ALONG WITH DUMMY)				
19.01	The digital almen gauge should be supplied.	1.Measuring range - 0.0001" to 0.025" 2.Resolution - 0.0001" or better. 3.The gauge should have an easy to read display.			

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19.02	500 no. almen strips should be supplied along with the machine.	1.Length - 76.11+/-0.29mm 2.Width - 18.985+/-0.065mm 3.Thickness - 1.2905+/-0.0205mm 4.Flatness - +/-0.025mm 5.Hardness - HRC 44-50			
19.03	Almen strip holders and Dummy blocks (for holding almen strip) for each type of blade root mentioned at clause no. 10.02 is to be provided.	-4 no. almen strip holders -1 dummy block each			
19.00	SHOT PEENING MEDIA				
19.01	Cast steel shots type S330 & S550(for achieving the desired results) should be quoted for initial charging and for subsequent consumption of 1000 hours peening. Also initial charging quantity and per hour of consumption rate should be defined in technical offer.(in kgs)	Vendor to accept & offer details			
20.00	BASIC NOZZLE AND BLAST HOSE				
20.01	Boron carbide blast nozzles of required orifice for shot peening the blade root of all types of blades mentioned in clause 10.02 are to be supplied. The blast hose should be of atleast 25mm ID and of the requisite length. The blast hose should be suited to the offered nozzles. Details for the blast nozzle should be provided.	-8mm dia. for S330 shot -10mm dia. for S550 shot Vendor to provide details			
21.00	DOCUMENTATION (5 printed copies and 1 electronic copy to be supplied along with machine in English)	Vendor to accept			
21.01	Basic equipment operation and maintenance manuals	Vendor to provide			
21.02	Detailed assembly drawings with clear marking of each component and giving reference of manufacturer for each assembly/sub assembly	Vendor to provide			
21.03	Detailed spare part list along with specification, part number and address of manufacturer	Vendor to provide			
21.04	Electrical schematic and pneumatic/ hydraulic diagram of the machine.	Vendor to provide			
21.05	Commissioning and interface manual of drive controller.	Vendor to provide			
21.06	Interface description of robotic system with PLC.	Vendor to provide			
21.07	Detailed circuit diagrams of drive controller.	Vendor to provide			
21.08	Wiring diagram and connector details.	Vendor to provide			
21.09	PLC (Ladder Logic diagram) statement list along with comments in English language.	Vendor to provide			
21.10	Back up of all software (licensed copy) e.g. diagnostic software, user program etc.	Vendor to provide			
21.11	Operation and maintenance manual of robot controller.	Vendor to provide			
21.12	Alarm list and fault diagnostic manual	Vendor to provide			
21.13	Service and user manual for all bought out items	Vendor to provide			
21.14	Installation and start up manual of Drive Controller.	Vendor to provide			
21.15	S7 Programming manual	Vendor to provide			
21.16	Backup of PLC; HMI on USB Drive (1 TB or More) and Backup of Robot system software, Teach pendent on PCMCIA card.	Vendor to provide			
21.17	Written procedure for setting the robot zero potisions of robot axes.	Vendor to provide			
21.18	Written procedure for backup/ restore of PLC/HMI/Teach pendent/ Robot system software.	Vendor to provide			
22.00	TRAINING				
22.01	2 weeks Training of BHEL engineers in the following fields shall be provided at supplier works during pre-acceptance.	Vendor to accept			
22.02	i. PLC / MMI / Drives / Robotic / CNC maintenance.	Vendor to accept			
22.03	ii. Mechanical / Pneumatic maintenance.	Vendor to accept			

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22.04	iii. Operation and programming.	Vendor to accept			
22.05	Vendor will teach preparation of parametric programming to the trainee deputed for operation & programming training. In case training facility in robotic components is not available at supplier's works, same shall be arranged by vendor at authorized training centre of robot manufacturer.	Vendor to accept			
22.06	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	For vendor's information.			
22.07	Competent, English speaking experts shall be arranged by the vendor for satisfactory & effective training of BHEL personnel.	Vendor to accept & confirm			
22.08	Vendor to quote for Training on per man per day basis	Vendor to accept and submit necessary details.			
23.00	SPARES				
23.01	Spares for at least 2 years, three-shift trouble free operation of machine should be offered. The spare package should include all attachments, accessories and peripherals. The spares' offer should contain individual item wise list along with price breakup, specification and source of supply.	Vendor to accept			
23.02	The spares offer should necessarily include the following apart from any other item that is required to meet the condition of clause 23.01. Incase any of the following items are not used in the machine, the vendor to clearly specify this against the item. However if at a later date, it is determined by BHEL that such an item is being used in the machine, the vendor will have to supply the item in the quantity mentioned to BHEL Haridwar at no extra cost.	Vendor to accept			
24.00	Electrical & CNC Spares should include the following :-	Vendor to accept			
24.01	PLC CPU	1 no.			
24.02	PLC Input Card	1 no. each type			
24.03	PLC Output Card	1 no. each type			
24.04	Proximity Switches	5 no. each type			
24.05	Limit Switches	4 no. each type			
24.06	Operator Display	1 no.			
24.07	Magna valve controller unit	1 no. each type(Magna Valve with controller unit)			
24.08	Stepper/drive motor(if used in machine)	1 no. each type			
24.09	Complete table drive controller	1 no.			
24.10	Push Buttons	16 no.			
24.11	Indicating Lamp	8 no.			
24.12	Vibratory Motor	1 no. each type			
24.13	AC drive	1 no. each type			
25.00	Mechanical Spares should include the following :-	Vendor to accept			
25.01	Blast Hose	15 mtrs			
25.02	Nozzle Holder	5 no.			
25.03	Rubber Bush for nozzle holder	10 no			
25.04	Blasting Nozzle	5 no. each type			
25.05	Rubber sleeves	10 no. each type			
25.06	O-rings/seals	5 no			
25.07	Coupling for blast hose	5 no			
25.08	Hose Connector	4 no.			
25.09	Exhaust Valve	2 no.			
25.10	Dump valve	2 no.			
25.11	Solenoid valves	2 no. each type			

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25.12	Magna Valve	1 no.			
25.13	Filter Element for dust collector	5 sets			
25.14	Pressure Switch	2 no each type			
25.15	Air Regulator	1 no.			
25.16	Air Filter	2 no. each type			
25.17	Vibratory Classifier Sieve for S330 & S550 shot	2 sets of meshes for each shot type			
26.00	Spares for Robot should include :-	Vendor to accept			
26.01	Axis Servo Unit	1 no.			
26.02	CPU unit / main board	1 no.			
26.03	Power Supply	1 no.			
26.04	Servo motor for axis	2 no. for each axis			
26.05	Operator Panel	1 no.			
26.06	Profibus Master/Slave unit	1 no.			
26.07	Memory board/flash rom card	1 no.			
26.08	Tech Pendant unit(loaded as used on the machine)	1 no.			
26.09	Battery	16 Nos. of each type			
26.10	Fibre Optical Cable(as used on the machine)	2 no. each type			
26.11	Robot protection cover	1 no.			
27.00	The colour of equipment and all peripherals shall be Apple Green RAL 6011.	Vendor to accept			
28.00	TROPICALISATION:				
28.01	All electrical / electronic equipment should be tropicalized.	Vendor to accept			
28.02	All electrical & electronic control cabinets & panels should be dust and vermin/rodent proof.	Vendor to accept			
28.03	All electrical components in the cabinets should be mounted on DIN Rails.	Vendor to accept			
28.04	All motors shall conform to IEC or Indian Standards or equivalent standards.	Vendor to accept			
28.05	Vendor should ensure the proper earthing for the machine and its peripherals/accessories. Any material requirement for the same should be informed with foundation design/drawings. The vendor can take earthing connection from the nearest available location of the production shop.	Vendor to accept			
29.00	OPERATING CONDITION:				
29.01	Input power supply condition Voltage = 415 V +10% / -15% Frequency = 50 Hz +3% / -3% No. of phases = 3 (3 wire system without neutral)	Vendor to accept			
29.02	Compressed air - 5 Kgs/Cm Sq. If the required compressed air pressure for operating of the machine is more than the stated pressure , the vendor to quote suitable compressor (of Indian make preferable) as an optional item.	Vendor to accept			
29.03	Temperature range during the year - 1 to 48 Deg. C	Vendor to accept			
29.04	Relative humidity - 95 % RH Max.	Vendor to accept			
29.05	The tropical environment consists of dust-laden atmosphere during some part of year.	Vendor to accept			
30.00	TOOLS FOR ERECTION, OPERATION & MAINTENANCE				
30.01	Tools and Equipment required for erection of the machine shall be brought by the vendor. Necessary tools required for operation and maintenance of the machine should also be supplied by the vendor. List of such tools should be submitted with offer. (It should necessarily include Fluke make clamp meter)	Vendor to accept and submit necessary details.			
31.00	FOUNDATION				

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31.01	Foundation Design: In case any special foundation is required for installing the machine, detailed foundation drawings to be offered. The vendor should agree to supply 5 copies of machine layout and foundation drawings (hard copies as well as AutoCAD drgs) within one month of Placement of LOI / Order.	Vendor to accept and submit necessary details.			
32.00	LEVELING & ANCHORING SYSTEM				
32.01	Complete set of anchoring materials including foundation bolts, nuts, washers, fixators, levelling shoes etc. for alignment and fixing of the machine on the floor should be supplied. Details to be submitted.	Vendor to accept and submit necessary details.			
33.00	ERECTION & COMMISSIONING:				
33.01	Supplier to take full responsibility for carrying out the erection, start up, testing of machine, it's control & all types of other supplied equipment/accessories, laser hardening 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 (capacity of EOT Crane in the shop is 5 Ton only) and helping personnel shall also be provided by BHEL. Details of these requirements should be informed/discussed by vendor and agreed with BHEL in advance. In case crane of higher capacity is required, representative of vendor to hire mobile crane from local sources at their own cost.	Vendor to accept			
34.00	PRE-ACCEPTANCE:				
34.01	Pre acceptance of the machine will be made at vendor's works by BHEL representatives. Geometrical accuracy of the machine [position turntable] & Robot repeatability should be demonstrated.	Vendor to accept			
34.02	Shot Peening trials will be done during pre-acceptance with 2 blade types(2 blades per type - total 4 blades) on the machine being supplied. These 2 blade type will be decided from those mentioned in clause 10.02. During pre-acceptance, all tests shall be witnessed by the BHEL team and all machine functions shall be verified.	Vendor to accept			
34.03	The blades for pre-acceptance tests will be supplied by BHEL, however the vendor will have to arrange for transport for these blades from BHEL and back after the pre-acceptance tests. The vendor will also have to provide suitable guarantee for these blades.				
34.04	Vendor shall arrange all necessary facilities for measurement of Surface finish, Residual Compressive Stresses and Peening Intensity .These will be measured as mentioned in clause 3. During pre-acceptance, all tests shall be witnessed by the BHEL team and all machine functions shall be verified.				
35.00	FINAL ACCEPTANCE				
35.01	Final acceptance will be at BHEL's Works where the following will be tested.	Vendor to accept			
35.02	Machine positioning, accuracy and repeatability (details to be furnished along with technical bid)	Vendor to accept			
35.03	Overall features and performance of the machine.	Vendor to accept			
35.04	Successful Peening of 10 Nos. of each type of blade as per clause 10.02	Vendor to accept			
35.05	Vendor shall arrange all necessary facilities for measurement of Surface finish, Residual Compressive Stresses and Peening Intensity .These will be measured as mentioned in clause 3	Vendor to accept			

Sl. No.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
35.06	Supervision of one full week(6 working days) of continuous peening of blade roots after completing the peening in prove out blades. During this period necessary training in machine operation, maintenance and programming shall also be extended to BHEL operators.	Vendor to accept			
35.07	The machine will be treated as finally commissioned and will be taken over only after successful completion of all final acceptance activities and supervision as mentioned above.	Vendor to accept			
36.00	OPERATIONAL SAFETY:				
36.01	The design of the machine will be such as to provide utmost operational safety. Mechanical and electrical stoppers, Electronic interlocks should be provided.	Vendor to accept			
36.02	Emergency Switches at suitable locations as per International Norms should be provided. Measures should be provided to ensure that the machine shuts down safely in case of sudden power cut.	Vendor to accept			
36.03	All doors shall be electrically protected so the peening is not possible with door open condition.	Vendor to accept			
36.04	In case door opens during operation, peening cycle should stop immediately.	Vendor to accept			
36.05	The motion of the nozzle should stop immediately when it touches with the work piece or fixture.	Vendor to accept			
37.00	ENVIROMENTAL PERFORMANCE OF THE MACHINE:				
37.01	Maximum noise level shall be 80 dB (A) at 1 meter away from the machine with correction factor for back ground noise, if necessary. This will be measured as per international standards like ISO 2151. Supplier to demonstrate compliance to noise level, if asked for.	Vendor to accept			
37.02	There shall not be any emission from the machine and hence no disposal system shall be required.	Vendor to accept			
37.03	No Effluent Treatment Plant or Pollution Control Device shall be required.	Vendor to accept			
37.04	No hazardous chemical shall be used in the machine.	Vendor to accept			
37.05	Dust and broken shots shall accumulate properly for future disposal.	Vendor to accept			
37.06	Gases used in cooling devices/refrigerant type air dryer shall be environment friendly. Details to be submitted.	Vendor to accept & submit details.			
38.00	GUARANTEE:				
38.01	Vendor shall offer performance guarantee of the machine with all its peripherals including robot and robot controller for a period of 24 months from the date of final acceptance of the machine as in clause no. 35	Vendor to accept			
38.02	In case of any problem during guarantee period, trained personnel of the party would attend the problem within 6 working days. Any parts needed to be replaced by the vendor during guarantee period, shall be arranged by the vendor, duly freight and duty paid by them.	Vendor to accept			
39.00	GENERAL INFORMATION				
39.01	All the information and drawings attached with tender document are exclusive property of BHEL Hardwar. Under no circumstances these should be passed to any third party without prior permission of BHEL and must not be used directly or indirectly detrimental to the interest of BHEL.	Vendor to accept			
40.00	QUALIFYING CONDITIONS				

Sl. No.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
40.01	Only those vendors (OEMs) should quote who have supplied and commissioned at least one Robotic shot peening center of same (shot size, component dimension, component weight) or higher parameters in the past ten years (on the date of opening of Tender) and referred machine is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender). The following information should be submitted by the vendor about the companies where similar machine(s) have been supplied. This is required from all the vendors for qualification of their offer.	Vendor to accept			
40.02	1. Name of the customer / company where referred machine is installed.	Vendor to submit			
40.03	2. Complete postal address of the customer.	Vendor to submit			
40.04	3. Month & Year of commissioning of referred machine	Vendor to submit			
40.05	4.Parameters of machine(s) supplied (shot size, component dimension, component weight) and application for which the machine is supplied.	Vendor to submit			
40.06	5. Name and designation of the contact person of the customer.	Vendor to submit			
40.07	6. Phone, FAX no. and email address of the contact person of the customer.	Vendor to submit			
40.08	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.	Vendor to submit			
40.09	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	Vendor to accept			

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