SPECIFICATION CUM COMPLIANCE CERTIFICATE FOR ROBOTIC LASER HARDENING CENTER
Qty. 1 No

	NOTE :-
	1. Vendor must submit complete information against clause No. 33. The offer, complying this clause, would only be considered.
	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.
	3. The offer and all documents enclosed with offer should be in English language only.

SCOPE: **SUPPLY, ERECTION & COMMISSIONING OF ROBOTIC LASER HARDENING 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 system is required for laser beam surface hardening of the suction side at the inlet edge of steam turbine blades of length maximum 1.5m or more and weight maximum 100 kg or more.	Vendor to accept			
01.02	The machine should be capable of creating a surface hardened zone with maximum dimensions of length at least 470 mm and width at least 30 mm on the suction side at the inlet edge of the steam turbine blade. The dimensions of the hardened zone should be adjustable from zero to the maximum limits continuously.	Vendor to accept			
01.03	The machine should be capable of laser surface hardening steam turbine blades made of X5CrNiCuNb16-4 (HW19466) & X10CrNiMoV12-2-2 (HW19392) material as per drawings mentioned at clause no. 14.03 and BHEL standard for laser hardening (HW0993005) also equivalent flame hardening standard(HW0990018). NOTE:- these documents will be provided to the vendor only after the vendor has signed a non-disclosure agreement with BHEL.	Vendor to accept			
01.04	Hardness to be achieved by the system on steam turbine blades should be in accordance with BHEL standard for laser hardening (HW0993005). In case the drawing states flame hardening is required, then equivalent laser hardening (equivalent to HW0990018) is to be carried out.	Vendor to accept			
01.05	For each of the items of the machine to be quoted, its specification should be clearly laid out with supporting printed catalogues/diagrams/photographs.	Vendor to accept			
02.00	**FIBRE COUPLED DIODE LASERS**				
02.01	2 no. high power, fibre coupled diode lasers of power 6kW or more for hardening of steam turbine blades simultaneously as mentioned at clause no. 1 to be provided and their technical details to be submited along with offer.	Vendor to provide suitable details			
02.02	A dynamic beam shaping system which allows adaptable laser spot sizes and free controllable intensity profiles on laser track width should be provided. The system should be able to provide a variable scan width as well as adapt to variable working distance by application of different focussing optics.	Vendor to accept			
03.00	**ROBOT SYSTEM AND ITS INTEGRATION**				
03.01	Suitable articulated robots for each laser (each should have 6 or more axis)-should be of reputed make, for mounting the diode lasers and the camera for monitoring and feedback and to provide simultaneous movement of lasers to cover the suction side of the inlet edge of steam turbine blades is to be provided. The position repeatability of both robots should be 0.1mm or better and payload capacity should be up to 100kg.	Vendor to accept			

SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
03.02	A suitable robot system for mounting the steam turbine blade with requisite fixture having 1.A swivel-mounted turning axis for holding the blade at its root. 2.A linear axis for holding the blade tip. 3.A linear axis which is in the base for movement of entire blade. 4.Appropriate control systems (hardware & software) are to be provided with the system.	Vendor to accept			
03.03	Vendor can also quote an equivalent system to that mentioned in clause 3.01 & 3.02 . In this case the vendor has to provide complete technical details of the system and each component used.	Vendor to accept and provide details			
03.04	Vendor is to provide detailed catalogue of the robots being supplied in the system for robots which are to be used for laser mounting. Vendor to quote the price of each item separately.	Vendor to accept and provide details			
03.05	Vendor has to ensure integration of the robotic system with the rest of the machine components and should provide all details regarding integration for hardening applications.	Vendor to accept and provide details			
04.00	**TEMPERATURE MEASURING SYSTEM**				
04.01	Vendor to provide a camera based system for ensuring temperature controlled hardening of turbine blades. The device should measure the temperature of the heat treat zone and give suitable feedback to the robot and the laser for automatically maintaining the process parameters.	Vendor to accept			
04.02	The temperature control should ensure a high process reliability and excellent quality even at complex geometry and contours of turbine blades.	Vendor to confirm			
04.03	All necessary hardware and control should be integrated into supplied machine. Suitable printout of the temperature profile be generated by the system after completion of the process.	Vendor to confirm			
04.04	The spatial resolution and field of view of the camera based system should be indicated.	Vendor to provide details			
05.00	**CONTROL SYSTEM**				
05.01	Suitable & flexible control unit(s) should be provided for the entire process to achieve the desired results.	Vendor to accept			
05.02	Should be provided with integrated control/ operator panel with display unit and PLC. Separate keyboard & mouse for software handling to be provided which should be either firmly mounted or placed on a sliding tray.	Vendor to accept			
05.03	The control system/ CNC/ IPC should have the following features:- 1.High flexibility due to individual adjustment of control behaviour 2.Consideration of specific conditions at the start of the process 3.Graphic display of all relevant process data during running processes (display and storage of false-colour images with reduced resolution) 4.Permanent saving of all setting parameters 5.Customized data storage 6.User-defined interface to temperature measuring devices 7.Increased safety by use of password protected user profiles 8.Online display of PLC ladder/ logic on screen for diagnostic purpose	Vendor to accept			
05.04	Should be equipped with internal safety features. Details to be provided.	Vendor to accept & provide necessary details.			
05.05	Should control the laser power depending on the feedback received from temperature measuring device.	Vendor to accept			
05.06	The movement of robot and rotary axis should be freely programmable and controlled through the system.	Vendor to accept			
06.00	**COOLING SYSTEM**				
06.01	Suitable Water/Air Chillers are to be provided for cooling of lasers.	Vendor to accept			
06.02	The inlet water temperature during summer will be around 45°C. Detailed schematics of the cooling water circuit and the complete cooling system is to be provided. Vendor to inform whether the water to be used is required to be de-mineralised or tap water is to be used. Vendor may note that the Water Hardness is 224-265 mg/L in this area. If soft water is required, Softening plant shall be installed by the vendor with the machine.	Vendor to accept & provide details			
07.00	**CABIN FOR LASER AND ROBOT SAFETY**				
07.01	Cabin for laser safety and robot safety to be constructed by the vendor to encapsulate the machine completely during Laser treatment operation with safety interlocked doors. The cabin should fit in a rectangular area of 12mx9m (approx.).	Vendor to accept			

SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
07.02	The cabin should be constructed of a steel frame covered with steel sheet metal of colour RAL 6011(Apple Green).	Vendor to accept			
07.03	The enclosure must consist of a working chamber, separate operators room, separate room for power supplies and electronic cabinets. Laser safety windows are to be provided for the operators. Detailed regarding the layout and construction of the enclosure including all necessary components to be provided by the vendor.	Vendor to accept and provide details			
07.04	Vendor to quote air conditioners required for operators room, working chamber, electrical & operator cabinets which can handle temperature up to 30 degree Celsius and high humidity at about 70%.	Vendor to accept			
07.05	Crane of adequate capacity (at least 500kg) for loading and unloading of turbine blades in the fixture should be supplied and installed in the cabin. Suitable holding arrangement for lifting the blade through crane should be provided ensuring that the blade is not damaged during loading/unloading.	Vendor to accept			
08.00	**LASER BEAM DIAGNOSTIC SYSTEM**				
08.01	Vendor should provide a beam diagnostic system, specifically designed for large scanned laser beams to constantly analyse the parameters of the laser beam (position, intensity distribution, start-up diagnostics etc.) before and during the process.	Vendor to accept			
08.02	The system should have a laser power meter of 10kW.	Vendor to accept			
09.00	**CAMERAS**				
09.01	1 no. camera for mounting on each robot and 1 no. of swivel mounted camera for the cabin to be provided for on-site observation by the operators as well as for quality management purposes.	Vendor to accept			
10.00	**OTHER TECHNICAL REQUIREMENTS AND ACCESSORIES**				
10.01	Suitable no. of PC's with latest configuration (hardware & software) for process control, camera systems and data management to be provided by the vendor and configuration details of each PC to be provided.	Vendor to accept & provide details			
10.02	Any other accessories, which is not mentioned above and is necessary for proper working of the machine, should be quoted with relevant details.	Vendor to accept & provide details			
10.03	Vendor should have at least one year experience on design, Construction and implementation of process for Laser surface hardening on turbine blade material as per Clause no.- 1.03. Technical know how of the process including the heat treatment (if any) after laser process is also to be provided and the specifications of the furnace required is to be submitted with the offer. BHEL will provide furnace with dimensions 1500mmx1500mmx3000mm for heat treatment purpose.	Vendor to accept			
11.00	**SERVO VOLTAGE STABILIZER**				
11.01	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			
11.02	The offer should be submitted with spares package (Variacs-2 nos., Correcting servomotors- 4 nos., Control cards-2 nos of each type) required for long term maintenance of this stabilizer.	Vendor to offer			
11.03	Make	Neel, Suvik, Servomax, Aplab or Auto Electric			
11.04	Model, Rating & Input/ Output Voltage etc.	Vendor to inform			
11.05	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			
12.00	**ULTRA ISOLATION TRANSFORMER**				
12.01	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			
12.02	Make	Neel, Suvik, Servomax, Aplab or Auto Electric			
12.03	Model, Rating & Input/Output Voltage etc.	Vendor to inform			
12.04	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			
12.05	Catalogue of the Isolation Transformer shall be submitted with the offer.	Vendor to submit			

SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
12.06	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.			
13.00	**SPARES & SPECIAL TOOLS**				
13.01	Mechanical, Hydraulic, Electrical and Electronic spares used on the machine, with item-wise breakup, are to be recommended and offered by the vendor in sufficient quantity for 2 years trouble free operation of the complete machine including CNC system and its accessories considering three shifts continuous 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			
13.02	**Essential Electrical and Electronic spare parts to be necessarily included: One no. of each type of all electronic PCBs including all PLC cards and cards used on the robot control, electronic modules including laser diodes, servo motors including all motors used on the robot, encoders including all encoders used on the robot, cameras, all sensors, switch gear items including LV switch gear, door lockers etc. used on the machine and any other accessories supplied with the machine.**	Vendor to accept and provide details			
13.03	Vendor to ensure that complete list of spares for machine and accessories, along with specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine.	Vendor to accept			
13.04	All the spares offered should be individually priced.	Vendor to accept			
13.05	All types of spares for total machine and accessories should be readily available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required. The vendor should agree to provide software updates(if applicable) of any software supplied along with the machine to BHEL through-out the machines's life.	Vendor to accept and provide details			
14.00	**PART FIXTURING**				
14.01	Vendor to provide suitable fixtures to allow holding of the turbine blades in the system. The fixtures should be universal type (one base and body for all types of blades) with changeable parts (if applicable) etc. for accommodating different types of blades as specified below.	Vendor to accept			
14.02	Orientation of blade in the system during laser hardening is to be clearly mentioned.	Vendor to intimate details.			
14.03	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 (Drawing will be provide only after vendor has signed non-disclosure agreement with BHEL)	Vendor to accept			
14.04	Part fixturing shall include holding elements at root end as well as tip end. Detailed manufacturing drawings of part fixturing including consumables & changeable parts to be supplied in the event of order. However, a scheme of holding arrangement with dimensional indication of clamping portion to be submitted with the offer.	Vendor to accept & provide details			
14.05	The clamping of fixture shall be hydraulic and integrated with machine control.	Vendor to accept			
14.06	Item wise price shall be clearly indicated in the price bid.	Vendor to accept			
15.00	**All hydraulic systems/components used in the system should be from a reputed manufacturer - e.g.. Rexroth / Vickers / Hawe or other reputed manufacturer.(Details to be submitted),**	Vendor to accept & provide details.			
16.00	**TIME CYCLE**				
16.01	Vendor to indicate cycle time for laser hardening of single of blade of each type as mentioned at 14.03	Vendor to provide details			
16.02	The cycle time shall include all components of time viz. job change time, robot movement time, laser treatment time, in-process probing and post process probing of complete blade. Each individual times is to be specified along with the total cycle time. Vendor shall have to prove the offered timing during final acceptance of the machine at BHEL Hardwar.	Vendor to accept			

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17.00	**DOCUMENTATION (5 printed copies and 1 electronic copy to be supplied along with machine in English)**	**Vendor to accept**			
17.01	Basic machine operation and maintenance/ service manual containing all assembly/ sub assembly drawings, circuit diagrams of the machine systems with proper identification no. and descriptions.	Vendor to provide			
17.02	Complete list of parts used in the machine along with specification, part/ ordering numbers and address of manufacturer in case of purchased item.	Vendor to provide			
17.03	Service and user manuals of all bought out items.	Vendor to provide			
17.04	Laser system operation manual & subsequent heat treatment details for hardening of steam turbine blades.	Vendor to provide			
17.05	Detailed maintenance manual of chiller unit used in the machine should include : Capacity of the chiller unit, type of compressor with complete specifications of the following (if applicable) : thermostatic expansion valve , fan size, flow rate of the condenser unit, evaporator unit(width plate type/coil type), functional requirement of temperature of cooling oil to be maintained between range T1 to T2, type of temperature indicator/ controller used in the chiller unit.	Vendor to provide			
17.06	Robotic system manuals - operation & maintenance.	Vendor to provide			
17.07	Electrical schematic of the machine. Detailed service and maintenance manuals , commissioning guides, circuit diagram (wherever available) should be provided for all the PC based, electronic and electrical items used on the machine. Detailed instruction for backup and restore to be provided for all software based units.	Vendor to provide			
17.08	Spare part list along with specification, part number and address of manufacturers (including Bought out items).	Vendor to provide			
17.09	Hard copy of PLC program/Ladder diagram along with cross reference and comments in English language only. In case PLC is not used , Machine logic should be provided with comments in English language and preferably cross reference.	Vendor to provide			
17.10	PLC/ **Logic** programming **and debugging** manual.	Vendor to provide			
17.11	Licensed copy of softwares & installation CDs/ DVDs along with programming device/laptop with necessary communication ports and communication cables for data backup, restoration and diagnostics.	Vendor to provide			
17.12	All data backup after final commissioning should be provided on USB hard disk(1TB or more) along with softcopy manuals of all documentation supplied with the machine.	Vendor to provide			
18.00	**OPERATING CONDITIONS**				
18.01	Total machine including all supplied items should work trouble free and efficiently under following operating conditions and should give specified accuracies. Power Supply (AC): Voltage = 415 V +10% / -15% Frequency = 50 Hz +3% / -3% No. of phases = 3 (3 wire system without neutral) Compressed air pressure available in the shop is 5.0 Kg/cm2 . If the required compressed air pressure for operating of the machine is more than the stated pressure , the vendor to provide suitable air compressor (of Indian make preferable with noise level not exceeding 70 dB). **Ambient Conditions**: Temperature = 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)	Vendor to accept			
18.02	Power Supply Voltage will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All types of cables, connections, circuit breakers etc. required for connecting BHEL's power supply point to different parts of the machine/control cabinets, shall be the responsibility of vendor. Requirement of grounding/earthling with required material details is to be informed by vendor well in advance so that same could be incorporated during construction of foundation.	Vendor to accept			
19.00	**TROPICALISATION**				
19.01	All electrical / electronic equipment shall be tropicalized to work in mentioned operating condition.	Vendor to accept			
19.02	All electrical & electronic control cabinets & panels should be dust and vermin & rodent proof.	Vendor to accept			
19.03	All electrical components in the cabinets should be mounted on DIN Rail.	Vendor to accept			

SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
19.04	All electrical / electronic panels shall be provided with suitable locks. Illumination and plug points of 220Volts, 5/15 Amp AC with on/off switch shall be provided inside the electrical cabinet.	Vendor to accept			
19.05	All motors shall conform to CE standard.	Vendor to accept			
19.06	All cables moving with traversing axes should be installed in caterpillar / Drag chain. Additionally, all the cable trays/chains etc. required for laying of cables should be included in the offer.	Vendor to accept and provide details			
19.07	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	Vendor to accept and provide details			
20.00	**SAFETY ARRANGEMENTS**				
20.01	Following safety features in addition to other standard safety features should be provided on the machine:	Vendor to accept			
20.02	Machine should have adequate and reliable safety interlocks / devices to avoid risk/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 should be available.	Vendor to accept			
20.03	A detailed list of all alarms / indications provided on machine should be submitted by the supplier.	Vendor to accept			
20.04	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.	Vendor to accept			
20.05	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations & noise.	Vendor to accept			
20.06	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			
20.07	Suitable laser safety windows should be provided in the cabin for laser.	Vendor to accept			
21.00	**ENVIRONMENTAL PERFORMANCE OF THE MACHINE**				
21.01	The Machine should conform to following factors related to environment :	Vendor to accept			
21.02	Vendor to specify the noise level (in dB) doing operation of Laser hardening.	Vendor to inform			
21.03	There shall not be any emissions from any part of the machine. Vendor to inform and include regarding the emission capturing system if in case of any emission.	Vendor to accept			
21.04	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.	Vendor to accept			
21.05	No hazardous chemicals shall be required to be used in the machine.	Vendor to accept			
21.06	If any environmental protection enclosure is required it should be built in the machine by the vendor.	Vendor to accept			
22.00	**TOOLS FOR ERECTION, OPERATION & MAINTENANCE**				
22.01	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.	Vendor to accept and submit necessary details.			
23.00	**FOUNDATION**				
23.01	**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.			
24.00	**LEVELING & ANCHORING SYSTEM**				
24.01	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.			
25.00	**TRAINING**				

SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
25.01	BHEL persons (4 individuals) should be trained at vendor's works for a period of 2 weeks at least in the area of: (a) Operation of the machine & other supplied equipment. (b) Electrical and Electronic maintenance for machine & other supplied equipments (c) Mechanical maintenance for machine & other supplied equipments (d) Details of laser treatment as well as heat treatment process which is to be carried after laser treatment for hardening of steam turbine blades	Vendor to accept			
25.02	Air-fare, boarding & lodging for the trainees shall be borne by BHEL.	For vendor's information.			
25.03	Competent, English speaking experts shall be arranged by the vendor for satisfactory & effective training of BHEL personnel.	Vendor to accept & confirm			
25.04	Vendor to quote for Training on per man per day basis	Vendor to accept and submit necessary details.			
26.00	**MACHINE PRE-ACCEPTANCE AT VENDOR'S WORKS**				
26.01	BHEL persons deputed for training will be doing pre-acceptance of the machine to be supplied at vendor's works and give dispatch clearance after satisfaction from all angles. During pre-acceptance, all tests shall be witnessed by the team and all machine functions shall be verified.	Vendor to accept			
26.02	During pre-acceptance, vendor shall carry out satisfactory laser surface hardening and subsequent heat treatment on five nos. long rectangular test piece (as per Annexure-T) of material X5CrNiCuNb16-4 (HW19466) as per standard HW0993005.	Vendor to accept			
26.03	Raw material , Fixturing ,Consumables, etc. for laser hardening during Pre-acceptance shall be supplied by the Vendor.	Vendor to accept			
27.00	**ERECTION & COMMISSIONING**				
27.01	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			
27.02	Successful proving of BHEL components by the supplier shall be considered as part of commissioning. All tests shall also be part of the commissioning activity.	Vendor to accept			
27.03	All instruments and all other necessary equipment required to carry out all erection & commissioning activities should be arranged and brought by the supplier.	Vendor to accept			
27.04	Commissioning spares, required for commissioning of the machine within stipulated time, shall be brought by the supplier on returnable basis.	Vendor to accept			
27.05	Broad Schedule of Erection and Commissioning shall be submitted with the offer.	Vendor to confirm & provide details			
27.06	Details, duration, terms & conditions for Erection & Commissioning should be furnished in detail separately by vendor along with offer.	Vendor to accept			
27.07	Portion, if any, of the machine, accessories and other supplied items where paint got rubbed or peeled off during transit or erection should be repainted and matched with the original adjoining paint by the vendor. For this purpose, the vendor should supply sufficient quantity of touch-up paint of various colours/shades of paints used. The vendor shall ensure performing touching after commissioning but before final acceptance.	Vendor to accept			
28.00	**PROVE OUT OF BHEL COMPONENTS AT BHEL WORKS**				
28.01	Drawings of prove out components will be provided to vendor after the vendor has signed a non- disclosure agreement with BHEL. Complete and successful laser hardening of prove out blades, to the specified accuracy, shall be done by the vendor after erection & start-up of the machine at BHEL works using tools, equipment and software etc. supplied by the vendor.	Vendor to accept			

SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
28.02	Representative of vendor shall have to carry out laser surface hardening of 7 rows of steam turbine blades as mentioned at clause no. 1. The prove out components of SKETCH1, SKETCH2, SKETCH3, SKETCH4, SKETCH5, SKETCH7 and SKETCH8 shall be provided by BHEL as mentioned at point no. 14.03	Vendor to accept			
28.03	Laser hardening will be carried out as per drawing accuracy and specified hardness. The vendor shall demonstate achievement of cycle-time submitted as per point number 16	Vendor to accept			
28.04	Vendor shall be fully responsible for laser hardening of prove out components as per requirements specified by BHEL to the full satisfaction of BHEL. Clarifications, if any required by vendor, regarding accuracy requirements of the prove out components, whether specified or not, should be discussed and resolved by the vendor during initial technical discussions.	Vendor to accept			
28.05	Vendor shall be responsible for any deviation/rejection in prove out component due to incorrect laser treatment or malfunctioning of the machine and also for the delay in laser hardening of the component due to improper recommended tooling etc. Any change in fixturing/ during prove out shall be at the responsibility and cost of the vendor.	Vendor to accept			
28.06	Machine operators support shall be provided by BHEL during prove out at BHEL, Haridwar and they will work under the supervision of vendor's experts. To carry out the task, the vendor shall provide one week of exclusive training to BHEL's operators after machine installation and before the start of prove out.	Vendor to accept			
29.00	**FINAL MACHINE ACCEPTANCE**				
29.01	Final acceptance shall be made by BHEL Hardwar after completion of following activities:	Vendor to accept			
29.02	Demonstration of specified/offered accuracies as per test chart/standard after machine commissioning.	Vendor to accept			
29.03	Demonstration of all features of the machine, control system & accessories to the satisfaction of BHEL for efficient and effective use of the machine.	Vendor to accept			
29.04	Training of BHEL machine operators in operation of complete machine, software & accessories etc. by the supplier's experts / engineers during their stay at BHEL works.	Vendor to accept			
29.05	Prove out of BHEL components as per point 28 include heat treatment of blades at BHEL works in furnace provided by BHEL"	Vendor to accept			
29.06	Demonstration of measurement results.	Vendor to accept			
29.07	One Week supervision after successful prove out.	Vendor to accept			
30.00	**PACKING**				
30.01	Sea worthy & rigid packing for machine, control and other supplied items to avoid any damage/loss in transit.	Vendor to accept			
31.00	**GUARANTEE**				
31.01	Guarantee for complete machine, softwares and all supplied accessories/equipments has to be provided for 24 months from the date of final acceptance of the machine. Any spare/modification/improvement required during guarantee period shall have to be arranged by the vendor free of cost and duty levied have to be borne by the vendor.	Vendor to accept			
31.02	All items should be replaced during guarantee period and delivered at BHEL, Hardwar, free of cost. The guarantee terms for the Diode Laser Head, robot and control unit, Temperature measuring device, Chiller, etc. should be clearly spelt out.	Vendor to accept			
32.00	**GENERAL INFORMATION**				
32.01	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			
32.02	The vendor should be capable of carrying out laser hardening of steam turbine blades of X5CrNiCuNb16-4 & X10CrNiMoV12-2-2 material (along with the subsequent heat treatment process) as per BHEL standard (HW0993005**)** and should be ready to demonstrate the process at their works if asked by BHEL. Details to be mutually discussed with BHEL.	Vendor to accept			
33.00	**QUALIFYING CONDITIONS**				

SL. NO.	DESCRIPTION OF BHEL REQUIREMENT	REQUIRED	OFFERED	DEVIATION	REMARKS
33.01	Only those vendors (OEMs) should quote who have supplied and commissioned at least one Robotic laser hardening center of same (Power of each laser, Max. Laser surface hardened zone) 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			
33.02	1. Name of the customer / company where referred machine is installed.	Vendor to submit			
33.03	2. Complete postal address of the customer.	Vendor to submit			
33.04	3. Month & Year of commissioning of referred machine	Vendor to submit			
33.05	4.Parameters of machine(s) supplied (Max. Blade Length, Power of each laser) and application for which the machine is supplied.	Vendor to submit			
33.06	5. Name and designation of the contact person of the customer.	Vendor to submit			
33.07	6. Phone, FAX no. and email address of the contact person of the customer.	Vendor to submit			
33.08	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			
33.09	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			
	Saksham Saxena	P.K.Singh			Norsang Tenzin
	(E1-TBM,NBS-PEB)	(Mgr-CNC-NBS,TBM)			(Mgr-MAINT-NBS)
	R.K.Rajak	S.R Choudhary			A.K. Kataria
	(Mgr.,NBS-PEB)	(DGM-Instr.)			(DGM-WEX-AC)
	V.K.Chugh				
	(AGM-TBM&NBS)				

Saksham Saxena
(E1-TBM,NBS-PEB)

R.K. Rajak
(Mgr.-TBM,NBS-PEB)

P.K.Singh
(Mgr-CNC-NBS,TBM)

S.R Choudhary
(DGM-Instr.)

Norsang Tenzin
(Mgr-MAINT-NBS)

A.K. Kataria
(DGM-WEX-AC)