An ISO 9001 Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant**)**
Tiruchirappalli – 620014, TAMIL NADU, INDIA
CAPITAL EQUIPMENT/ MATERIALS MANAGEMENT

ENQUIRY **NOTICE INVITING TENDER**	Phone: +91 431 257 70 49 Fax : +91 431 252 07 19 Email : csguna@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two parts.	**Enquiry Number:** **2621000062**	**Enquiry Date:** **07.06.2010**	**Due date for submission of quotation:** **07.07.2010**

You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.
Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity
10	**Steel Fin Calibration Station** as per the technical specification, general guidelines instructions & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**2 Nos**

Important points to be taken care during submission of offer

1. **Delivery required 8 months from the date of purchase order.**
2. **Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.**

BHEL's General guidelines / instructions (refer MM/CE/GT/001) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site http://www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "2621000062".

Tenders should reach us before 14:00 hours on the due date Tenders will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present	Yours faithfully, For BHARAT HEAVY ELECTRICALS LIMITED Sr.Manager / MM / Capital Equipment

Technical Specification for
Fin Width Correction & Fin Straightening Station

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	Vendor offer
1.0	**APPLICATION**	The fin Width correction and fin straightening station will be used for correcting the width of the fins by **cold rolling** to the preset width that are used to make Membrane Panels for Power boilers.	
2.0	**JOB DESCRIPTION**		
2.1	Fin Width	10mm to 110mm	
2.2	Fin Thickness	5mm to 12mm	
2.3	Fin Length (Cut length)	Minimum Length : 4m Maximum length : 25m	
2.4	Fin Material	Carbon Steel: ASTM A 576 Tensile Strength: 390 MPa Alloy Steel: a) ASTM A 387Gr.12 (TS: 450 to 585MPa) b) ASTM A 387Gr.22 (TS: 515 to 690 MPa)	
2.5	Fin Coil Weight	Max: 2000 kg	
2.6	Fin Coil OD	Min: 1000mm / Max: 1500mm	
2.7	Fin Coil ID	Min:450mm / Max: 700mm	
3.0	**PRODUCTIVITY**	Speed Upto. 6m/min	
4.0	**MACHINE CONFIGURATION:** The machine shall have the following elements / Components:		
4.1	De-Coiling Unit with Coiled Fin Mounting Arrangement		
4.2	Fin Butt Welding Bench		

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	Vendor offer
4.3	Fin Width Correction Unit		
4.4	Fin Horizontal Straightening		
4.5	Fin Vertical Straightening		
4.6	Fin Length Measuring		
4.7	Hydraulic Fin Cut-Off / Shearing Unit.		
4.8	Fin Feeding system & Fin Storage rack		
4.9	Control Panel		
5.0	**DE-COILING UNIT WITH COILED FIN MOUNTING ARRANGEMENT**		
5.1	Coil Loading	Manual loading with the help of crane.	
5.2	Fin Coil Maximum OD	1500mm	
5.3	Fin Coil Minimum OD	450mm	
5.4	Width of coil mounting arrangement - Maximum	200mm	
5.5	Coil Weight - Maximum	2000 kgs. (maximum)	
5.6	Coil Clamping arrangement	Mechanical Jaws –Four jaws – Self Centering type	
5.7	Device to prevent free uncoiling	Friction Brake (with adjuster)	
5.8	Uncoiling and Fin feeding	By pinch rolls in the fin calibrating m/c.	
5.9	Fin Coil end Sensing	Suitable Mechanical type Sensor or any other sensing device for stopping the machine automatically once the fin comes to an end in the de-coiling unit.	
6.0	**FIN BUTT WELDING BENCH**		
6.1	To be of simple and compact design to weld the leading end with trailing end of fin		

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6.2	Clamping	Manually operated clamps for clamping the ends of fins and aligning.	
6.3	Welding Process	MIG / MAG / SMAW Welding Power Source is under BHEL scope.	
6.4	Construction	During fin feeding, the weld bench shall be retracted from the fin feeding line. Weld bench may be mounted on slides or by wheels with brake arrangement.	
7.0	**FIN WIDTH CORRECTION UNIT BY COLD ROLLING**		
7.1	Purpose : Continuous width correction of Fins to be done by **COLD ROLLING** by means of rollers and straightening in horizontal and vertical directions..		
7.2	Fin Bar Straightening & Width correcting Unit by Rolling shall consist of :		
	Supporting & In feed Guide Rollers		
	Vertically straightening rollers, Mechanically Adjustable		
	Horizontally straightening rollers, Mechanically Adjustable		
	Fin width correcting unit with top & bottom support rollers		
	Motorized, Hardened, Calibrating Rollers, Mechanically adjustable to the needed Fin-Width, with Mechanical Width Indicators.		
7.3	Total No.of Width & Bow Correcting Roller Stages 1. Entry & Exit Guide rollers: 2 set 2. Entry Straightening Rollers(Bow correction): 1 set 3. Width correcting rollers: 5 stages 4. Exit Straightening Rollers (Bow correction) : 1 set		
7.4	No.of Width & Bow Correcting Rollers per Stage 1. Each set of entry & exit Guide rollers has 4 No`s (2Horizontal + 2Vertical) 2. Each set of entry Straightening Rollers(Bow correction) has 5 No`s (2Top + 3 Bottom) 3. Each set of width correcting rollers has 4 No`s (2Horizontal + 2Vertical) 4. Each set of exit Straightening Rollers (Bow correction) has 6 No`s (3Top + 3 Bottom)		

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7.5	Width correction Capacity	Suitable for the Material as per Clause 2.4	
7.6	Width of Fins used	10 mm to 110mm	
7.7	Fin thickness	5mm to 12mm	
7.8	Width Correction required upto	1.5 mm	
7.9	Tolerance on Width	± 0.1mm	
7.10	Fin Feeding Speed	Range : 1.0 to 6.0m/min	
8.0	**FIN FEEDING SYSTEM & FIN STORAGE RACK**		
8.1	Automatic fin bar pulling of the fin from the Decoiler Unit and through rollers of the fin width correction unit / other units.		
8.2	The fin storage rack on the out feed side has to be rigid by design.		
8.3	The width of the fin storage rack on the out feed side shall have enough width to store atleast 50 fins of 12.5mm width.		
8.4	The outfeed conveying system to be provided. Details such as drives provided, means of conveying etc to be provided about the outfeeding system		
8.5	The system to shift the corrected fins from Outfeed conveyor to the fin storage rack to be explained.		
8.6	The outfeed conveying system and fin storage rack to handle fins with maximum length of 25metres and minimum length of 4metres		
9.0	**HYDRAULIC CUT OFF UNIT & FIN LENGTH MEASURING DEVICE**		
9.1	Purpose : To cut the fin to the pre-programmed length after Fin width correction & Straightening		
9.2	Cutting	Hydraulic Shear	
9.3	Length Measuring Devices	Online Automatic Length measurement before the shearing unit to be provided.	
9.4	Length range	Programmed length after Width correction & straightening. Range : Upto 25m length	

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9.5	Length display	The actual length to be continuously displayed by the side of the programmed length on the control panel screen.	
9.6	No.of Fins to be cut	Programmed no.of fins to be cut and actual no.of fins cut to be displayed on the control panel screen.	
9.7	Length Tolerance of Fin	± 10mm in 25 m	
9.8	Interlock	Automatic Fin travel stop and restart when Fin being Cut	
9.9	Interlock	Automatic fin travel start after the fin is transferred to fin storage rack.	
10.0	**OPERATION AND CONTROL SYSTEM**		
10.1	**OPERATOR'S CONTROL PANEL:**		
10.1.1	Control shall be **PLC based.**		
10.1.2	Operator's Panel having complete machine control system with suitable TFT colour display touch screen of required configuration shall be provided for convenient and efficient operation. All switches should be within reach of operator. All displays/indications should also be conveniently placed. The control panel shall be standalone type with a cable length of minimum 15metres. (Layout showing complete details should be submitted with the offer)		
10.2	**PLC SYSTEM & FEATURES**		
10.2.1	Make: Preferred Make – GE Fanuc / Siemens / Mitsubishi only.		
10.2.2	Model (suitable and latest version, as available at the time of purchase order placement, shall be supplied).		
10.2.3	Details of Standard features		
10.2.4	Details of optional features, recommended by vendor.		
10.2.5	Display type and size : Touch panel Color Screen with Not less the 5.6" Size.		

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10.2.6	Control panel shall have the following digital display for pre-setting and control:: a) Start / Stop of Machine b) Length of the fin c) Width of the fin d) No.of fins (Qty) e) Speed of fin feeding		
10.2.7	Actual values are to be displayed on the control panel screen by the side of the pre-set values during operation of the following: a) Length of the fin b) Width of the fin c) No.of fins (Qty) d) Speed of fin feeding		
10.3	**FAULT DIAGNOSTIC SYSTEM:**		
10.3.1	Fault diagnostic system should be provided to show the faults on the display and detailed cause, and remedy for the faults related to mechanical and electrical maintenance. A Screen in Maintenance Window Shall shows all PLC Inputs & Outputs. This is to Help Maintenance Crew to Monitor the Status of IO's & Trouble Shooting.		
10.3.2	Help guide should be provided to use both diagnostic systems		
11.0	**HYDRAULICS**		
11.1	The System should be centralized, modular / stacked valve construction having minimum number of pipes / pipe joints and located at suitable location with easy accessibility of components for maintenance.		
11.2	Pumps, valves, cylinder, accessories etc shall be of Bosch-Rexroth / Vickers only. (Details to be submitted). The seals used in cylinders shall be of Merkel / Parker / Bushak + Shamban make only.		
11.3	Suitable filtration system should be provided. The filter unit shall be of Hydac / Parker / Rexroth/Pall (Details to be submitted).		
11.4	The flexible hoses used in the system shall be of Gates / Aeroquip / Parker.		
11.5	Failure indication for oil level, temperature, pressure, filter clogging should be provided		

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11.6	Automatic shut off provision during hose failures, low oil level etc. Pump unloading feature during idle running to be provided for energy conservation. Details should be submitted.		
11.7	Suitable Cooling system of sufficient capacity to maintain complete Hydraulic System at a temperature not exceeding 50 deg C irrespective of the ambient conditions.		
11.8	It should be possible to replace hydraulic elements like valves, manifolds etc without disturbing the associated pipelines. The positioning of hydraulic elements should allow easy maintenance		
11.9	Maximum Operating Pressure of hydraulic system		
11.10	Main Pump flow in lpm and Motor Power in kW		
11.11	Reservoir capacity (in litres)		
11.12	All oil pipelines shall be of stainless steel and should undergo pickling process.		
11.13	One hand held minimess pressure gauge of suitable range with minimess hose (1.0 to 1.5m length) to be supplied along with the power pack. Check points to be provided in the system.		
11.14	All cylinders used in the machine should have standard bore and rod sizes. The piston rod shall be hard chrome plated.		
11.15	The Power pack should be designed taking into account the energy efficiency (Hi-low pump system, proper unloading during idling, etc.). The motor used for pumps shall be energy efficient ones.		
11.16	The oil to be used shall be of standard ISO Viscosity Grades –SS 46 / 68		
11.17	The maximum pressure of the system should preferably not to exceed 310 bar		
11.18	The control voltages for all the Solenoids of the valves shall be of 24 V DC and all solenoid operated DC valves should have manual over-ride provision and light indicating solenoids.		
11.19	The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems.		
11.20	All hydraulic pipelines, hoses and electrical control cables to be neatly laid out with proper clamps and flexible hose conveyors wherever required.		
11.21	All the components in the hydraulic power pack shall be provided with identification numbers, as per the hydraulic circuit and should be pasted with metallic identification number plates.		

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11.22	Hydraulic oil will be supplied by BHEL during commissioning at BHEL works. Vendor to provide the oil during pre-dispatch inspection.		
12.0	**LUBRICATION :**		
12.1	Machine lubrication: Automatic centralized lubrication system with timer control and suitable metering cartridges to be supplied.		
12.2	First filling of Lubrication Oil should be supplied by the supplier.Indian equivalent shall be mentioned.		
12.3	First filling of Grease should be supplied by the supplier. Indian equivalent shall be mentioned.		
13.0	**PNEUMATIC SYSTEM:**		
13.1	The pneumatic operated elements of the machine shall work efficiently with BHEL compressed air supply at a pressure of 3.5 to 4.5 kg/cm2.(g) If higher air pressure is required for efficient operation of the machine, vendor shall quote for a suitable Air Compressor / Air Booster of suitable capacity as an option.		
13.2	BHEL will provide compressed air at only one point near / on the machine. Vendor shall provide suitable filter-regulator-lubrication (FRL) unit and in addition a hand wheel valve. at this point		
13.3	Hydraulic, Pneumatic & Lubricating oil piping should be preferably metallic except places where flexible piping is essential. All the pipes required for the same shall be included in the standard scope of the machine.		
13.4	Pneumatic components shall be of FESTO / SMC make.		
14.0	**ELECTRICAL & ELECTRONICS SYSTEMS**		
14.1	415V with a voltage fluctuation of +/- 10%, 50HZ with a fluctuation of +/-3%, 3 Phase AC (3 wire system without neutral) power supply will be provided by BHEL at a single point near the machine, as per layout recommended by Vendor. All cables, connections, circuit breakers etc. required for connecting BHEL's power supply to the machine shall be in the scope of vendor.		
14.2	Tropicalization**:** All electrical / electronic equipment shall be tropicalized.		
14.3	All electrical components in the cabinets should be mounted on DIN Rail		

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14.4	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 Indian equivalents.		
14.5	Motors & other electrical components shall conform to IEC or Indian Standards		
14.6	Motors and drives shall be of Siemens / Allen Bradley / ABB / Indramat makes conforming to IS / IEC Standards, (Vendor should indicate make and type in the offer)		
14.7	All electrical items shall be of from SEW / ROCKWELL Allen Bradley/ Telemechanique / Delta or reputed makes acceptable to BHEL.		
14.8	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.		
14.9	All components/devices/terminals are to be incorporated with numbered ferrules.		
14.10	External wiring from / to control panel, control desk, external motors etc shall be by means of screened multi-core cables.		
14.11	All electrical motors, limit switches etc, on the machine shall be wired using PVC sheathed cable running in conduits and converging to common terminal block.		
14.12	All feedback systems & field sensors, limit switches, proximity switches, pressure switches, temperature controllers, should be for heavy duty application and wired up with flexible PVC insulated screened cables. All field elements shall have easy accessibility for maintenance.		
14.13	Vendor should ensure the proper earthing for the machine and its peripherals.		
14.14	Cables shall be routed through totally enclosed cable trays. There shall not be cable trenches.		
14.15	In-cycle hour counter with reset facility should be provided.		
14.16	All electrical & electronic control cabinets & panels should be vermin and dust proof. All Electric enclosures shall have IP 54 protection		

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	Vendor offer
14.17	Air Conditioners with Dehumidifiers of suitable capacity to be provided for all Electrical / Electronic Panels / Cabinets including Operator's Panel considering specified ambient conditions. Make: Rittal / Warner & Finley or any other reputed make acceptable to BHEL. Detailed specifications to be submitted.		
15.0	**MACHINE SPARES:**		
15.1	List of spares with itemized break-up of mechanical, hydraulic, pneumatic, electrical and electronic spares used in the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis shall be furnished by vendor along with offer. The list is to include following, in addition to other recommended spares: **(Unit Price for each item of spare shall be offered)**		
15.2	**Mechanical & Hydraulic Spares:** All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses etc.		
15.3	**Electrical / Electronic / PLC Spares:** All types of Relays, Contactors, Proximity Switches, Push Buttons, Indicating Lamps, Semiconductor Fuses, Special Fuses, Circuit Breakers, Main Power Switch, Encoders, Spares for PLC, Servo Motors for Feed Drives, Power Module & Control Cards for Main Drive as well as Feed Drives etc.		
15.4	All types of spares for total machine and accessories shall be 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		
15.5	Vendor to confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine		
16.0	**DOCUMENTATION:**		
16.1	GA drawings,Civil Foundation layout drawings, Hydraulic / Pneumatic / Electrical / Electronic circuits with BOM, are to be submitted within 60 days from the date of ordering for approval by BHEL.		

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16.2	The following documents in English language should be supplied along with the machine: **Hard Copies - 3 Sets** **In CD form - 1 Set** 1. GA Drawing of the complete station. 2. GA & Sub-Assembly Drawings for sub-systems for maintenance purpose. 3. Operating manuals of Machine & its PLC System 4. Programming manuals of Machine & its PLC System 5. Maintenance manuals with all drawings of machine assemblies / sub-assemblies with parts list 6. Electrical circuit diagrams with bill of materials 7. Hydraulic circuit diagrams with bill of materials 8. Pneumatic circuit diagrams with bill of materials 9. Maintenance & Interface manuals for Machine Control System 10. Preventive Maintenance check list for Electrical and Mechanical System\ 11. Catalogues, O&M manuals for all bought out items used in the machine. 12. Operating Manuals, Maintenance Manuals & Catalogues for all supplied Accessories. 13. Detailed specification of all rubber items / hydraulic / lubrication fittings 14. PLC program print-outs with All symbols & comments in English (Preferably by Ladder Diagram) 15. PLC program Back up and data on CD. 16. PLC & Touch Panel software with Licence to be supplied & The Same Shall be installed in BHEL Computer / Laptop for PLC Program downloading, Uploading, Make Modification & On-line Trouble shooting etc. 17. Complete back up of hard disk on GHOST CD and clear written Instructions (3 copies) to take back up and reloading of a new hard disk. 18. Complete list of Alarm log, Error code, error messages & remedies and on line fault diagnostics to be provided by the vendor. 19. Complete list of spares for machine, along with item part no /specification / type / model and make & address of the sub-vendor.	

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17.0	**MACHINE INSPECTION & ACCEPTANCE:**		
17.1	**PRE-DISPATCH INSPECTION AT SUPPLIER'S WORKS:**		
17.1.1	Machine shall be offered for inspection by BHEL Engineers at supplier's works		
17.1.2	The Fin Width correction & Fin Straightening station and the accessories (shot blasting station) shall be tested for its performance prove-out as per Technical Specifications, at the Supplier's Works prior to despatch.		
17.1.3	Required fins of 12.5mm width and 5 to 6m lengths will be supplied by BHEL for trials at Supplier's works. The fins can be butt welded end to end to build up length at Supplier's works to prove out the maximum length specified. Welding to be arranged by the supplier.		
17.1.4	The corrected fins should meet the requirements as specified in the Technical Specification. The tolerances and feed rate will be checked as per clauses 3.0, 7.9, 7.10		
17.1.5	All the fins after prove out are to be returned to BHEL and shall be dispatched along with the machine.		
17.2	**PROVE-OUT AND ACCEPTANCE AT BHEL WORKS:**		
17.2.1	After the machine has been erected and energized, a few idle runs have to be done to demonstrate the good working condition of the machine.		
17.2.2	The Fin Width correction & Fin Straightening station and the accessories shall be tested for its performance prove-out as per Technical Specifications, at the BHEL works after erection.		
17.2.3	Fin Width correction & Fin Straightening with shot blasting shall be carried out on 2 Nos of full coiled flats per station continuously, as prove out test to observe the performance of the station. The quality and the production rate (Max.feed rate) shall be as per clauses 3.0, 7.9, 7.10		
18.0	**TRAINING:**		
18.1	The supplier shall train TWO BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and Programming) of the Machine for TWO working days at supplier's works after the pre-dispatch inspection.		
18.2	Vendor to clearly mention whether the training is offered free of cost or chargeable. If chargeable, the vendor has to quote on manday basis.		

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18.3	Travel, board & lodging for the BHEL Engineers who will be visiting supplier's works for pre-dispatch inspection and training, shall be borne by BHEL.		
18.4	The Supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance (Mechanical, Electrical/ Electronics and PLC System) during commissioning of the Machine at BHEL works for FIVE working days.		
18.5	The training shall include specialized coaching in i) Safety ii) Operation of the machine iii) PC based System & Operation, iv) Trouble-Shooting, v) Software Application vi) All special features of the machine Electrical / Mechanical / Electronics systems		
18.6	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel		
19.0	**MACHINE FOUNDATION:**		
19.1	Vendor shall submit the preliminary layout drawing for getting BHEL's approval within one month from the date of Letter of Intent (LOI). Complete details like static and dynamic loads etc required for foundation design shall be submitted by the Vendor within three months after getting BHEL's approval.		
19.2	BHEL shall design and construct complete foundation for the machine as per the Vendor's recommendation		
19.3	Complete anchoring system including foundation bolts, anchoring materials, fixators, levelling shoes etc should be supplied		
20.0	**ERECTION & COMMISSIONING**		
20.1	Supplier to take full responsibility for Supervision of the erection and for start up, testing and commissioning of machine, its controls and accessories. Supplier shall send suitable qualified Engineers for supervision of Erection and Commissioning of the machine at BHEL works.		

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20.2	Service requirement like power, air & water shall be provided at free of cost by BHEL at only one point to be indicated by Vendor in their foundation/layout drawings. Other requirements like crane and helping personnel shall also be provided by BHEL at free of cost. Welding machine with accessories and cutting gases shall be provided by BHEL at free of cost.		
20.3	Successful proving of BHEL components by the Vendor shall be considered as part of commissioning. All tests, as mentioned (Machine Acceptance) shall form part of the commissioning activity.		
20.4	Commissioning spares, required for commissioning of the machine shall be supplied free of cost by supplier.		
20.5	Test Mandrels, Instruments and other necessary equipment including Laser equipment, if required, to carry out all above activities should be brought by the Vendor.		
20.6	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 colours of paint used.		
21.0	**IN-BUILT SAFETY ARRANGEMENTS**		
21.1	Following safety features in addition to other standard safety features should be provided on the machine:		
21.2	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor.		
21.3	Suitable safety enclosure to be provided with glass windows for the fin width correction machine.		
21.4	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.		
21.5	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.		

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21.6	Machine functions should be continuously monitored and alarm / warning indications through lights/ alarm number with messages (on the display and operator panels) should be available.		
21.7	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations and suitably guarded.		
21.8	Emergency Switches should be provided at suitable locations as per International Norms.		
21.9	All lubricated parts like Bed, guide ways shall have provision for collecting the used Lubrication oil from machine guide ways and preventing them from spilling over on to the ground.		
22.0	**THERMAL STABILITY FOR AMBIENT CONDITIONS & ENVIRONMENTAL PERFORMANCE OF THE MACHINE:**		
22.1	The machine shall be suitable for an ambient temperature of +45 deg C and relative humidity of 90% respectively, but both do not occur simultaneously.		
22.2	The vendor should ensure trouble free operation of the machine with Thermal Stability of the complete machine and accuracy requirements of BHEL components, keeping in view of ambient conditions as mentioned above.		
22.3	The machine, including attachments and accessories, should be suitable for continuous operation on three shifts a day.		
22.4	If any safety / environmental protection enclosure is required it shall be built in the machine by the vendor.		
22.5	Paint of the machine should be oil / coolant resistant and should not peel off		
22.6	Maximum noise level shall be 85 dB(A) at normal load condition..		
23.0	**PAINTING:**		
23.1	Painting of Machine & accessories / Electrical Panels shall be Painted with 2 coats of primer paint & apple green final paint . **RAL 6011 Apple Green** (Polyurethane Paint)		
24.0	**GUARANTEE:**		
24.1	Performance Guarantee to be given for 12 months from the date of commissioning OR 18 months from the date of dispatch whichever is earlier.		

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25.0	**MACHINE PACKING:**		
25.1	Sea worthy & rigid packing for all items of complete machine, PLC 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		
26.0	**GENERAL:**		
26.1	Machine Model No.		
26.2	Total connected load (KVA):		
26.3	Floor area required (Length, Width, Height) for complete machine & accessories		
26.4	Total weight of the machine (approx)		
26.5	The general arrangement drawing showing the machine & associated systems with salient dimensions shall be submitted along with the offer. The drawing should be clear and legible		