



An ISO 9001
Company

Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

| | |
|-------------------------------|---|
| ENQUIRY | Phone: +91 431 257 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com |
| NOTICE INVITING TENDER | |

| | | | |
|-------------------------------------|------------------------|----------------------|--|
| TWO PART BID | Enquiry Number: | Enquiry Date: | Due date for submission of quotation: |
| Tender to be submitted in two Parts | 2620900241 | 09.11.2009 | 14.12.2009 |

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 | Fin Width Correction & Fin Straightening Station with Shot Blasting as per the technical specification & 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 10 months from the date of purchase order.
2. Grace period of 2 months beyond the above delivery period will be considered.
3. Checklist to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
4. All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.

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 "2620900241".

| | |
|--|---|
| 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 Manager / Capital Equipment / MM |
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PART A**QUALIFYING CRITERIA FOR THE SUPPLY OF**
Fin Width Correction & Fin Straightening Station with Shot Blasting**SECTION – I**

The BIDDER is expected to give complete details against each clause in the table given below, with additional sheets those may be attached (giving clear reference number) to furnish and cover the requisite details / documents.

| S. No. | PARTICULARS | VENDOR's RESPONSE |
|---------------|--|--------------------------|
| 1 | VENDOR to provide the Profile of their Company | |
| 2 | The Bidder / Vendor (OEM) shall have a minimum of TEN Years of Continuous Experience in the field of Design, Manufacture and Supply of Cold Rolling Machines for Steel. | |
| 3 | List of customers to whom Cold Rolling Machines for steel were supplied, installed and commissioned till date, highlighting the customers who are in the field of Power Utility Boilers manufacturing (of High Pressure Ratings). The sizes of machines supplied may be furnished. | |
| 4 | Details on SERVICE-AFTER-SALES Set-Up in India including the Addresses of Agents / Service Centres in India. | |
| 5 | Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment. | |

SECTION – II

The BIDDER / VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the Fin Width Correction & Fin Straightening Station with Shot Blasting.

| S. No. | REQUIREMENTS | VENDOR'S RESPONSE |
|---------------|--|--------------------------|
| 1 | Only those vendors (OEMs) should quote, who have supplied and commissioned at least ONE COLD ROLLING MACHINE for making cross-sectional change in steel strips or bars by cold rolling in the past Ten years (on the date of opening of Tender) and such machine should presently be working satisfactorily for more than one year after commissioning (on the date of opening of Tender),. However, if such equipment has been supplied to BHEL, then the same must be currently working satisfactorily for not less than six months (as on date of Tender Opening) from the date of commissioning and acceptance. | |
| | The vendor should submit following information where similar machine has been supplied: | |
| 1.1 | Name and postal address of the customer or company where similar equipment is installed. | |
| 1.2 | Name and designation of the contact person of the customer. | |
| 1.3 | Phone, FAX no and email address of the contact person of the customer. | |
| 1.4 | Month and Year of commissioning of the equipment. | |
| 1.5 | Application for which the equipment is supplied | |
| 2 | Along with the Technical offer, the Vendor should submit the <u>Performance certificate from the customer for the satisfactory performance of the equipment supplied as per clause 1.0 above.</u> (For obtaining the Performance certificate, a suggestive format is provided in SECTION – IV) | |
| 3 | Offers of only those vendors who meet the above Qualifying Criteria will be considered for further evaluation. | |
| 4 | 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. | |
| 5 | DELIVERY - The bidder shall quote the best possible delivery. However the delivery period shall not exceed 10 months from the date of Purchase Order. A grace period of 2 months in addition is provided. The additional grace period will attract loading, which is explained in the commercial terms of the enquiry. The delivery period is reckoned from the date of purchase order to date of despatch from the vendor works. | |

SECTION – III

The BIDDER / VENDOR has to comply with the following, for accepting the Technical Offer for scrutiny by the Purchaser:

| S. No. | REQUIREMENTS | VENDOR's COMPLIANCE |
|---------------|--|----------------------------|
| 1 | The BIDDER / VENDOR shall submit the offer in TWO PARTS-Technical [with PART A & PART B] & Commercial and Price Bid. | |
| 2 | The offer shall contain a comparative statement of Technical Specifications given by BHEL and the offered details submitted by the Bidder, against each clause. Merely stating 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words wherever 'Vendor to Specify' details in the technical comparative statement may lead to disqualification of the Technical Offer. | |
| 3 | The Technical Offer shall be supported by product Catalogues & Data Sheets and also technical details of Bought-Out-Items with copies of Product Catalogue to the extent possible. | |
| 4 | The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation of the inclusion of all the accessories, toolings, attachments, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements. | |
| 5 | BIDDER has to indicate the Country of Origin for the supply of equipment. | |

SECTION – IV

PERFORMANCE CERTIFICATE
(On Customer's Letter Head)

1. Supplier of the machine :
2. Make & Model of the Equipment :
3. Month & Year of Commissioning :
4. Application for which machine is used :
5. Sizes of Jobs Performed in the machine
6. Performance of the Machine : Satisfactory / Good / Average /
(Strike off whichever is not applicable) Not Satisfactory
7. After Sales Service : Satisfactory / Good / Average /
Not Satisfactory
8. Any other remarks :

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

PART B

**Technical Specification for
Fin Width Correction & Fin Straightening Station with Shot Blasting**

| S.No. | PARTICULARS | SPECIFICATION / DESCRIPTION | | Bidder's Offer with Complete Technical Details |
|-------|-------------------------|---|-------------------|--|
| 1.0 | APPLICATION | The fin Width correction and fin straightening station with shot blasting 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 | Vendor to Confirm | |
| 2.2 | Fin Thickness | 5mm to 12mm | Vendor to Confirm | |
| 2.3 | Fin Length (Cut length) | Minimum Length : 4m Maximum length : 25m | Vendor to Confirm | |
| 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) | Vendor to Confirm | |
| 2.5 | Fin Coil Weight | Max: 2000 kg | Vendor to Confirm | |
| 2.6 | Fin Coil OD | Min: 1000mm / Max: 1500mm | Vendor to Confirm | |
| 2.7 | Fin Coil ID | Min:450mm / Max: 700mm | Vendor to Confirm | |
| 3.0 | PRODUCTIVITY | Max. 6m/min | Vendor to Confirm | |

| S.No. | SPECIFICATION / DESCRIPTION | | | Bidder's Offer with Complete Technical Details |
|------------|---|--|---------------------------|--|
| 4.0 | MACHINE CONFIGURATION: The machine shall have the following elements / Components: | | | |
| 4.1 | Coiled Fin Mounting Arrangement | | Vendor to Confirm | |
| 4.2 | De-Coiling Unit | | Vendor to Confirm | |
| 4.3 | Fin Butt Welding Bench | | Vendor to Confirm | |
| 4.4 | Fin Shot Blasting Station | | Vendor to Confirm | |
| 4.5 | Fin Width Correction Unit | | Vendor to Confirm | |
| 4.6 | Fin Horizontal Straightening Unit | | Vendor to Confirm | |
| 4.7 | Fin Vertical Straightening Unit | | Vendor to Confirm | |
| 4.8 | Fin Length Measuring Unit | | Vendor to Confirm | |
| 4.9 | Hydraulic Fin Cut-Off / Shearing Unit. | | Vendor to Confirm | |
| 4.10 | Fin Transfer Unit | | Vendor to Confirm | |
| 4.11 | Fins storage rack | | Vendor to Confirm | |
| 4.12 | Control Panel | | Vendor to Confirm | |
| 5.0 | COILED FIN MOUNTING ARRANGEMENT & DE-COILING UNIT | | | |
| 5.1 | Coil Loading | Manual loading with the help of crane. | Vendor to Confirm | |
| 5.2 | Fin Coil Maximum OD | 1500mm | Vendor to Confirm | |
| 5.3 | Fin Coil Minimum OD | 450mm | Vendor to Confirm | |
| 5.4 | Width of coil mounting arrangement - Maximum | 200mm | Vendor to Confirm | |
| 5.5 | Coil Weight - Maximum | 2000 kgs. (maximum) | Vendor to Confirm | |
| 5.6 | Coil Clamping arrangement | Mechanical Jaws –Four jaws – Self Centering type | Vendor to provide details | |

| S.No. | SPECIFICATION / DESCRIPTION | | | Bidder's Offer with Complete Technical Details |
|------------|---|---|---------------------------|--|
| 5.7 | Device to prevent free uncoiling | Friction Brake (with adjuster) | Vendor to provide details | |
| 5.8 | Uncoiling and Fin feeding | By pinch rolls in the fin calibrating m/c. | Vendor to provide details | |
| 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. | Vendor to provide details | |
| 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 | | | |
| 6.2 | Clamping | Manually operated clamps for clamping the ends of fins and aligning. | Vendor to Confirm | |
| 6.3 | Welding Process | MIG / MAG / SMAW Welding Power Source is under BHEL scope. | Vendor to Confirm | |
| 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. | Vendor to provide details | |

| S.No. | SPECIFICATION / DESCRIPTION | | Bidder's Offer with Complete Technical Details |
|------------|--|---------------------------|--|
| 7.0 | FIN SHOT BLASTING STATION | | |
| 7.1 | The proposed machine shall be capable of cleaning the oil film, grease, rust, scales, protective film-coats etc. from the surface of the fins. | | |
| 7.2 | The design of the machine shall be such that the equipment is compact in size with ease of maintenance. | Vendor to Confirm | |
| 7.3 | The chamber size shall be of suitable size for the job envelope and effective cleaning of the surfaces. | Vendor to Confirm | |
| 7.4 | The shot-blasting operation should be carried out automatically by multiple guns fitted onto the mounting brackets inside the chamber and directed at suitable angles towards the job. Blasting guns shall be adjustable to cover the surface of the fin. | Vendor to provide details | |
| 7.5 | The blasting chamber shall have access doors and chamber door for maintenance purposes. | Vendor to Confirm | |
| 7.6 | The machine shall have suitable inlet with scrubbers for fin in-feed, intermediate supports for fin inside the chamber and outlet with scrubbers for fin out-feed for cleaning. Suitable guide units for the fin to be provided at the inlet and outlet points and the guide units shall be adjustable to accommodate varying width of fins. | Vendor to Confirm | |
| 7.7 | The blasting chamber shall be constructed of thick plates of abrasive resistant steel with suitable stiffeners inside the chamber to ensure minimum wear of chamber. | Vendor to Confirm | |
| 7.8 | The blasting chamber shall be leak-proof with proper sealing elements for the openings so that no dust / shots leaks out of chamber during operation. | Vendor to Confirm | |

| S.No. | SPECIFICATION / DESCRIPTION | | | Bidder's Offer with Complete Technical Details |
|-------|--|---|---------------------------|--|
| 7.9 | Type | Push-Through Type | Vendor to Confirm | |
| 7.10 | Location | Inline and between Fin Butt-Welding Bench & Width correction unit | Vendor to Confirm | |
| 7.11 | Cleaning Standards | SA2½ (Sweden) equivalent | Vendor to Confirm | |
| 7.12 | Shots – Quantity, Mix, Selection & Specification | Around 500 kg./filling, Mix of Shots of specification SS 850 & SS 600 as per IS 4606-1983 | Vendor to Confirm | |
| 7.13 | Filter Cleaning | Automatic and Pulse Jet Cleaning | Vendor to Confirm | |
| 7.14 | Moisture removal | A suitable Refrigerant Air Dryer and filter unit for moisture removal shall be incorporated in the pneumatic circuitry of shot blasting station. Capacity details to be provided. | Vendor to provide details | |
| 7.15 | Purging of shots | Purging to be done for 10 to 15 seconds after the shot blasting is completed to purge out residual shots in the system. | | |
| 7.16 | Dust Collection | In designated Dust Collecting Bins. | Vendor to Confirm | |
| 7.17 | Dust Extraction - Outlet Air Quality | Dust Emission Maximum @ 5mg/Nm ³ [for particle size 10 micron & above] | Vendor to Confirm | |
| 7.18 | Number of Nozzles | | Vendor to Specify | |
| 7.19 | Nozzle Diameter | | Vendor to Specify | |
| 7.20 | Blasting speed | | Vendor to Specify | |
| 7.21 | Integral Shot Recovery & Recycling System | | Vendor to Confirm | |

| S.No. | SPECIFICATION / DESCRIPTION | | | Bidder's Offer with Complete Technical Details |
|------------|---|--|-------------------|--|
| 7.22 | Location | Normal Shop-Floor Area | Vendor to Confirm | |
| 7.23 | Dust Separation | Through a system containing cyclonic separators, ducts connecting blasting chamber & dust extraction unit, dust collectors and exhaust fan | | |
| 7.24 | Shots Leakage | Leak proof arrangement to be provided | Vendor to Confirm | |
| 7.25 | Control | Manual & Automatic Start / Stop with indicating alarm for shots level low | Vendor to Confirm | |
| 7.26 | Noise Level | Not exceeding 85dBA | Vendor to Confirm | |
| 7.27 | Air booster | Suitable air booster to be provided. For pneumatic air supply refer clause: 14.1 | Vendor to Confirm | |
| 8.0 | FIN WIDTH CORRECTION UNIT BY COLD ROLLING | | | |
| 8.1 | Purpose : Continuous width correction of Fins to be done by COLD ROLLING by means of rollers and straightening in horizontal and vertical directions.. | | Vendor to Confirm | |
| 8.2 | Fin Bar Straightening & Width correcting Unit by Rolling shall consist of : | | Vendor to Confirm | |
| | a) Supporting & In feed Guide Rollers | | Vendor to Confirm | |
| | b) Vertically straightening unit, Mechanically Adjustable | | Vendor to Confirm | |
| | c) Horizontally straightening unit, Mechanically Adjustable | | Vendor to Confirm | |
| | d) Fin width correcting unit with top & bottom support rollers | | Vendor to Confirm | |
| | e) Motorized, Hardened, Calibrating Rollers, Mechanically adjustable to the needed Fin-Width, with Mechanical Width Indicators. | | Vendor to Confirm | |

| S.No. | SPECIFICATION / DESCRIPTION | | | Bidder's Offer with Complete Technical Details |
|------------|---|---|---|--|
| 8.3 | Total No.of Width Correcting Roller Stages (In how many stages the width correction is done) | | Vendor to Specify | |
| 8.4 | No.of Width Correcting Rollers per Stage (How many rollers are there in each stage) | | Vendor to Specify | |
| 8.5 | Width correction Capacity | Suitable for the Material as per Clause 2.4 | Vendor to Confirm | |
| 8.6 | Width of Fins used | 10 mm to 110mm | Vendor to Confirm | |
| 8.7 | Fin thickness | 5mm to 12mm | Vendor to Confirm | |
| 8.8 | Width Correction required upto | 1.5 mm | Vendor to Confirm | |
| 8.9 | Tolerance on Width | ± 0.1mm | Vendor to Confirm | |
| 8.10 | Fin Feeding Speed | Range : 1.0 to 6.0m/min | Vendor to Confirm | |
| 9.0 | FIN FEEDING SYSTEM & FIN STORAGE RACK | | | |
| 9.1 | Automatic fin bar pulling of the fin from the Decoiler Unit and through rollers of the fin width correction unit / other units.. | | Vendor to provide details of the feeding system | |
| 9.2 | The fin storage rack on the out feed side has to be rigid by design. | | Vendor to Confirm | |
| 9.3 | 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. | | Vendor to Specify | |
| 9.4 | The outfeed conveying system to be provided. Details such as drives provided, means of conveying etc to be provided about the outfeeding system | | Vendor to Specify | |
| 9.5 | The system to shift the corrected fins from Outfeed conveyor to the fin storage rack to be explained. | | Vendor to Specify | |

| S.No. | SPECIFICATION / DESCRIPTION | | | Bidder's Offer with Complete Technical Details |
|-------------|--|--|-------------------|--|
| 9.6 | The outfeed conveying system and fin storage rack to handle fins with maximum length of 25metres and minimum length of 4metres | | Vendor to Confirm | |
| 10.0 | HYDRAULIC CUT OFF UNIT & FIN LENGTH MEASURING DEVICE | | | |
| 10.1 | Purpose : To cut the fin to the pre-programmed length after Fin width correction & Straightening | | | |
| 10.2 | Cutting | Hydraulic Shear | Vendor to Confirm | |
| 10.3 | Length Measuring Devices | Online Automatic Length measurement before the shearing unit to be provided. | Vendor to Confirm | |
| 10.4 | Length range | Programmed length after Width correction & straightening. Range : 200mm to 25m | Vendor to Confirm | |
| 10.5 | Length display | The actual length to be continuously displayed by the side of the programmed length on the control panel screen. | Vendor to Confirm | |
| 10.6 | 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. | Vendor to Confirm | |
| 10.7 | Accuracy on Length of Fin | ± 10mm in 25 m | Vendor to Confirm | |
| 10.8 | Interlock | Automatic Fin travel stop and restart when Fin being Cut | Vendor to Confirm | |
| 10.9 | Interlock | Automatic fin travel start after the fin is transferred to fin storage rack. | Vendor to Confirm | |

| S.No. | SPECIFICATION / DESCRIPTION | | Bidder's Offer with Complete Technical Details |
|-------------|--|---------------------------|--|
| 11.0 | OPERATION AND CONTROL SYSTEM | | |
| 11.1 | OPERATOR'S CONTROL PANEL: | | |
| 11.1.1 | Control shall be PLC based. | Vendor to Specify | |
| 11.1.2 | Operator's Panel having complete machine control system with suitable TFT colour display preferably 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) | Vendor to provide details | |
| 11.2 | PLC SYSTEM & FEATURES | | |
| 11.2.1 | Make: Preferred Make – Fanuc / Siemens / Mitsubishi or any other reputed makes acceptable to BHEL | Vendor to provide details | |
| 11.2.2 | Model (suitable and latest version, as available at the time of purchase order placement, shall be supplied). | Vendor to Specify | |
| 11.2.3 | Details of Standard features | Vendor to Specify | |
| 11.2.4 | Details of optional features, recommended by vendor. | Vendor to Specify | |
| 11.2.5 | Display type and size | Vendor to Specify | |
| 11.2.6 | 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 | Vendor to Confirm | |

| S.No. | SPECIFICATION / DESCRIPTION | Bidder's Offer with Complete Technical Details |
|-------------|---|--|
| 11.2.7 | 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 | Vendor to Confirm |
| 11.3 | FAULT DIAGNOSTIC SYSTEM: | |
| 11.3.1 | 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. | Vendor to Confirm |
| 11.3.2 | Help guide should be provided to use both diagnostic systems | Vendor to Confirm |
| 12.0 | HYDRAULICS | |
| 12.1 | 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. | Vendor to Furnish Details |
| 12.2 | Pumps, valves, accessories etc shall be of Bosch-Rexroth / Vickers or equivalent reputed make acceptable to BHEL. (Details to be submitted). The seals used in cylinders shall be of Merkel / Parker / Bushak + Shamban / Hunger / Simrit make. | Vendor to confirm & furnish details |
| 12.3 | Suitable filtration system should be provided. The filter unit shall be of Hydac / Parker / Rexroth or equivalent reputed make acceptable to BHEL. (Details to be submitted). | Vendor to confirm & furnish details |

| S.No. | SPECIFICATION / DESCRIPTION | | Bidder's Offer with Complete Technical Details |
|-------|---|-------------------------------------|--|
| 12.4 | The flexible hoses used in the system shall be of Gates / Aeroquip / Parker or any other reputed make acceptable to BHEL. | Vendor to Specify | |
| 12.5 | Failure indication for oil level, temperature, pressure, filter clogging should be provided | Vendor to confirm & furnish details | |
| 12.6 | 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. | Vendor to Specify | |
| 12.7 | Suitable Cooling system of sufficient capacity to maintain complete Hydraulic System at a temperature not exceeding 50 deg C irrespective of the ambient conditions. | Vendor to confirm & furnish details | |
| 12.8 | 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 | Vendor to furnish details | |
| 12.9 | Maximum Operating Pressure of hydraulic system | Vendor to Specify | |
| 12.10 | Main Pump flow in lpm and Motor Power in kW | Vendor to Specify | |
| 12.11 | Reservoir capacity (in litres) | Vendor to Specify | |
| 12.12 | All oil pipelines shall be of seamless steel and should undergo pickling process. | Vendor to Confirm | |
| 12.13 | 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. | Vendor to Confirm | |
| 12.14 | All cylinders used in the machine should have standard bore and rod sizes. The piston rod shall be hard chrome plated. | Vendor to furnish details | |

| S.No. | SPECIFICATION / DESCRIPTION | Bidder's Offer with Complete Technical Details |
|-------|--|--|
| 12.15 | 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. | Vendor to furnish details |
| 12.16 | The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68 | Vendor to Specify |
| 12.17 | The maximum pressure of the system should preferably not to exceed 310 bar | Vendor to Specify |
| 12.18 | 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. | Vendor to Specify |
| 12.19 | The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems. | Vendor to furnish details |
| 12.20 | All hydraulic pipelines, hoses and electrical control cables to be neatly laid out with proper clamps and flexible hose conveyors wherever required. | Vendor to Confirm |
| 12.21 | 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. | Vendor to Confirm |
| 12.22 | Hydraulic oil will be supplied by BHEL during commissioning at BHEL works. Vendor to provide the oil during pre-dispatch inspection. | Vendor to Confirm |

| S.No. | SPECIFICATION / DESCRIPTION | | Bidder's Offer with Complete Technical Details |
|-------------|--|-------------------|--|
| 13.0 | LUBRICATION : | | |
| 13.1 | Machine lubrication: Automatic centralized lubrication system with timer control and suitable metering cartridges to be supplied. | Vendor to Confirm | |
| 13.2 | First filling of Lubrication Oil to be supplied by the supplier. Indian equivalent shall be mentioned. | Vendor to Specify | |
| 13.3 | First filling of Grease should be supplied by the supplier. Indian equivalent shall be mentioned. | Vendor to Specify | |
| 14.0 | PNEUMATIC SYSTEM: | | |
| 14.1 | 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/cm ² . 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. | Vendor to Confirm | |
| 14.2 | 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 | Vendor to Confirm | |
| 14.3 | 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. | Vendor to Confirm | |
| 14.4 | Pneumatic components shall be of FESTO / NORGREN make or equivalent reputed make acceptable to BHEL. | Vendor to Specify | |

| S.No. | SPECIFICATION / DESCRIPTION | | Bidder's Offer with Complete Technical Details |
|-------------|--|-------------------|--|
| 15.0 | ELECTRICAL & ELECTRONICS SYSTEMS | | |
| 15.1 | 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. | Vendor to Confirm | |
| 15.2 | Tropicalization: All electrical / electronic equipment shall be tropicalized. | Vendor to Confirm | |
| 15.3 | All electrical components in the cabinets should be mounted on DIN Rail | Vendor to Confirm | |
| 15.4 | 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. | Vendor to Confirm | |
| 15.5 | Motors & other electrical components shall conform to IEC or Indian Standards | Vendor to Confirm | |
| 15.6 | Motors and drives shall be of Fanuc / Siemens / Allen Bradley / ABB / Indramat / SEW or any other internationally reputed makes conforming to IS / IEC Standards, acceptable to BHEL (Vendor should indicate make and type in the offer) | Vendor to Confirm | |
| 15.7 | All electrical items shall be of from SEW / ROCKWELL Allen Bradley/ Telemecanique / Delta or reputed makes acceptable to BHEL. | Vendor to Confirm | |
| 15.8 | 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. | Vendor to Confirm | |

| S.No. | SPECIFICATION / DESCRIPTION | Bidder's Offer with Complete Technical Details |
|-------|--|--|
| 15.9 | All components/devices/terminals are to be incorporated with numbered ferrules. | Vendor to Confirm |
| 15.10 | External wiring from / to control panel, control desk, external motors etc shall be by means of screened multi-core cables. | Vendor to Confirm |
| 15.11 | 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. | Vendor to Confirm |
| 15.12 | 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. | Vendor to Confirm |
| 15.13 | Vendor should ensure the proper earthing for the machine and its peripherals. | Vendor to Confirm |
| 15.14 | Cables shall be routed through totally enclosed cable trays. There shall not be cable trenches. | Vendor to Confirm |
| 15.15 | In-cycle hour counter with reset facility should be provided. | Vendor to Confirm |
| 15.16 | All electrical & electronic control cabinets & panels should be vermin and dust proof. All Electric enclosures shall have IP 54 protection | Vendor to Confirm |
| 15.17 | 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. | Vendor to Specify |

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| 16.0 | MACHINE SPARES: | |
| 16.1 | 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) | Vendor to Confirm |
| 16.2 | Mechanical & Hydraulic Spares: All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses etc. | Vendor to Confirm |
| 16.3 | 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. | Vendor to Confirm |
| 16.4 | 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 | Vendor to Confirm |

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| 16.5 | 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 | Vendor to Confirm |
| 17.0 | DOCUMENTATION: | |
| 17.1 | GA drawings, Machine detailed constructional drawings with dimensions, Civil Foundation layout drawings, Hydraulic / Pneumatic / Electrical / Electronic circuits with BOM, are to be submitted within 45 days from the date of ordering (in case of an order) for approval by BHEL. | Vendor to Confirm |
| 17.2 | <p>The following documents in English language should be supplied along with the machine:</p> <p style="text-align: center;">Hard Copies - 3 Sets Vendor to confirm In CD form - 1 Set</p> <ol style="list-style-type: none"> 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 | |

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| 17.2 (contd) | 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 comments in English 15. PLC program and data on CD, Flash Memory Card. 16. 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. 17. Complete list of Alarm log, Error code, error messages & remedies and on line fault diagnostics to be provided by the vendor. 18. Complete list of spares for machine, along with item part no /specification / type / model and make & address of the sub-vendor. | |
| 18.0 | MACHINE INSPECTION & ACCEPTANCE: | |
| 18.1 | PRE-DISPATCH INSPECTION AT SUPPLIER'S WORKS: | |
| 18.1.1 | Machine shall be offered for inspection by BHEL Engineers at supplier's works | Vendor to Confirm |
| 18.1.2 | 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. | Vendor to Confirm |
| 18.1.3 | 40 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. | Vendor to Confirm |
| 18.1.4 | 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, 8.9, 8.10 | Vendor to Confirm |

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| 18.1.5 | All the fins after prove out are to be returned to BHEL and shall be dispatched along with the machine. | Vendor to Confirm |
| 18.2 | PROVE-OUT AND ACCEPTANCE AT BHEL WORKS: | |
| 18.2.1 | 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. | Vendor to Confirm |
| 18.2.2 | 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. | Vendor to Confirm |
| 18.2.3 | 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, 8.9, 8.10 | Vendor to Confirm |
| 18.3 | TRAINING: | |
| 18.3.1 | 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. | Vendor to Confirm |
| 18.3.2 | Vendor to clearly mention whether the training is offered free of cost or chargeable. If chargeable, the vendor has to quote on manday basis. | Vendor to Specify |
| 18.3.3 | Airfare, board & lodging for the BHEL Engineers who will be visiting supplier's works for pre-dispatch inspection and training, shall be borne by BHEL. | Vendor to note |

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| 18.3.4 | 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. | Vendor to Confirm |
| 18.3.5 | 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 vii) Electrical / Mechanical / Electronics systems | Vendor to Confirm |
| 18.3.6 | Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel | Vendor to Confirm |
| 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. | Vendor to Confirm |
| 19.2 | BHEL shall design and construct complete foundation for the machine as per the Vendor's recommendation | Vendor to Confirm |
| 19.3 | Complete anchoring system including foundation bolts, anchoring materials, fixators, levelling shoes etc should be supplied | Vendor to Specify |

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| 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. | Vendor to Confirm | |
| 20.2 | Service requirement like power, air & water shall be provided 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. | Vendor to Confirm | |
| 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. | Vendor to Confirm | |
| 20.4 | Commissioning spares, required for commissioning of the machine shall be supplied free of cost | Vendor to Confirm | |
| 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. | Vendor to Confirm | |
| 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. | Vendor to Confirm | |

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| 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. | Vendor to Specify | |
| 21.3 | Suitable safety enclosure to be provided with glass windows for the fin width correction machine. | Vendor to Confirm | |
| 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. | Vendor to Confirm | |
| 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. | Vendor to Specify | |
| 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. | Vendor to Confirm | |
| 21.7 | All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations and suitably guarded. | Vendor to Confirm | |
| 21.8 | Emergency Switches should be provided at suitable locations as per International Norms. | Vendor to Confirm | |
| 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. | Vendor to Confirm | |

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| 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. | Vendor to Confirm | |
| 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. | Vendor to Confirm | |
| 22.3 | The machine, including attachments and accessories, should be suitable for continuous operation on three shifts a day. | Vendor to Confirm | |
| 22.4 | If any safety / environmental protection enclosure is required it shall be built in the machine by the vendor. | Vendor to Confirm | |
| 22.5 | Paint of the machine should be oil / coolant resistant and should not peel off | Vendor to Confirm | |
| 22.6 | Maximum noise level shall be 85 dB(A) at normal load condition.. | Vendor to Confirm | |
| 23.0 | PAINTING: | | |
| 23.1 | Painting of Machine / Electrical Panels: RAL 6011 Apple Green (Polyurethane Paint) | Vendor to Confirm | |
| 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. | Vendor to Confirm | |

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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 | Vendor to Confirm | |
| 26.0 | GENERAL: | | |
| 26.1 | Machine Model No. | Vendor to Specify | |
| 26.2 | Total connected load (KVA): | Vendor to Specify | |
| 26.3 | Floor area required (Length, Width, Height) for complete machine & accessories | Vendor to Specify | |
| 26.4 | Total weight of the machine (approx) | Vendor to Specify | |
| 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 | Vendor to provide compulsorily | |