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 79 38 Fax : +91 431 252 07 19 Email : tvenkat@bheltry.co.in Web : www.bhel.com

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2620900239**	**Enquiry Date:** **07.11.2009**	**Due date for submission of quotation:** **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	**20 Torch Panel Welding Station** as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	**1 No**.

Important points to be taken care during submission of offer

1. **Delivery required 12 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 "2620900239".

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

PART A

QUALIFYING CRITERIA FOR THE SUPPLY OF
20 TORCH PANEL WELDING STATION

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 Panel Welding Stations.	
3	List of customers to whom Panel Welding Stations 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 20 Torch Panel Welding Station:

S. No.	REQUIREMENTS	VENDOR's RESPONSE
1	Only those vendors (OEMs) should quote, who have supplied and commissioned at least **20 Torch Tube Panel Welding station with top and bottom side welding** 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 Performance certificate from the customer for the satisfactory performance of the equipment supplied as per clause 1.0 above. (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 12 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 / Not Satisfactory
(Strike off whichever is not applicable)

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 20 TORCH PANEL WELDING STATION

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
1.0	**PURPOSE**	Continuous welding of Super critical / Sub Critical High Pressure Power Boiler Membrane Wall Panels formed by welding of seamless tubes with intermediate flats.	
2.0	**JOB SPECIFICATION**		
2.1	Tube Outside Diameter	**28.6mm / 31.8mm / 38.1mm / 44.5mm / 51mm / 57mm / 63.5mm 76.1mm**	
2.2	Tube Wall Thickness	**2.3mm to 10mm**	
2.3	**Tube Material**		
2.3.1	a) Carbon Steel	SA192, SA210A1, SA210C	
2.3.2	b) Alloy Steel	SA213T11, SA213T22, SA213T23	
2.4	**Fin Material**		
2.4.1	a) Carbon Steel	ASTM A 576	
2.4.2	b) Alloy Steel	ASTM A 387Gr.12, ASTM A 387Gr.22	
2.5	Fin Width	**9mm to 110mm**	
2.6	Fin Thickness	**5mm to 12mm**	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
2.7	Fin Coil Weight	Max: 2000 kg	
2.8	Fin Coil Diameter (OD)	Min: 1000mm / Max: 1500mm	
2.9	Fin Coil Diameter (ID)	Min:450mm / Max: 700mm	
2.10	Panel Length (Welded Portion)	Minimum : 4000 mm Maximum : 25000 mm	
2.11	Panel Width	Upto 2500 mm	
2.12	Panel Tolerances	Tolerance on Width: +0mm /-3mm Bow: Not allowed	
	WELDING LINE		
3.0	**WELDING STATION**		
3.1	Type	PLC Controlled Push-Through (moving tube) Stationary Welding Machine	
3.2	Weld Process	Pulsed GMAW	
3.3	Welding Wire Diameter	1.2mm Solid Wire	
3.4	Construction	Rigid Closed Frame	
3.5	Number of Torches	20 Nos suitable for Pulsed GMAW	
3.6	Torch Arrangement	10 Torches each for top & bottom side welding.	
3.7	Machine Design	Machine design to ensure formation of panels without kink, bow and twist, in addition to a perfect defect-free welding.	
3.8	Panel Welding	Simultaneous Welding on both Top side & Bottom side of the panel	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
3.9	Selection of Torches for welding in a group	Welding with any or all 20 Torches at a time by operator selection	
3.10	Welding Speed (Variable Range)	500 to 1500 mm/min	
3.11	Continuous Welding without interruptions	Welding shall progress without interruptions while welding a 24m long panel when welding with all 20 Torches simultaneously. **Note:** A maximum of 2 interruptions for torch cleaning purpose only are allowable	
3.12	Drive	Inverter Controlled AC Drive	
3.13	Upper Form Roller Shafts and Lower Form Roller Shafts	Screw Rod and Locking Arrangement with Gear-Box and Motor. Suitable arrangement to vary effective height so that adjustment for different diameter of tubes is possible. Bidder to explain the complete construction.	
3.14	Form Rollers and Distance Rings	Shall be suitable for both tube-end and fin-end panels.	
3.15	Fin Bar Guiding Arrangement	Electrically Operated, vertically adjustable pre-set system to position fins at tube centre to suit various tube diameters. Bidder to provide details.	
3.16	Fin Bar Pressing Rolls	Automatic control with pre-setting provisions to suit various tube diameters. Bidder to provide details.	
3.17	Fin & Tube Clamping Device	Side Pressing Unit with hydraulically operated pressing rollers for fins or tubes with automatic control and mechanically pre-setting provisions.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
3.18	Arc Blow Prevention & Return Current Collecting Arrangement	Welding return current collectors (for grounding) are to be provided at suitable locations and machine frame to be constructed with separate high capacity collectors to withstand high current flow and to avoid over heating of collectors and to avoid current flow through rollers & other machine supporting systems. Bidder to explain the arrangement for Arc Blow prevention to ensure smooth & stable arc when all torches are working.	
3.19	Service Platform over the Machine	To locate the welding power sources, wire feeders, fume extractors, 300kg Jumbo coil holders, hydraulic power pack, etc.	
3.20	Roller construction for feeding the tube and pressurizing the tubes	Sufficient number of rows of rollers across the width & length of the panel are to be arranged, in order to avoid welding heat related problems of like bow / twist generation during welding and insufficient pressure related problems in the horizontal or vertical directions.	
3.21	Weld Quality	Machine Design to ensure perfect weld quality (in single stroke) without any defects like Weld Skip-Off, Off-Line, Burn- Through, Under-Cuts, Lack of Fusion or Penetration, Weld Porosity. Weld Quality inspection visually as per Annexure-I. Bidder to confirm.	
3.22	Weld Quality	Complete weld penetration across the thickness of the fin to be ensured. Bidder to confirm.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
3.23	Machine Elements	Welding components / equipments arrangement are to be of rigid and solid design, self guiding/holding type and user friendly to avoid welding related problems (due to fragile arrangement of wire feeders, guides & controllers, torch assembly & positioning, devices with respect to feeding rollers, etc.) The details of torch vertical up and down adjustment to be provided by the bidder.	
4.0	**WELDING EQUIPMENT**		
4.1	**Welding Power Source**	20 Nos. Inverter Controlled (IGBT based) DC Welding Powersource	
4.1.1	Powersource Current Rating	500 Amps. @ 100 % Duty Cycle	
4.1.2	Welding Process	Suitable for Pulsed GMAW with Mixed Gas (Argon + CO_2) Shielding	
4.1.3	Powersource Make	OTC / DAIHEN CORPORATION, Japan	
4.1.4	Other Features of Powersource	Capable to produce Weld in the Panel Building Process [with Spatter Free Welding, Smooth Arc Initiation, Crater Filling, Good Penetration, Uniform Weld Bead Formation, etc.]	
4.2	**Wire Feeder**	Make and model of the wire feeder to be provided by the bidder.	
4.2.1	Wire feeding roller mechanism	Wire feeding roller mechanism shall be FOUR roll wire feeding system. Bidder to confirm.	
4.2.2	Wire feed motor rating	Wire feeder motor to be adequately rated to ensure smooth wire feeding of 1.2mm solid wire from 300kg Jumbo packs / 25 kg spools.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
4.2.3	Welding Wire Coil Holders	Capacity to hold and feed 25 kg. Spools	
4.2.4	Welding Wire Drum Holders	Capacity to hold 300 kg. Jumbo Coil packs	
4.2.5	TOP Torches: Wire feeder and Jumbo coil packs mounting position	Wire feeders and Jumbo coil packs for TOP torches shall be on the Service Platform	
4.2.6	BOTTOM Torches: Wire feeder and Jumbo coil packs mounting position	Wire feeders and Jumbo coil packs for TOP torches shall be on the Side of the machine for convenient loading of Small spools and Jumbo coils.	
4.2.7	Wire feeding conduits	The wire feed conduits for feeding of the wire from the Drum Packs to Wire feeder inlet shall have a suspending/support arrangement that ensures the conduits are routed in smooth curves aiding uninterrupted wire flow.	
4.3	**Welding Torches**	To be Rated for continuos heavy duty application of 500 Amps at 100 % Duty cycle. Bidder to confirm.	
4.3.1	Torches	Make and Model to be provided by the bidder.	
4.3.2	Type of torch cooling	Bidder to specify the type of cooling of torches	
4.3.3	Torch cable	Appropriate cable length & support devices (such as servo assist) if reqd. to ensure high speed stable wire feeding with 1.20 mm solid wire shall be provided.	
4.3.4	Torch cable protection	Torch cables to be provided with protective sheathing that is fire proof	
4.3.5	Welding Torch Mounting Arrangement	Torch Mounting Guide to be suitable for welding 2.5m wide panel.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
4.3.6	Weld Torch movement and positioning	It should be possible to move and locate the Welding Torch Carriages at any desired position on the horizontal Guide Beam. Movement should be motorized.	
4.3.7	Stroke adjustment of Welding Torch	Up/Down Stroke adjustment shall be motorized. BIDDER to specify the stroke length.	
4.3.8	Weld Arc Shielding Glass	Machine mounted arc shield for Pulsed GMAW	
4.3.9	Mixed Gas Flow Rate	20 – 40 litres / min / torch	
4.3.10	Inlet Pressure	1.5 to 5 Bar	
4.3.11	Torch design	The Gas nozzles of the torches, torch body & torch slides shall be of design & construction to allow satisfactory aiming of the 1.20 mm solid wire to the particular point in the tube-fin interface (for all combinations of Tube-Fin sizes) with appropriate stick out distance (10 - 12 mm)-appropriate Torch angles - to result in deposition of a defect free bead of satisfactory shape in all Torches (Down hand + Overhead). Bidder to confirm.	
4.3.12	Gas circuit - Accessories	Gas Manifold, Gas Solenoid Valves, Gas Flow-Meters and with hoses and end connections, are to be provided with machine tripping logics arrangement.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
5.0	**FUME EXTRACTION SYSTEM**		
5.1	Fume extraction System	A very effective fume extraction system to be provided to suck the entire fumes being generated during welding with all 20 torches in the welding zone.	
5.2	Details of Fume extraction system	Bidder to explain the complete fume extraction system provided on the machine with Make, Type, Capacity, Hood design and its location etc. Bidder to also provide details such as suction pressure, Flow rate, Filter cartridge type, ducting and hood arrangement.	
6.0	**IN-FEED , OUT-FEED CONVEYORS & RETURN CONVEYORS**		
6.1	Conveyor Design	1. Made of Wear Resistant but Smooth (not to make impressions on the tubes of the panels) Steel Rollers. 2. Position of Idler & Motorized Rollers are to be so designed such that the Panels of all Dimensions (within the range specified) are handled smoothly. 3. BIDDER to specify the details on the arrangement of Drive and Idler Rollers.	
6.2	Conveyor Width	Suitable for making Panels upto a width of 2500 mm	
6.3	In-feed Conveyor	To be suitable for welding 25metres long and 2.5metres wide panels.	
6.4	Out-feed Conveyor	To be suitable for welding 25metres long and 2.5metres wide panels.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
6.5	Pass-On Stand or Return Conveyor	Provided with all motorized Steel Rollers Stand, suitable for transporting sub-panels / full panels (with width upto 2500 mm) through the full traverse length of the In-Feed Conveyor, Out-Feed Conveyor and the Machine Frame Width.	
6.6	Conveyor Speed of Infeed / Out feed / Return conveyor	500 to 6000 mm/min (synchronized to the Welding Speed in Automatic Mode) – Otherwise selectable for Manual Operations, even when the welding operation is not in progress or stopped.	
6.7	Cross Conveyors	1. Cross Conveyors to be provided to shift sub-panel / mini-panels from the Out-Feed Conveyor to the pass-on conveyor after welding, and again from pass-on conveyor to the In-feed Conveyor for further build up of panel.	
		2. Cross Conveyors shall be of Lift and Shift type conveying system. Rigid guiding arrangement of lifting and shifting conveyor system to be provided.	
		3. Lift evenly throughout the length and width of the panel irrespective of its position on the lifting supports. The supports and lifting mechanism has to be very rigid.	
		4. Each Cross Conveyor Unit shall be made of minimum six numbers of cross-transferring arm assemblies. Bidder to specify the no.of cross conveyor arms.	
6.8	Noise Level Control	By providing non-metallic linings in the various tube conveyors in the system	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
7.0	**INSPECTION TABLE**		
7.1	Purpose	For purpose of Panel Inspection & Storage	
7.2	Size	2.5m x 25m	
7.3	Position	Inspection table to be positioned on the out-feed side of the machine and parallel to panel conveyor. Bidder to indicate the position of Inspection table in GA drg.	
7.4	Transportation of Panels to & from Inspection Table	Cross Transport Conveyor Extension from Roller Conveyors on Out-feed Side to Inspection table. Bidder to explain the construction.	
8.0	**INTEGRATED TUBE & FIN FEEDING ARRANGEMENT**		
8.1	Tube Feeding System	Bidder to explain the arrangement of Tube feeding arrangement from the sloping rack to the panel tacking unit. The tubes have to be automatically lowered on to the scalloped bar of panel tacking unit, one by one from the sloping rack.	
8.2	Fin Storage and Feeding System	Bidder to explain the arrangement of feeding the fins in between the tubes in panel tacking unit. The fin feeding to be done automatically.	
8.3	Panel Tacking table	Bidder to explain the construction of Panel tacking table, having a fixture for arranging the tubes & fins including automatic feeding of tubes & fins to the Panel tacking table. The table to be suitable for a sub-panel of 6 tubes and 5 fins of 25m length.	

S.No.	PARTICULARS	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
8.4	Tack Welding Fixture	The tack welding fixture shall have a Pneumatic clamping unit, which clamps the tubes and fins firmly in the fixture, (maintaining the pitch distance between tubes) for tack welding at the start of the panel for about 5 to 10mm (up to 250mm length). Bidder to explain the construction of Panel tack welding fixture.		
8.5	Tack Welding	Tack welding shall be done by MIG / SMAW welding. The Welding power source is under BHEL scope.		
8.6	Transport of Tack Welded Panel to Machine In-Feed Table	The tack welded sub-panel to be shifted from the panel tacking table to the machine In-feed table by means of Cross Transport Conveyor. Bidder to explain the construction.		
8.7	Control Unit for the above	Controls for Automatic tube & fin feeding and clamping, transport of tack welded sub panel to the In-feed table to be provided. Bidder to confirm the controls provided.		
9.0	**FIN WIDTH CORRECTING UNIT WITH SHOT BLASTING**			
9.1	**JOB DESCRIPTION**			
9.1.1	Fin Width	9mm to 110mm	Vendor to Confirm	
9.1.2	Fin Thickness	5mm to 12mm	Vendor to Confirm	
9.1.3	Fin Length (Cut length)	Minimum Length : 4m Maximum length : 25m	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.1.4	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	
9.1.5	Fin Coil Weight	Max: 2000 kg	Vendor to Confirm	
9.1.6	Fin Coil OD	Min: 1000mm / Max: 1500mm	Vendor to Confirm	
9.1.7	Fin Coil ID	Min:450mm / Max: 700mm	Vendor to Confirm	
9.2	**PRODUCTIVITY**	Max. 6m/min	Vendor to Confirm	
9.3	**MACHINE CONFIGURATION:** The machine shall have the following elements / Components:			
9.3.1	Coiled Fin Mounting Arrangement		Vendor to Confirm	
9.3.2	De-Coiling Unit		Vendor to Confirm	
9.3.3	Fin Butt Welding Bench		Vendor to Confirm	
9.3.4	Fin Shot Blasting Station		Vendor to Confirm	
9.3.5	Fin Width Correction Unit		Vendor to Confirm	
9.3.6	Fin Horizontal Straightening Unit		Vendor to Confirm	
9.3.7	Fin Vertical Straightening Unit		Vendor to Confirm	
9.3.8	Fin Length Measuring Unit		Vendor to Confirm	
9.3.9	Hydraulic Fin Cut-Off / Shearing Unit.		Vendor to Confirm	
9.3.10	Fin Transfer Unit		Vendor to Confirm	
9.3.11	Fins storage rack		Vendor to Confirm	
9.3.12	Control Panel		Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.4	**COILED FIN MOUNTING ARRANGEMENT & DE-COILING UNIT**			
9.4.1	Coil Loading	Manual loading with the help of crane.	Vendor to Confirm	
9.4.2	Fin Coil Maximum OD	1500mm	Vendor to Confirm	
9.4.3	Fin Coil Minimum OD	450mm	Vendor to Confirm	
9.4.4	Width of coil mounting arrangement - Maximum	200mm	Vendor to Confirm	
9.4.5	Coil Weight - Maximum	2000 kgs. (maximum)	Vendor to Confirm	
9.4.6	Coil Clamping arrangement	Mechanical Jaws –Four jaws – Self Centering type	Vendor to provide details	
9.4.7	Device to prevent free uncoiling	Friction Brake (with adjuster)	Vendor to provide details	
9.4.8	Uncoiling and Fin feeding	By pinch rolls in the fin calibrating m/c.	Vendor to provide details	
9.4.9	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	
9.5	**FIN BUTT WELDING BENCH**			
9.5.1	To be of simple and compact design to weld the leading end with trailing end of fin			
9.5.2	Clamping	Manually operated clamps for clamping the ends of fins and aligning.	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.5.3	Welding Process	MIG / MAG / SMAW Welding Power Source is under BHEL scope.	Vendor to Confirm	
9.5.4	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	
9.6	**FIN SHOT BLASTING STATION**			
9.6.1	The proposed machine shall be capable of cleaning the oil film, grease, rust, scales, protective film-coats etc. from the surface of the fins.			
9.6.2	The design of the machine shall be such that the equipment is compact in size with ease of maintenance.		Vendor to Confirm	
9.6.3	The chamber size shall be of suitable size for the job envelope and effective cleaning of the surfaces.		Vendor to Confirm	
9.6.4	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	
9.6.5	The blasting chamber shall have access doors and chamber door for maintenance purposes.		Vendor to Confirm	
9.6.6	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	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.6.7	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	
9.6.8	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	
9.6.9	Type	Push-Through Type	Vendor to Confirm	
9.6.10	Location	Inline and between Fin Butt-Welding Bench & Width correction unit	Vendor to Confirm	
9.6.11	Cleaning Standards	SA2½ (Sweden) equivalent	Vendor to Confirm	
9.6.12	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	
9.6.13	Filter Cleaning	Automatic and Pulse Jet Cleaning	Vendor to Confirm	
9.6.14	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	
9.6.15	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.		
9.6.16	Dust Collection	In designated Dust Collecting Bins.	Vendor to Confirm	
9.6.17	Dust Extraction - Outlet Air Quality	Dust Emission Maximum @ 5mg/Nm^3 [for particle size 10 micron & above]	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.6.18	Number of Nozzles		Vendor to Specify	
9.6.19	Nozzle Diameter		Vendor to Specify	
9.6.20	Blasting speed		Vendor to Specify	
9.6.21	Integral Shot Recovery & Recycling System		Vendor to Confirm	
9.6.22	Location	Normal Shop-Floor Area	Vendor to Confirm	
9.6.23	Dust Separation	Through a system containing cyclonic separators, ducts connecting blasting chamber & dust extraction unit, dust collectors and exhaust fan		
9.6.24	Shots Leakage	Leak proof arrangement to be provided	Vendor to Confirm	
9.6.25	Control	Manual & Automatic Start / Stop with indicating alarm for shots level low	Vendor to Confirm	
9.6.26	Noise Level	Not exceeding 85dBA	Vendor to Confirm	
9.6.27	Air booster	Suitable air booster to be provided. For pneumatic air supply refer clause 17.1	Vendor to Confirm	
9.7	**FIN WIDTH CORRECTION UNIT BY COLD ROLLING**			
9.7.1	Purpose : Continuous width correction of Fins to be done by **COLD ROLLING** by means of rollers and straightening in horizontal and vertical directions..		Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.7.2	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	
9.7.3	Total No.of Width Correcting Roller Stages (In how many stages the width correction is done)		Vendor to Specify	
9.7.4	No.of Width Correcting Rollers per Stage (How many rollers are there in each stage)		Vendor to Specify	
9.7.5	Width correction Capacity	Suitable for the Material as per Clause 9.1.4	Vendor to Confirm	
9.7.6	Width of Fins used	9 mm to 110mm	Vendor to Confirm	
9.7.7	Fin thickness	5mm to 12mm	Vendor to Confirm	
9.7.8	Width Correction required upto	1.5 mm	Vendor to Confirm	
9.7.9	Tolerance on Width	± 0.1mm	Vendor to Confirm	
9.7.10	Fin Feeding Speed	Range : 1.0 to 6.0m/min	Vendor to Confirm	
9.7.11	Lubrication	Greasing points have to be provided in convenient locations for easy grease filling in the unit.	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.8	**FIN FEEDING SYSTEM & FIN STORAGE RACK**			
9.8.1	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	
9.8.2	The fin storage rack on the out feed side has to be rigid by design.		Vendor to Confirm	
9.8.3	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.		Vendor to Specify	
9.8.4	The outfeed conveying system to be provided. Details such as drives provided, means of conveying etc to be provided about the outfeeding system		Vendor to Specify	
9.8.5	The system to shift the corrected fins from Outfeed conveyor to the fin storage rack to be explained.		Vendor to Specify	
9.8.6	The outfeed conveying system and fin storage rack to handle fins with maximum length of 25metres and minimum length of 4metres		Vendor to Confirm	
9.9	**HYDRAULIC CUT OFF UNIT & FIN LENGTH MEASURING DEVICE**			
9.9.1	Purpose : To cut the fin to the pre-programmed length after Fin width correction & Straightening			
9.9.2	Cutting	Hydraulic Shear	Vendor to Confirm	
9.9.3	Length Measuring Devices	Online Automatic Length measurement before the shearing unit to be provided.	Vendor to Confirm	
9.9.4	Length range	Programmed length after Width correction & straightening. Range : 200mm to 25m	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.9.5	Length display	The actual length to be continuously displayed by the side of the programmed length on the control panel screen.	Vendor to Confirm	
9.9.6	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.	Vendor to Confirm	
9.9.7	Accuracy on Length of Fin	± 10mm in 25 m	Vendor to Confirm	
9.9.8	Interlock	Automatic Fin travel stop and restart when Fin being Cut	Vendor to Confirm	
9.9.9	Interlock	Automatic fin travel start after the fin is transferred to fin storage rack.	Vendor to Confirm	
9.10.0	**OPERATION AND CONTROL SYSTEM FOR FIN WIDTH CORRECTION SYSTEM**			
9.10.1	**Control shall be** PLC based.		Vendor to Specify	
9.10.2	Separate operator's panel for Fin width correcting & shot blasting station, 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.		Vendor to provide details	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
9.10.3	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	
9.10.4	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	
10.0	**OPERATION AND CONTROL SYSTEM FOR THE PANEL WELDING STATION**		
10.1	**OPERATOR'S CONTROL PANEL:**		
10.1.1	**Control shall be** PC based PLC based.	Vendor to Specify	
10.1.2	Operator's Panel having complete machine control system with suitable display unit 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 (Layout showing complete details should be submitted with the offer)	Vendor to Confirm	
10.2	**PC based PLC SYSTEM & FEATURES**		
10.2.1	Make: Preferred Make – Fanuc / Siemens / Mitsubishi or Any other reputed makes acceptable to BHEL	Vendor to provide details	
10.2.2	Model (suitable and latest version, as available at the time of purchase order placement, shall be supplied).	Vendor to specify	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
10.2.3	Details of Standard features		Vendor to specify	
10.2.4	Details of optional features, recommended by vendor.		Vendor to specify	
10.2.5	The system should have full alphanumeric keyboard, display of suitable size, RS232C serial interfaces, parallel interface for printer, compact disc drive unit for data input/output, hard disk of sufficient capacity, pre-installed system software and other associated / required soft wares, etc . (Details shall be furnished by the Vendor in the TECHNICAL OFFER)		Vendor to Confirm	
10.2.6	TFT monitors to be provided for display. Bidder to specify the size of the monitors.			
10.2.7	Display type and size		Vendor to Specify	
10.2.8	Latest version Laptop with pre-loaded software for PLC for maintenance to be supplied with the machine.		Vendor to Specify	
10.3	**MACHINE OPERATIONAL CONTROLS**			
10.3.1	Welding Process Control	Independent Process Controllers	Vendor to Confirm	
10.3.2	The Controls shall be Hinged with swiveling arrangement	Located in a convenient position for the operator (180 deg Swivel)	Vendor to Confirm	
10.3.3	Remote Control on Both Sides of Welding Machine	For Welding Torches Operations : - Torch Left / Right Torch Up / Down Wire Feed – Jogging control (inching)	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
10.4	**CONTROL FEATURES** shall include the following:			
10.4.1	Start / Sop of Panel movement	Auto / Semi Auto / Manual START/STOP of welding according to panel movement.	Vendor to Confirm	
10.4.2	Panel movement trip logic	If panel movement stops or slows down, welding should be stopped. Similarly panel movement should STOP if welding is interrupted.	Vendor to Confirm	
10.4.3	Interlocks	All necessary interlocks such as burn through, weld seam tracking, welding wire feed indication and alarm for change over, etc. to be provided. Bidder to list down all the interlocks provided in the machine.	Vendor to Specify	
10.4.4	Separate controls of Different Units	Tube Shot Blast Unit Control / Fin width correcting unit control / Welding Power Source Controls / Wire Feed Controls / Panel Movement Controls etc. to be provided.	Vendor to Confirm	
10.4.5	Movements control	Operation of Torches / Upper Rolls / Fin Pressing Rolls / In-Feed, Out-Feed and Return Conveyor Control / Emergency Stop etc.	Vendor to Confirm	
10.4.6	Displays	Controller shall be provided with Digital Ammeters & Voltmeters for display of preset & real time weld parameters, digital display of Welding speed, Gas flow etc. Bidder to enlist all displays on the control panel.	Vendor to Specify	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
10.4.7	Locking	Provision for setting & locking of welding parameters	Vendor to Confirm	
11.0	**DIAGNOSTIC SYSTEMS**			
11.1	**FAULT DIAGNOSTIC SYSTEM:**			
11.1.1	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	
11.1.2	Help guide should be provided to use both diagnostic systems		Vendor to confirm	
11.2	**TELE-DIAGNOSTIC SERVICE (OPTIONAL)**			
11.2.1	Tele-diagnostic service should be provided through International telephone lines along with required Hardware / Software package for the supplied PC based PLC system for remote diagnosis and correction of the problems in PC based PLC System of the machine. The tele-diagnostic service shall be provided free of charge for the guarantee period. BHEL will provide the necessary telephone line near the machine. GSM connection not acceptable.		Vendor to confirm	
11.2.2	The Vendor shall inform terms and conditions for the service after guarantee period. Subsequently, it should be possible to use other platforms, such as Internet or ISDN, subject to their availability in future.		Vendor to confirm	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
12.0	**MACHINE CONSTRUCTION AT WELDING ZONE**		
12.1	Machine frame shall be designed in such a manner to have easy access for the operators to view the weld bead in all 20 Torches and make adjustments online. Particularly to view the bottom torches welding, adequate wide space to be provided for the operator to go and stand and observe without much effort or inconvenience. The standing space to be suitably designed. Easy access to the operators to load 25kg wire spool coils in the wire feed coil holders particularly for the bottom torch wire feeders.	Bidder to give details of the arrangement with dimensions of machine frame in the welding zone.	
13.0	**TOOLINGS**		
13.1	Complete set of toolings to be offered for the following sizes to weld a 2.5m wide full panel – Bidder to offer and confirm. 1. Tube dia. 38.1mm x Pitch 50.8mm - 1 Set 2. Tube dia. 41.3mm x Pitch 54mm - 1 Set 3. Tube dia. 51mm x Pitch 63.5mm - 1 Set		
13.2	Tooling drawings for the complete sets of Toolings ordered shall be submitted with the documentation		

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
14.0	**HYDRAULICS**		
14.1	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	
14.2	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	
14.3	Each pump should have an independent motor. Tandem pumps shall be avoided.	Vendor to confirm	
14.4	Suitable filtration system should be provided with Duplex / standby filter units. It is preferable to use re-usable type of filter elements in the system. 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	
14.5	The flexible hoses used in the system shall be of Gates / Aeroquip / Parker or any other reputed make acceptable to BHEL.	Vendor to specify	
14.6	Failure indication for oil level, temperature, pressure, filter clogging should be provided	Vendor to confirm & furnish details	
14.7	Automatic shut off provision during hose failures, chiller failure, low oil level etc. Pump unloading feature during idle running to be provided for energy conservation. Details should be submitted.	Vendor to specify	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
14.8	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	
14.9	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	
14.10	**Maximum Operating Pressure of hydraulic system**	Vendor to specify	
14.11	**Main Pump flow in lpm and Motor Power in kW**	Vendor to specify	
14.12	Reservoir capacity (in litres)	Vendor to specify	
14.13	All oil pipelines shall be of seamless steel and should undergo pickling process.	Vendor to confirm	
14.14	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.		
14.15	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	
14.16	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	
14.17	All the pipe / hose end fittings shall be of standard weld nipple with O-ring seating type (DIN 3865 or equivalent). No ferrule joints are to be used in the hydraulic system. All threaded connections shall be of metric sizes.	Vendor to confirm	

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14.18	The oil to be used shall be of standard ISO Viscosity Grades – 32 / 46 / 68		Vendor to specify	
14.19	The maximum pressure of the system should preferably not to exceed 310 bar		Vendor to specify	
14.20	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	
14.21	The pipelines to be painted with standard colours as per the colour coding accepted internationally for hydraulic systems.		Vendor to furnish details	
14.22	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	
14.23	Suitable leakage oil collection metallic tray to be provided wherever required.		Vendor to confirm	
14.24	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	
14.25	Hydraulic oil will be supplied by BHEL during commissioning at BHEL works. Vendor to provide the oil during pre-dispatch inspection.		Vendor to confirm	
15.0	**COOLING SYSTEM**			
15.1	Chiller Unit for Cooling of Sub-Systems	Suitable Capacity Refrigerant / Radiator type Chilling Units are to be provided for the cooling of Power Transformers, Tube Clamping Rollers, Hydraulic Power Pack Oil etc. Bidder to give Complete Technical Details on these Chilling Units	Vendor to Specify	

S.No.	SPECIFICATION / DESCRIPTION			BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
15.2	Interlock System for Chilling Units – Coolant Flow	Suitable flow censors are to be provided to have an interlock with welding circuit, to avoid failure of flow of cooling medium	Vendor to Confirm	
16.0	**LUBRICATION :**			
16.1	Machine lubrication: Automatic centralized lubrication system with timer control and suitable metering cartridges to be supplied.		Vendor to confirm	
	All greasing points to be provided at convenient location for the operators to fill grease periodically.			
16.2	First filling of Lubrication Oil to be supplied by the supplier. Indian equivalent shall be mentioned.		Vendor to specify	
16.3	First filling of Grease should be supplied by vendor. Indian equivalent shall be mentioned.		Vendor to specify	
17.0	**PNEUMATIC SYSTEM:**			
17.1	The pneumatic operated elements of the machine shall work efficiently with BHEL compressed air supply at a pressure of 4.5 to 5 kg/cm2.		Vendor to confirm	
17.2	If higher air pressure is required for efficient operation of the machine, vendor shall furnish the information for Air Compressor / Air Booster of suitable capacity.		Bidder to Specify	
17.3	Bidder to specify the total air volume required for efficient operation of the complete machine.		Bidder to confirm	
17.4	Refrigerated Air Drier to be provided to eliminate moisture content from the compressed air at the designed flow and pressure rating.		Bidder to confirm	

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17.5	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	
17.6	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	
17.7	Pneumatic components shall be of FESTO / NORGREN make or equivalent reputed make acceptable to BHEL.	Vendor to Specify	
18.0	**ELECTRICAL & ELECTRONICS SYSTEMS**		
18.1	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	
18.2	Tropicalization**:** All electrical / electronic equipment shall be tropicalized.	Vendor to confirm	
18.3	Control circuit voltage shall not exceed 24V DC	Vendor to confirm	
18.4	All electrical components in the cabinets should be mounted on DIN Rail	Vendor to confirm	
18.5	All electrical and electronic panels including operator's panel should be provided with fluorescent lamps for sufficient illumination and power receptacles of 220Volts, 5/15 Amp AC. All adapters /receptacles should have compatibility with Indian equivalents.	Vendor to confirm	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
18.6	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	
18.7	Vendor should ensure the proper earthing for the machine and its peripherals.	Vendor to confirm	
18.8	Cables shall be routed through totally enclosed cable trays. There shall not be cable trenches.	Vendor to Confirm	
18.9	All electrical & electronic control cabinets & panels should be vermin and dust proof. All Electric enclosures shall have IP 54 protection	Vendor to confirm	
18.10	Motors and drives shall be of Fanuc / Siemens / Allen Bradley / ABB / Indramat / SEW or any other reputed makes acceptable to BHEL conforming to IS / IEC Standards (Vendor should indicate make and type in the offer)	Vendor to confirm	
18.11	All electrical items shall be of from SEW / ROCKWELL Allen Bradley/ Telemechanique / Delta or reputed makes acceptable to BHEL.	Vendor to Confirm	
18.12	All the motor control variable frequency drives should have input and out put chokes with brake resistor.	Vendor to confirm	
18.13	All indication lamps should be provided with LED Indication Lamp.		
18.14	All components/devices/terminals are to be incorporated with numbered ferrules.	Vendor to Confirm	
18.15	External wiring from / to control panel, control desk, external motors etc shall be by means of screened multi-core cables.	Vendor to Confirm	

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18.16	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	
18.17	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	
18.18	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	
19.0	**MACHINE LIGHTS**		
19.1	Machine Spot Lights and suitable fluorescent light or metal halide lamps to be provided for sufficient illumination in the welding zone and in the pit where bottom torches are mounted.	Vendor to Confirm	
19.2	All light fittings, consumables, adapters/receptacles should have compatibility with Indian equivalents	Vendor to Confirm	
20.0	**MACHINE FOUNDATION:**		
20.1	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	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
20.2	BHEL shall design and construct complete foundation for the machine as per the Vendor's recommendation	Vendor to Confirm	
20.3	Complete anchoring system including foundation bolts, anchoring materials, fixators, levelling shoes, chemical for anchoring etc should be supplied	Vendor to Specify	
21.0	**MACHINE SPARES:**		
21.1	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	
21.2	**Mechanical, Hydraulic, Pneumatic Spares:** All types of Pumps, Valves, Pressure Switches, Transducers, Flow Switches, Filters, Seals, O-rings, Hydraulic Hoses, hoses, bearings, sprockets, chains etc.	Vendor to Confirm	
21.3	**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	
21.4	Welding Consumable spares such as Contact tips, Gas nozzles, Tip adapters, Other torch spares for atleast 3 months continuous operation shall be provided.		
21.5	Spare Torches, Torch cables and Wire feed conduits, Wire feed rollers may also be offered..		

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
21.6	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	
21.7	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	
21.8	A set of Service Tools for dismantling and assembling of machine components such as roller sets etc. may be quoted.	Vendor to Confirm	
22.0	**DOCUMENTATION:**		
22.1	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	
22.2	Tooling drawings for the ordered tooling are to be submitted within 60 days from the date of placing order, for BHEL approval before manufacturing, in case of an order.	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION	BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
22.3	The following documents in English language should be supplied along with the machine: **Hard Copies - 3 Sets Vendor to confirm** **In CD form - 1 Set** 1. GA Drawing of the complete Panel Welding station. 2. GA Drawing of Individual Mechanisms 3. GA & Sub-Assembly Drawings for sub-systems for maintenance purpose. 4. Operating manuals of Machine & its PLC System 5. Programming manuals of Machine & its PLC System 6. Maintenance manuals with all drawings of machine assemblies / sub-assemblies with parts list 7. All Electrical circuit diagrams with bill of materials 8. Hydraulic circuit diagrams with bill of materials 9. Pneumatic circuit diagrams with bill of materials 10. Maintenance & Interface manuals for Machine Control System 11. Preventive Maintenance check list for Electrical and Mechanical System 12. Trouble shooting chart for Main and all sub systems 13. Complete PCB Schematics indicating check points for Electronic controls. 14. Catalogues, O&M manuals for all bought out items used in the machine. 15. Operating Manuals, Maintenance Manuals & Catalogues for all supplied Accessories. 16. Detailed specification of all rubber items / hydraulic / lubrication fittings 17. PLC program print-outs with comments in English 18. PLC program and data on CD, Flash Memory Card. 19. 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. 20. Complete list of Alarm log, Error code, error messages & remedies and on line fault diagnostics to be provided by the vendor. 21. Complete list of spares for machine, along with item part no /specification / type / model and make & address of the sub-vendor.	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
23.0	**MACHINE INSPECTION & ACCEPTANCE:**		
23.1	**PRE-DISPATCH INSPECTION AT SUPPLIER'S WORKS:**		
23.1.2	Complete Panel Welding station with all sub-systems and accessories shall be assembled and offered for inspection by BHEL Engineers at supplier's works	Vendor to Confirm	
23.1.3	All systems of the machine have to be operated and demonstrated to the BHEL Engineers in proper working condition.		
23.1.4	Two full panels of 12m length / 2.5m width to be welded and shown. The Tubes and fins will be supplied by BHEL. The welding consumables have to be arranged by the supplier. All the other consumables have to be arranged by supplier. Welding wire shall be either in 25kg spools or Jumbo packs.	Vendor to Confirm	
23.1.5	The Weld quality shall be tested as per Annexure-I and as per Clause 3.21 & 3.22.	Vendor to Confirm	
23.1.6	The welded panels are to be returned back to BHEL along with the machine consignment.	Vendor to Confirm	
23.2	**PROVE-OUT AND ACCEPTANCE AT BHEL WORKS:**		
23.2.1	After the machine erection and energizing at BHEL works, all systems of the machine have to be operated and demonstrated in proper working condition.	Vendor to Confirm	
23.2.2	25m long and 2.5m wide panels shall be welded and proved out with only Jumbo Coils (250kg or 300kg) with wire specification ER70S6 – 1.2mm Solid wire.	Vendor to Confirm	
23.2.3	All consumables, tubes and fins will be supplied by BHEL.	Vendor to Confirm	
23.2.4	The welding shall be smooth and without interruptions as specified under clause 3.11.	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
23.2.5	The machine shall be accepted after trouble free welding of panels for SIX consecutive shifts. Weld quality test shall be done as per Clause 3.21 & 3.22	Vendor to Confirm	
24.0	**TRAINING:**		
24.1	The supplier shall train TWO BHEL Engineers in Operation and Maintenance (Mechanical, Electrical/ Electronics and Programming) of the Machine for FIVE working days at supplier's works after the pre-dispatch inspection.	Vendor to Confirm	
24.2	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	
24.3	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	
24.5	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 TEN working days.	Vendor to Confirm	
24.6	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	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
24.7	Competent, English speaking experts shall be arranged by the vendor during training for satisfactory & effective training of BHEL personnel	Vendor to Confirm	
25.0	**ERECTION & COMMISSIONING**		
25.1	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. Commissioning Engineers who will be deputed to BHEL shall be English speaking or English interpreters have to be arranged by the supplier for the entire duration from start of erection till the machines are commissioned and handed over to BHEL with complete training.	Vendor to Confirm	
25.2	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	
25.3	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	
25.4	Commissioning spares, required for commissioning of the machine shall be supplied free of cost	Vendor to Confirm	
25.5	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	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
25.6	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	
26.0	**IN-BUILT SAFETY ARRANGEMENTS**		
26.1	Following safety features in addition to other standard safety features should be provided on the machine:		
26.2	Panel Welding Machine shall have Safety Guards / Sliding Doors for protection against the welding arc / splash / flashing for the Machine Operators. Safety Doors to have visible glasses for clear vision also. Bidder to submit details on this arrangement offered.	Vendor to specify	
26.3	A detailed list of all alarms / indications provided on machine should be submitted by the Vendor.	Vendor to Specify	
26.4	Suitable safety enclosure to be provided with glass windows for the fin width correction machine.	Vendor to Confirm	
26.5	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	
26.6	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	
26.7	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	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
26.8	All the rotating parts used on machine should be statically & dynamically balanced to avoid undue vibrations and suitably guarded.	Vendor to Confirm	
26.9	Emergency Switches should be provided at suitable locations as per International Norms.	Vendor to Confirm	
26.10	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	
27.0	**THERMAL STABILITY FOR AMBIENT CONDITIONS & ENVIRONMENTAL PERFORMANCE OF THE MACHINE:**		
27.1	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	
27.2	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	
27.3	The machine, including attachments and accessories, should be suitable for continuous operation on three shifts a day.	Vendor to Confirm	
27.4	If any safety / environmental protection enclosure is required it shall be built in the machine by the vendor.	Vendor to Confirm	
27.5	Paint of the machine should be oil / coolant resistant and should not peel off	Vendor to Confirm	
27.6	Maximum noise level shall be 85 dB(A) at normal load condition..	Vendor to Confirm	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
28.0	**PAINTING:**		
28.1	Painting of entire Machine / Electrical Panels: **RAL 6011 Apple Green** (Polyurethane Paint) **Heat resistant paint** on the inside of the machine in the welding zone.	Vendor to Confirm	
29.0	**MACHINE PACKING:**		
29.1	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	
30.0	**GUARANTEE:**		
30.1	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	
31.0	**GENERAL:**		
31.1	Machine Model No.	Vendor to Specify	
31.2	Total connected load (KVA):	Vendor to Specify	
31.3	Total air volume in cu.m/min	Vendor to Specify	
31.4	Floor area required (Length, Width, Height) for complete machine & accessories	Vendor to Specify	
31.5	Total weight of the machine (approx)	Vendor to Specify	
31.6	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	

S.No.	SPECIFICATION / DESCRIPTION		BIDDER'S OFFER WITH CONFIRMATION & COMPLETE TECHNICAL DETAILS
32.0	**OPTIONAL ACCESSORIES or SUPPORTING SYSTEMS**		
32.1	Weld Quality Scanner	A suitable hand held or machine mounted instrument with recording / live indicating facility to check the quality of weldment in the panel, after the welding operation. Bidder to provide details if such a system is optionally offered.	
32.2	Seam Tracking System	A mechanical or laser seam tracking system for the bead to be in position. Bidder to provide details if such a system is optionally offered.	
32.3	Camera for monitoring the weld bead particularly of the bottom torches	Camera arrangement for viewing the bead, to ensure operators are able to monitor the bead with ease and produce welds free from defects. Bidder to provide details if such a system is optionally offered.	
32.4	Sensor to detect distance	Sensor for automatic detection of contact tip to work distance. Bidder to provide details if such a system is optionally offered.	

ENCLOSURE : ANNEXURE – 1 : Visual inspection of Weld quality

VISUAL INSPECTION OF TUBULAR PANELS

The tubular products shall be visually inspected at appropriate stages and accepted based on the Acceptance standards detailed in below:

ACCEPTANCE CRITERIA

Characteristics	Acceptance norms
a) Cracks, Voids & Skips b) Burnthrough c) Lack of Fusion d) Lack of penetration e) Oxide/metallic inclusions f) Overlaps g) Underflushing h) Root porosity i) Wrinkles & Deformities j) Poor restart	Not permitted
1. Surface mismatch	Not to exceed 1/4 t where " t " is the tube thickness
2. Undercut (on pressure retaining materials)	Not to exceed 0.4mm
3. Porosity (for fillet welds)	Pores up to & including 1.6 mm diameter, provided it does not occur at a start or stop. 4 or more pores (cluster or inline) are not permitted if they are separated by less then 1.6mm or less than the major dimension of the largest indication in that group. For other pores, acceptance shall be as per TABLE 1.
4. Reinforcement	Not to exceed 3 mm
5. Tool marks	Not permitted. To be ground to have a smooth transition
6. Concavity of the fillet weld	Permissible, provided it does not encroach on the required weld thickness
7. Arc strikes	Not permitted. Stray arc areas shall be examined with LPI or MPI after grinding followed by thickness measurement
8. Spatter	To be removed. Isolated spatter may be permitted
9. Bore passage	Freedom from foreign materials

TABLE 1 - Porosity acceptance level

TYPE	SIZE in mm	No. of pores permitted in 150 mm length
SMALL	0.8	10
MEDIUM	1.2	5
LARGE	1.6	3
ASSORTED	-	LARGE – 1No.) MEDIUM – 2 Nos.) TOTAL – 7 Nos. SMALL – 4 Nos.)