An ISO 9001 Company

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

| **ENQUIRY – Corrigendum 2** | Phone: +91 431 257 79 38<br>Fax : +91 431 252 07 19<br>Email : tvenkat@bheltry.co.in<br>Web : www.bhel.com |
|---|---|

| **NIT No. 4891** | **Enquiry Number:** | **Enquiry Date:** | **Due date for submission of quotation (Revised):** |
|---|---|---|---|
| | **2620800051** | **04.07.2008** | **17.10.2008** |
| You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order | | | |

**Item Description: Laser Hybrid Welding System**

**Details of Corrigendum**

**The final technical specification arrived based on the Pre-Bid meeting held on 4th August 2008 for Laser Hybrid Welding System has been posted in** www.bhel.com or http://tenders.gov.in **web sites which may please be used for submission of offer.**

***Also, The due date for submission of quotation has been extended to 17.10.2008***

**All other terms and conditions as published in the NIT 4891 remain unaltered.**

**Confirmation of acceptance for BHEL commercial terms & conditions and Price Bid formats have been posted in BHEL Corporate web site www.bhel.com or from the Government tender website http://tenders.gov.in (public sector units > Bharat Heavy Electricals Limited page) under Enquiry reference "2620800051".**

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

**PART A**

## QUALIFYING CRITERIA FOR THE SUPPLY OF
# LASER HYBRID WELDING SYSTEM

**SECTION – I**

The BIDDER / VENDOR has to compulsorily meet the following requirements to get Qualified for submitting an offer for **Laser Hybrid welding system**

| | | |
|---|---|---|
| **S. No.** | **REQUIREMENTS** | **Vendor's RESPONSE** |
| 1 | The BIDDER shall have a minimum of THREE Years of Continuous Experience in the field of Design, manufacture and supply of **Laser Hybrid Welding system.** | |
| 2 | Only those vendors, who have supplied, and commissioned at least one such **Laser hybrid welding system for industrial application** in the past five years (on the date of opening of Tender) and such system is presently working satisfactorily for more than one year after commissioning (on the date of opening of Tender), should quote. ***The offer should be sent directly by the Laser Hybrid Welding System manufacturer / integrator and not by any of their agents.*** | |
| 3.0 | The vendor should submit the following information where laser hybrid welding system have been supplied, for qualification of their offer. | |
| 3.1 | Name and postal address of the customers where the system is installed. | |
| 3.2 | Name of the contact person of the customers with Phone, fax and email ID | |
| 3.3 | Month and Year of commissioning | |
| 3.4 | Industrial application for which the systems are supplied. | |
| 3.5 | Performance certificate from the customers regarding satisfactory performance of system supplied to them. The certificate should be current and on the letterhead of the Customer. It should contain information regarding model, capacity, year of commissioning and performance of the system. | |
| 4.0 | 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. | |

## SECTION – I 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 |
|---|---|---|
| 5 | Profile of the Company bringing-out the years of Experience of the BIDDER in the field of design, manufacture, integration and supply of **Laser hybrid welding system.** | |
| 6 | Details on the Firm's Registration and the FINANCIAL STRENGTH of the COMPANY (Balance Sheet for the last **3** years) shall be submitted with the TECHNICAL OFFER | |
| 7 | Details on International Standards / Design Process Codes followed in Design and Manufacture of the Equipment. | |
| 8 | Details on *Service-After-Sales* Set-Up in India including the Addresses of Agents / Service Centers in India along with their Competency & Experience details are to be provided | |
| 9 | Any Additional Data to supplement the manufacturing capability of the BIDDER for the subject equipment | |

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SECTION – III

**The BIDDER has to comply with the following, for accepting the Technical Offer for Scrutiny by the Purchaser:**

| S. No. | REQUIREMENTS | VENDOR's RESPONSE |
|---|---|---|
| 10 | The BIDDER / VENDOR shall submit the offer in TWO PARTS-Technical [with PART A & PART B] & Commercial and Price Bid. | |
| 11 | The Technical Offer shall be supported by Product Catalogues and description. | |
| 12 | The Offer shall contain a comparative statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. A mere 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement [without any supporting technical write-ups, photos and datasheets] may lead to disqualification of the Technical Offer. | |
| 13 | The BIDDER / VENDOR shall assure a continuous support for the supply of SPARES and SERVICE for TEN Years, from the date of commissioning of equipment at BHEL Works. | |
| 14 | 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, tooling, attachments, auxiliary parts, spares, consumables, etc. with the main and basic equipment, to meet the technical specification requirements. | |
| 15 | Soft copy if any, giving the salient features of the proposed machine with all sub-systems and auxiliaries, and /or showing live-demo of an existing and working machine of similar configuration and capacity may be provided. | |
| 16 | BIDDER has to indicate the Country of Origin for the supply of equipment. | |
| 17 | The reference List of Customers shall be accompanied with (Phone Number and E-Mail ID) of the CONTACT PERSON for cross reference by BHEL | |
| 18 | In case of preliminary qualification of the offer, on technical grounds, the BIDDER may be called for a detailed technical discussion on the original technical offer at BHEL Works, with a sufficient notice period. | |

**PART – B**
**TECHNICAL SPECIFICATION FOR LASER – MIG HYBRID WELDING SYSTEM**

| Sl. No | Particulars and BHEL specification | **Bidder's offer (With Complete Technical Details)** |
|---|---|---|
| 1.0 | **Purpose** | |
| | To carryout capacitor box welding by Laser –MIG Hybrid welding system using a Robot as per the following details:<br><br>Product : CAPACITOR BOX at BHEL, Bhopal<br>Material & thickness : SS409Ti, 1.5 to 2.0mm<br>Input parts : Bent Sheet for rectangular box and sheet for bottom side enclosure<br>Approx. dimensions : LxBxH : As per annexure A<br>Production Volume : 1000 nos per month on single shift basis<br>Final product : One side opened rectangular box<br>Acceptance criteria : Water Leak proof weld joints | |
| 2.0 | **Scope of supply** | |
| | All the systems should be supplied for the following working environment:<br>Power availability: Three phase input supply with ground - 415V ±10%, 49-51Hz<br>Working temperature: max: 40deg C and min: 10 deg C<br>Following are the major scope of supply:<br>**1. High accuracy Industrial Robot for laser applications**<br>**2. Robot controller**<br>**3. Laser hybrid welding head**<br>**4. Two axis positioner with controls**<br>**5. Laser source**<br>**6. Chiller unit**<br>**7. MIG welding equipment**<br>**8. Seam tracking system with vision based laser range profile sensor - Optional**<br>**9. Media supply for laser hybrid package**<br>**10 Isolation transformer & voltage stabiliser**<br>**11. Clamping unit for job holding**<br>**12. Laser cabin**<br>**13. Operating Panel for operation and control**<br>**14. Industrial fume extraction system**<br>**15. Laser Safety Goggles**<br>**16. Manuals**<br>**17. Spare parts- Optional** | |

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| 3.0 | **High accuracy Industrial Robot for laser applications:**<br>No of axis : Six<br>Pay load, Supplementary load and Reach : As applicable for the purpose<br>The working envelop should be suitable to accommodate capacitor box length of 1200mm<br>Repeatability: ± 0.15mm | |
| 4.0 | **Robot controller**<br>Control cabinet- Modular type;<br>Processor unit with PC connectivity, Ethernet interface, with battery back-up; programming using windows OS<br>Position sensor<br>Hand held teach and control pendant with necessary interface for laser and MIG system, with connecting line, remote diagnostic<br>Anti collision system for robot & Interlocks for safety | |
| 5.0 | **Laser hybrid welding head**<br>Necessary Optics, Viewing system for locating the weld joint with cross hair | |
| 6.0 | **Two axis positioner with controls**<br>Capacity: Suitable to carry clamping fixtures and the job while welding<br>One rotational and one tilting axis<br>Speed of rotary axis, Speed of tilt axis, Rotational radius and Tilting axis to specified by the bidder<br>Provision for welding current transmission<br>Should be as synchronous addition to the robot | |
| 7.0 | **Laser source**<br>Capacity: min. 2000watts; CW Nd:YAG Solid state laser source;<br>Fiber optic cable of suitable length with 600micron diameter.<br>Pilot laser and optical arrangement for beam delivery.<br>DI water will be supplied by BHEL | |
| 8.0 | **Chiller unit**<br>Close loop Water- water chiller suitable for laser system as per pt.7.0 | |
| 9.0 | **MIG welding equipment**<br>With interface for process control<br>Necessary communication interface with teach pendant<br>Inverter power source of 400A at 100% duty cycle<br>Suitable 4 wheel driven wire feeder to feed 0.8, 1.0 and 1.2mm stainless steel wires from wire spools. | |
| 10.0 | **OPTIONAL:**<br>**Seam tracking system with vision based laser range profile sensor**<br>Detection of seam position with a resolution better than 0.05mm<br>Measurement of absolute distance between work piece and sensor head<br>Suitable interface with robot | |

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| 11.0 | **Media supply for laser hybrid package**<br>Electrical interfaces<br>Pneumatic interface - Pressure switch and display<br>Other interfaces like cross jet, gas flow indicator etc. | |
| 12.0 | **Clamping unit(s) / holding fixture(s) for job holding**<br>To hold the rectangular profile box during the longitudinal welding and to hold in place the bottom enclosure sheet during assembly and welding, with necessary clamping frame, adjustable retaining mechanism to suit different dimensions of capacitor box as per annexure A.<br>Any suitable alternative solutions by the bidder will also be acceptable | |
| 13.0 | **Laser cabin**<br>Suitable Steel cabin to accommodate the system with adequate working area, with one slidable loading door and one maintenance door.<br>Enclosure consisting of lighting, video control and exhaust system.<br>Suitable laser safety provisions to isolate the work centre from the surrounding work area; Safety interlocks | |
| 14.0 | **Operating panel for operation and control**<br><br>Windows based OS for operation and control with provision for upgrading to higher versions | |
| 15.0 | **Industrial fume extraction system**<br>Suitable industrial fume extraction system for laser welding with a minimum of 98% dust collection efficiency | |
| 16.0 | **Laser Safety Goggles – as spares**<br>Minimum 6 nos of safety goggles for Nd:YAG wave length of 1.06micrometer | |
| 17.0 | **Isolation transformer & voltage stabilizer**<br>Suitable isolation transformer & voltage stabilizer to be supplied for the laser source and robot | |

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| 18.0 | **Manuals**<br>Three sets of following documents (3 Hard copies & soft) in English language<br>**Machine Operation manuals:**<br>• Operating manuals of Machine & Robot with machine specifications, detailed operating instructions for machine operation, setting of machine parameters, precautions, and machine safety details. Programming Manuals of Power source, Laser & Robot system.<br>**Maintenance and trouble shooting manuals:**<br>• Detailed Maintenance manual of machine with all drawings of assemblies/sub-assemblies/parts and part list, Electrical circuit diagrams. Maintenance, Interface & commissioning manuals for system & drives<br>• Manufacturing drawings for all supplied holders, adapters, fixtures etc if any.<br>• Catalogues, O&M Manuals of all bought out items including drawings, wherever applicable.<br>• Detailed specification of all wear items and fittings with part nos.<br>• The vendor shall submit complete Master List of parts used in the machine.<br>• One additional set of all the above documentation on CD<br>• On line fault diagnostic system | |
| 19.0 | **Inspection and training**<br>Pre- dispatch inspection at suppliers works: For this, BHEL will supply 20 nos. of one type of bent and tack welded capacitor boxes, free of cost, for process parameter establishment trials at suppliers end. BHEL will supply required consumable wire.<br>Operation and maintenance training to be also provided at suppliers work for one week. | |
| 20.0 | **Installation and commissioning**<br>The total system is to be commissioned at BHEL, Bhopal and actual welding to be proved on the product.<br>Operation and maintenance training to be also provided at BHEL, Bhopal for one week. | |
| 21.0 | **Civil foundation**<br>Civil and foundation will be done by BHEL and foundation details for Robot, fixtures, positioner and working cabin to be provided by the supplier. | |
| 22.0 | **Optional : Spares to be quoted for 2 years trouble free operation – Unit price to be quoted** | |
| 23.0 | **Warranty :** 2 years from the date of commissioning<br>Commissioning spares to be included in the offer | |

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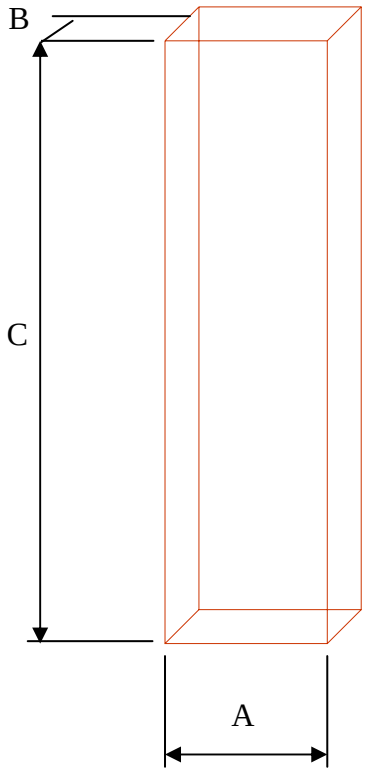
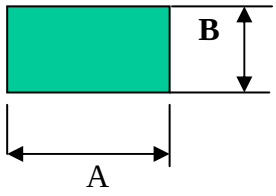
| 24.0 | **General Points**<br>• Make and Model of the machine to be mentioned. Detailed catalogs of the machine to be sent with the offer<br>• Complete description of all systems & sub-systems shall form part of the technical bid<br>• A schematic diagram showing the layout of the machine & associated systems with salient dimensions shall be submitted along with the offer<br>• The operating sequence of the machine with broad outline of various operations involved should be furnished with the offer<br>• Standards for Design, Manufacture and testing of the machine shall be in accordance with internationally accepted standards<br>• Total weight of the Machine & Sub-Systems, Weight of the heaviest part of the machine to be mentioned<br>• Total connected load KVA to be mentioned<br>• Floor area required (Length x width x height) for complete machine and accessories to be given | |

## *Possible Dimensions of capacitor box*

| SL NO | SIZE OF THE BOX t x C x A x B |
|---|---|
| 01 | 1.5 x 433 x 343 x 131 |
| 02 | 1.5 x 483 x 343 x 170 |
| 03 | 1.5 x 523 x 343 x 140 |
| 04 | 1.5 x 583 x 343 x 170 |
| 05 | 1.5 x 673 x 343 x 131 |
| 06 | 1.5 x 853 x 343 x 140 |
| 07 | 1.5 x 853 x 343 x 170 |
| 08 | 1.5 x 953 x 343 x 170 |
| 09 | 1.5 x 1003 x 343 x 170 |
| 10 | 1.6 x 853 x 343 x 140 |




Bent sheet for longitudinal welding




Bottom sheet to be welded to the box

***t= Thickness***

**Steps of bending the sheet in preparation for longitudinal welding**

Sheet