An ISO 9001 Company

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

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

TWO PART BID Tender to be submitted in two Parts	**Enquiry Number:** **2620900196**	**Enquiry Date:** **18.09.2009**	**Due date for submission of quotation:** **29.10.2009**

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	**Ultrasonic Imaging System** 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 3 months from the date of purchase order.**
2. **Grace period of 2 weeks 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.**

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 "2620900196".

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 Senior Manager / Capital Equipment / MM

PART A

Qualifying Criteria for Supply of 'Ultrasonic imaging system with TOFD facility'

S. No.	PARTICULARS	VENDOR's RESPONSE
1.0	Number of Years of Experience of the BIDDER/ VENDOR in the field of design, manufacture and supply of 'Ultrasonic Imaging system with TOFD facility'	
2.0	YEAR of LAUNCH of the Model quoted against this ENQUIRY	
3.0	Is there any other model launched after the quoted Model? Otherwise, indicate the likely year in which the next model is likely to be launched	
4.0	Number of 'Ultrasonic Imaging systems with TOFD facility' supplied, installed and commissioned till date, in the QUOTED MODEL	
5.0	Number of 'Ultrasonic Imaging systems with TOFD facility' supplied, installed and commissioned till date for the following category of CUSTOMERS (within INDIA): a) Government Organisations b) Private Sector Companies [Large Scale Industries]	
6.0	Number of 'Ultrasonic Imaging systems with TOFD facility' supplied, installed & commissioned till date in the following Category (around the GLOBE) : a) Universities b) R&D Labs c) Reputed Heavy Engineering Works/Manufacturing firms	
7.0	Details of Design Set-Up and Technology Back-Up assured for the PRINCIPAL Equipment Maker	
8.0	Details on International Standards followed in Design of the System	
9.0	Comprehensive Details on Performance Testing - of the Equipment quoted, to be ensured, prior to dispatch from Supplier's Works	
10.0	Details of Quality System followed (Kindly furnish the salient aspects of the QA system followed)	
11.0	Details on SERVICE-after-SALES Set-Up in India including the addresses of Agents/Service Centres in India and Asia	
12.0	Any Additional Data to supplement the manufacturing capability of the BIDDER	

SECTION – II

The BIDDER / VENDOR has to compulsorily meet the following requirements to get qualified for submitting an offer for the Ultrasonic Imaging System with TOFD facility.

S. No.	REQUIREMENTS	VENDOR's COMMENTS
13.0	The BIDDER / VENDOR shall have a minimum of TWO Years of Continuous Experience in the Design, Manufacture of **'**Ultrasonic Imaging system with TOFD facility'. Indicate the actual experience.	
14.0	The BIDDER / VENDOR shall have supplied at least one number of **'**Ultrasonic Imaging system with TOFD facility within the last five years. Indicate the number of equipment (of QUOTED MODEL) sold .	
15.0	Reference List of Customers and Performance Certificate from CUSTOMERS (minimum ONE Customer) with full contact details of CONTACT PERSON.	

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
16.0	The BIDDER / VENDOR shall submit the offer in TWO PARTS - Technical **[with PART A & PART B]** & Commercial and Price Bid.	
17.0	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 just 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
18.0	The BIDDER / VENDOR shall assure a continuous support for SPARES and SERVICE for FIVE Years, from the date of commissioning of the equipment at BHEL Works.	
19.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
20.0	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 Scope of Supply.	
21.0	The reference List of Customers shall be accompanied with the details (Phone Number / E-Mail ID) of the CONTACT PERSON for cross reference by BHEL	

TECHNICAL SPECIFICATION FOR ULTRASONIC IMAGING SYSTEM WITH TOFD FACILITY

<table>
<tr><th>Sl.No.</th><th>Particulars</th><th colspan="3"></th><th>Bidder's offer</th></tr>
<tr><td>1.0</td><td>Description of the Ultrasonic Imaging System</td><td colspan="3">Automated Portable Multichannel Ultrasonic Imaging/data acquisition System capable of carrying out Time of Flight Diffraction Technique (TOFD) combined with Pulse Echo/Creeping wave Technique for evaluation of Longitudinal / Circumferential weldments in Pressure vessels, Heat Exchangers, and Pipes.</td><td></td></tr>
<tr><td>1.1</td><td>Materials of construction</td><td colspan="3">Ferrous and Non Ferrous Materials</td><td></td></tr>
<tr><td rowspan="5">1.2</td><td rowspan="5">Area of application</td><td colspan="3">Ultrasonic Examination for detection of planar / volumetric defects of the following:</td><td rowspan="5"></td></tr>
<tr><td>Seam</td><td>Outer Diameter range (OD)</td><td>Wall thickness</td></tr>
<tr><td>Cir seams in Pressure vessels/Heat Exchangers</td><td>900mm to 3500mm</td><td>50mm-200mm</td></tr>
<tr><td>Long Seams in Pressure vessels</td><td>900mm to 1800mm</td><td>50mm-200mm</td></tr>
<tr><td>Pipe Circ seam welds</td><td>400mm to 900mm</td><td>30mm-70mm</td></tr>
<tr><td>1.3</td><td>Principle of operation</td><td colspan="3">Time of Flight Diffraction Technique (TOFD) combined with Pulse Echo/Creeping wave Technique</td><td></td></tr>
<tr><td>1.4</td><td>System capability</td><td colspan="3">The system shall conform to the following International Standards
ASME Section I , Section III,Section VIII Division 1&2, ASME Section V, Article 4 and ASME Code Case 2235 Rev 9 – Use of Ultrasonic Examination in Lieu of Radiography
▪ Non-Destructive Examination of Welded Joints – Ultrasonic Examination of Welded Joints. – British and European Standard BS EN 1714:1998</td><td></td></tr>
<tr><td colspan="6">2.0 Specification of Multi Channel UT System</td></tr>
<tr><td>2.1</td><td>Basic Hardware Specification</td><td colspan="3">The Portable multi channel Ultrasonic system suitable for the conditions expected in an Industrial Environment.</td><td></td></tr>
<tr><td>2.2</td><td>Number of Channels</td><td colspan="3">The Portable system shall have a minimum 8 UT channels (Systems with more than 8 channels shall be specifically mentioned in the offer)</td><td></td></tr>
<tr><td>2.3</td><td>Pulsing / Receiving Type</td><td colspan="3">All channels to fire, receive, digitize, and record signals parallelly / Sequentially .Sequential cycles of firing, receiving, digitizing, and recording signals by each channel are to be separated in time in a sequence loop.</td><td></td></tr>
<tr><td>2.4</td><td>Pulse type</td><td colspan="3">Preferably Square Wave Pulse – Supplier to specify.</td><td></td></tr>
<tr><td>2.5</td><td>Pulse rise</td><td colspan="3">Supplier to specify.</td><td></td></tr>
<tr><td>2.6</td><td>Pulse Voltage</td><td colspan="3">Supplier to specify.</td><td></td></tr>
<tr><td>2.7</td><td>Pulse width</td><td colspan="3">Supplier to specify</td><td></td></tr>
<tr><td>2.8</td><td>Modes</td><td colspan="3">Single / Dual</td><td></td></tr>
</table>

2.9	PRF	15-10000 Hz - Supplier to specify	
2.10	Gain	Preferably 0 to100dB controllable in ≤0.2 dB resolution - Supplier to specify	
2.11	Frequency Band Width	Preferably in the ranges between 0.5-40MHz or less (Supplier to specify)	
2.12	Range	0.5-3000 μs in steel - Supplier to specify the ranges for non-ferrous materials	
2.13	Signal Filtering	Supplier to specify.	
2.14	Display Modes	A-Scan: RF, Full Wave, Rectified Wave (Both positive and negative) Color Selectable (Supplier to specify) TOFD Display: Adjustable for brightness and contrast gray scale color palette	
2.15	Reject	Full linear control to 0-100% Full Screen Height- Supplier to specify.	
2.16	DAC / TCG	The system's individual channels shall be capable of electronically plotting DAC/TCG in Pulse Echo mode	
2.17	DAC	Supplier to specify the following details. Dynamic Slope range: Minimum no of Points: No of curves: Code type:	
2.18	DGS(Optional)	Supplier to specify clearly that the system's capability for use with DGS option along with Standard Library for probes – (Either in automated use or manual without automation)	
2.19	Gates	Atleast 2 Independent Gates - Supplier to specify	
2.20	Gate Start and Width	Controllable over whole range - Supplier to specify	
2.21	Gate Threshold	5-95 % of A-Scan height controllable in 1 % resolution - Supplier to specify	
2.22	Freeze (A-Scans and Spectrum Graphs)	Freeze All – A-Scans and Spectrum Graphs / Freeze Peak – A-Scans / All measurements functions, manipulating Gates, and ±6dB Gain varying option for frozen signals. Otherwise provision to extract A-scans from the collected Data. - Supplier to specify.	
2.23	Digitizer	Supplier to Specify the following- ❑ Signal Sampling Rate – Minimum 100 MHz or More ❑ Data Resolution – At least 8-bit ❑ Signal Averaging –Supplier to specify	
2.24	Imaging Modes	Cross Sectional B-scan, D-Scan (Gray Scale/Rainbow – Supplier to Specify)	
2.25	Encoder Interface	Built-in interface for incremental mechanical encoder - Supplier to specify	
2.26	Encoding	Two axis encoder. True-to-location (incremental encoder – 0.5 mm resolution) – for multi channel operation - Supplier to specify	
2.27	Outputs	LAN / USB / PS 2/ SVGA - Supplier to specify	
2.28	Compatibility with the external devices	Supplier to specify	

2.29	Operating System	Supplier to specify	
2.30	Battery Life	Supplier to specify	
2.31	Power	Mains - 240 VAC, 50 Hz.	
2.32	Housing	Supplier to specify	
2.33	Dimensions	Supplier to specify	
2.34	Weight of the system	Preferably less than10kg – Supplier to specify	
3.0 Specification of the Motorized scanner			
3.0	Motorized Scanner	→ The Motorized Scanner for inspection of welds in pressure vessels, and pipes (For the Application mentioned in Clause 1.2 &meeting the requirement of Clause 1.4). → Supplier to specify the scanner capability of inspection of both Ferrous and Non- Ferrous materials. → Supplier to specify additional requirements if any for use of the scanner on non-magnetic materials. → Synchronization methodology with data acquisition system for automated scanning of the welds. → Complete technical specification catalogue must be quoted along with the offer. The scanner should also have • Two stoppers on the arm of the X-axis that define the endpoints of a scan range - Supplier to specify • Provision to Adjust transducer distance - Supplier to specify • The scanners type should be automatically detected by the UT system - Supplier to specify. • Scanner interface ports - Supplier to specify Input type, Motor drive unit interface, Encoder interface, Temperature inputs, Potentiometer interface, Video input. • Real Time coupling monitoring feature. Also supplier to specify- ➢ Scanner Dimensions ➢ Scan range ➢ Scan resolution ➢ Arm Length to accommodate to maximum thickness range (TOFD/PE)as per specification. ➢ Pre-amp band width ➢ Pre-amp gain ➢ Scan speed ➢ Scanner controller	

4.0	Image Analysis Software	Supplier to specify the details of the software used for analysis.	
5.0	Data Reporting	Calibration details, A-Scans, cross-sectional B-Scans, TOFD maps, Should be transferable to any External Computer and Printer so that Direct printouts can be taken.	
6.0	Data Storage Capacity	Supplier to specify	
7.0	PC/Laptop for Data acquisition and Analysis	On board / External. CPU-Processor speed minimum 1.4GHz.RAM- Minimum 512 MB(upgradable).Hard Disc-Minimum 80GB(upgradable).Display monitor-14'' colour daylight readable, TFT / LCD monitor - Supplier to specify.	
8.0	Probes, Wedges	TOFD (longitudinal) probes - 3 pairs (Frequency range 1MHz-to 15 MHz) Shear wave probes of transverse cracks – 2 Nos (Frequency range 1MHz-to 5MHz) Shear wave probes for longitudinal root defects – 2 Nos(Frequency range 1MHz-to 5MHz) Shear wave probes for longitudinal crown defects –2 Nos(Frequency range 1MHz-to 5MHz) Longitudinal wave probes – testing of HAZ – 2Nos (Frequency range 1MHz-to 5MHz) Creeping wave probes- 2Nos ((Frequency range 1MHz-to 5MHz) Supplier should specify the crystal diameter, probe centre frequency, along with technical data sheet as per ASTM E-1065 with Band width of operation Supplier should also quote TOFD/Pulse Echo wedges suitable to use with the probes for TOFD and Pulse Echo Supplier should study the area of application as per clause 1.2 of the tender scope and quote the requirement accordingly	
9.0	Cables	Supplier to specify the details of Power cables, Transducer connector cables, Computer connector cables, Scanner cables etc.	
10.0	Scope of Supply	• Portable Multi-Channel Ultrasonic Imaging system comprising Time of Flight Diffraction Technique (TOFD) and Pulse Echo Ultrasonic Weld Inspection techniques as per this specification –1No. • Motorized Scanner with data synchronization as per the specification for long seam and cir seam, for Inspection of Magnetic and Non magnetic materials. • Data acquisition, analysis software – Offline and On-line.	
11.0	Inspection	If warranted, the overall system and accessories shall be offered for Inspection to BHEL Engineers at vendor's works. The performance of the system can be demonstrated using reference blocks.	
12.0	Performance Prove-Out at BHEL	On supply of the equipment it is essential to Demonstrate the satisfactory performance of the system to meet the applications as per clause 1.2 and the Code Requirement as per clause 1.4	

13.0	Installation and commissioning	The Ultrasonic Imaging system and accessories is to be installed & commissioned at BHEL Works, FREE OF COST, by the SUPPLIER.	
14.0	Documentation in ENGLISH Language	3 Copies (In English) of the Operation & Maintenance Manuals shall be supplied along with the system.	
15.0	Performance Guarantee	The Ultrasonic Imaging system and accessories are to be guaranteed for its performance for a period of one year from the date of commissioning.	
16.0	Service and Spares Support Requirements	Vendor shall ensure after the guarantee period, through trained service personnel in India for next 5 years as and when need arises. Spares to be made available with shortest possible time.	
17.0	Training on Operation & Maintenance	Complete Training at Free of cost for minimum one week at BHEL, is to be given on Operation & Maintenance of the system. Training has to be provided at BHEL, after the successful commissioning of the Equipment & Accessories.	
18.0	Annual Maintenance Contract – AMC	The BIDDER has to QUOTE for AMC with detailed scope of work.	
19.0	Spares for Main Equipment & Accessories	BIDDER has to list down the critical SPARES under Mechanical, Electrical & Electronic Category for the Main Equipment & Accessories for Equipment Operation.	