Ahmedabad University

Procurement of Ultrasonic Flaw Detector

Vendor Technical Pre-Qualification

Sr No.	Criteria
1	Bidder must have a minimum of more than 10 years of experience in the supply of related products within the respective industry. .
2	Should have installed at least 50 machines at different educational / private / public institutions and organizations.
3	Authorized dealer/distributor certification from original equipment manufacturers.
4	Bidder/authorized dealers' OEM must be capable of providing supply, servicing, spare parts, technical assistance, and training, along with periodic technical updates, for a minimum of 5 years after the machine's supply.
5	The warranty period should be clearly mentioned. The comprehensive warranty will commence from the date of the satisfactory installation/commissioning of the equipment against the defect of any manufacturing, workmanship and poor quality of the components. Annual maintenance charge (AMC) post-warranty period should be specified.

Technical Specifications

AURIS Requisition Number: 2627

Machine Type: Ultrasonic Flaw Detector

Quantity: One (01)

Technical Criteria: The technical evaluation of all the proposals will be done in the following parameters:

1. **Phased Array Configuration:** 16:64PR (Pulser-Receiver) or better. Should support linear, dual-linear and matrix array probes
2. **Techniques:** UT, Phased Array, TOFD & TFM/FMC
3. **Inspection Modes:** Phased Array, Pulse echo, Dual, Pitch-Catch
4. **Housing:** Overall dimensions & Weight: Portable with one battery and weighing less than 6 kg

Data Storage

5. **Storage devices:** The instrument shall have an Internal memory of at least 64 GB SSD or more, option to expand using an external USB drive.
6. **Data file size:** Up to 12GB or more
7. **1/0 Ports:** Phased Array Ultrasonic flaw detector that can potentially be applied to

any standard engineering material to provide full volume inspection producing accurate and detailed cross-sectional images of internal structures, including,

a. Metals
b. Fiber Reinforced Plastic (FRP) Composites - monolithic and hybrid
c. Fiber Metal Laminates (FML) Composites
d. Ceramic/FRP Composites
e. Cylindrical FRPs/FMLs using immersion type transducers
f. Should have the capability to measure Young's Modulus and poison's ratio.

The instrument shall provide a means of transmitting, receiving, storing, displaying, and analyzing ultrasonic signals with an inbuilt focal law generator and algorithms to deploy various flaw detection techniques that include conventional ultrasound, Phased Array Ultrasonic Testing (PAUT), Time-of-Flight Diffraction (ToFD) and Full Matrix Capture (FMC) / Total Focusing Method (TFM).

8. **Compliance:** Equipment manufacturers should comply with ISO 9001:2015, ISO/ IEC17025:2017, ISO 14001:2015 International Quality System, Laboratory Certification and Environmental Management System Certification and produce relevant written certificates. Equipment shall be compliant with the requirements of ISO 185631:2015 & EN12668-1:2010.

9. **Main Technical Features:** Phased array:
Capable of generating a minimum of 2 or more inspection groups simultaneously.
Onboard Dual Matrix Array probe setup creation without any third-party software. It should be Compatible with Linear and Matrix array probes.
Onboard ray tracing tools for scan plan evaluation and 3D scan plan view.

10. **USB**
    a. At least 2 USB 2.0 and one 3.0 ports for data transfer and wireless connectivity.
    b. Code compliant: Distance Amplitude Curve (DAC), Time Corrected Gain (TCG), Distance Gain Size (DGS) software and (American Welding Society) AWS features.
    c. Onboard code compliant calibration tools.
    d. The instrument should have Data, reference and measurement cursors for defect sizing. Capable to read and record up to 800% A scan amplitude.
    e. Law file import
    f. CAD **(.DXF)** import for custom geometry
    g. Independent Coupling check channels to monitor the data loss and coupling across the scanning length

11. **Full Matrix Capture (FMC) / Total focusing method (TFM):**
    a. Capable of generating up to 2 groups simultaneously.
    b. Capable of performing multiplexing to enable use of extended apertures for full matrix captures (e.g., 64 TFM for 32:128 equipment).

c. Various pulse echo and tandem modes/wave sets including but not limited to LL, TT, TT-TT, TT-T, TL-T, TT-L, LL-L, TT-TT-T, LTL, TL-L
d. High Pixel resolution for individual groups, up to 1024 X 1024 pixels.
e. Able to control the sparsity of firing by factors of at least 1 to 8.
f. Should have additional digital filters to enhance the signals.
g. Onboard Beam simulation tool that displays the ultrasonic response and energy distribution for the selected TFM wave set. (Ex: A.I.M)
h. Beam pressure simulation to evaluate the coverage and sensitivity achieved by various TFM modes interacting with various defect models.
i. Amplitude fidelity reading output for easy code compliance.
j. Live envelop features for processed TFM images.
k. Should be able to perform TCG calibration in TFM.
l. Ability to perform circumferential outside diameter (COD) TFM/FMC.
m. Remote control tools should have features to share equipment screen and remotely operate the equipment wirelessly.
n. 32 element extended aperture for TFM

12. **Additional Features**
    a. Multiple predefined display layouts consisting of various data views including but not limited to A, B, C, D & S Scans.
    b. The instrument should have extensive readings database and predefined lists for trigonometry, flaw statistics on axes, volumetric position information, code-based acceptance criteria, corrosion mapping statistics.
    c. Views shall be linked for interactive analysis and automatically updated when performing off-line gate repositioning.
    d. Lifetime free perpetual software with analysis tools compatible to read the data formats generated in the equipment with regular updates.
    e. Equipment should incorporate a GPS (Global Positioning systems), which provides geographic coordinates(location) of the instrument.
    f. User replaceable external cooling fan to adapt to harsher environments. Replacement of the fan should not affect IP rating or any OEM warranty.
    g. Compatible with external digital inputs for couplant & scan speed monitoring.

13. **Video output:** Video out **(HDMI)**
    a. **Wireless I/O Lines:** Shall be able to connect wireless access to cloud for remote software update, remote screen sharing and remote control of the equipment.
    b. **Encoder** Minimum of 2-axis encoder line (quadrature or clock/direction), 3rd encoder ready (for applications like nozzles, cylinders)
    c. **Digital input:** At least 5 (minimum) digital inputs, TTL.

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15. **Acquisition Controls:** Shall be compatible with external digital inputs for couplant and

scan speed monitoring

16. **Power output line:** 5 V nominal, 1 A (short-circuit protected), and 12 V output at 1 A.
17. **Pace input:** 5 V TTL pace input
18. **Display**
    a. **Display size/Type:**The instrument shall be equipped with a TFT LCD touch screen having 250 - 300 mm diagonal size
    b. **Resolution** The instrument screen shall have a minimum of 1280 x 768 -pixel resolution.

19. **Power Supply**
    a. **Battery type** Smart Li-ion battery
    b. **Number of batteries:** Up to 2 batteries can be connected simultaneously for enhancing time between charges.
    c. Standard supply with equipment is One battery.
    d. **Battery life:** At least 5 hours using 2 batteries (hot-swap capability)
    e. **Environmental Specification**
    f. **Operating temperature range:** Shall be able to operate at 0 °C to 45 °C
    g. The instrument shall come with a user-replaceable external cooling fan to adapt to harsher environments. Replacement of the fan should not affect IP rating or any OEM warranty.

20. **Ingress protection rating:** Shall be certified min to an IP65 rating or more.
21. **Shockproof rating:** Shall be drop tested according to MIL-STD-810G
22. **Ultrasound Specification: Minimum Requirement**
    a. Connectors: 1 Phased Array connector
    b. 1X UT connectors: LEMO 00
    c. **Number of focal laws:** 1024 (For generating ultrasonic bean at different angular positions)

23. Details of Software, Probe and Wedges:
    a. Lifetime free Analysis software should be supplied with equipment.
    b. Transport case for Equipment.
    c. Calibration Certificate should be provided with Equipment.

Table 1: Specifications of Ultrasound PA and UT Channels.

Sr No.	Pulser	PA Channels	UT Channels
1	Voltage	40 V, 80 V, and 115 V	85 V, 155 V, and 295 V
2	Pulse Width	Adjustable from 30 ns to 500 ns; resolution of 2.5 ns	Adjustable from 30 ns to 1,000 ns; resolution of 2.5 ns
3	Pulse Shape	Negative square wave	Negative square wave
4	Output Impedance	28 Ω in pulse-echo 24 Ω in pitch-catch	<30 Ω
5	Receiver Gain	PA Channels 0 dB to 80 dB, maximum input signal 550 mVp-p (full-screen height)	UT Channel 0 dB to 120 dB maximum input signal 34.5 Vp-p (full-screen height)
6	Input Impedance	60 Ω (pulse-echo mode) 150 Ω (pitch- catch mode)	60 Ω (pulse-echo mode) 50 Ω (pulse-receive mode)
7	System Bandwidth	0.6 MHz to 18 MHz	0.25 MHz to 28 MHz
8	Data Acquisition Bit Depth	PA Channels At least 16 bits	UT Channel At least 16 bits
9	Effective digitizing frequency	Up to 100 MHz	
10	Maximum pulsing rate	Up to 20 kHz	
11	Data Processing Number of Data Points	16000 - 17000	
12	Real time averaging rectifier	PA: 2,4,8,16	UT: 2,4,8,16,32,64
13		RF, full wave, half wave +, half wave -	RF, full wave, half wave +, half wave -
14	Filtering Video Filtering	3 low-pass, 3 band pass, and 5 high pass filters, smoothing (adjusted to probe frequency range)	3 low-pass, 6 band-pass, and 3 high-pass filters (8 low-pass filters when configured in TOFD), smoothing (adjusted to probe frequency range)
15	Data Visualization A-scan refresh rate A-scan	: >= 60 Hz, S-Scan: 20-30 Hz	
16	No. of points for TCG	32 One TCG (time corrected gain) curve per focal law	

17	Delay Range Transmission	0 µs – I0 µs in <= 2.5 ns increments
18	Delay Range Reception	0 µs – 6.4 µs in <= 2.5 ns increments

Table 2: List specifying the quantity of each item

Sr No.	Description of Probe, Wedges, and other Accessories	Quantity
1	Standard Phased Array (PA) Probe 5 MHz Linear Array, 64 Elements, 64x7 mm Total Active Aperture, 1.00 mm Pitch, 7 mm Elevation, Impedance Matching to Rexolite, PVC Sheathing, 2.5 m Cable Length	01
1a	Standard wedge for phased array probe near wall, normal scan, 0-degree longitudinal wave with IHC option (irrigation, holes and carbides).	01
1b	Standard Aqualene wedge for phased array probe with near- wall normal scan, 0-degree longitudinal wave with IH option (irrigation, holes, and without carbides). The wedge features a 25mm thick aqualene delay line and small water pocket.	01
2	Standard Phased Array Probe 5 MHz Linear Array, 16 Elements, 9.6x l O mm Total Active Aperture, 0.60 mm Pitch, IO mm Elevation, Impedance Matching to Rexolite, PVC Sheathing, 2.5 m Cable Length,	01
2a	Standard wedge for angle beam phased-array probe normal scan, 55-degree shear wave, with IHC option (with irrigation holes and carbides).	01
2b	Standard Wedge for angle beam Phased-Array Probe, normal scan,0-degree Refracted Angle in Steel, Longitudinal Wave, with IHC option (Irrigation, Holes and Carbides), with a 20 mm delay line	01
3	Mini Encoder 5 m cable, waterproof with Lemo or equivalent connector compatible with PA equipment and includes bracket kit	01
4	Contact Transducer, 2.25 MHz, 12.5mm Element Diameter, Standard Case Style, Straight BNC Connector	01
4a	Cable, Lemo 00 to BNC, RG174, 2.4 m. Gage Single, Flaw Detector Single	01
5	Contact Transducer, 5 MHz, 6.25mm Element Diameter, Fingertip, Case Style, Right Microdot Connector	01
5a	Contact Transducer, 5.00 MHz, 6.25mm Shear Element Diameter, Fingertip Case Style, Right Microdot Connector Includes Test Form	01

	Certificate	
5b	Cable. Standard LEMO to Microdot. 1.8m.	02
6	Portable manual couplant feed unit. Manual water pump used to supply couplant to wedges during automated inspection. Includes: reservoir capacity of 8 L, flow valve, irrigation tube (8 mm OD, 5 mm ID) and sling for transportation	01
7	Immersion Transducer, 10 MHz, 6.25mm Element Diameter, Side Looking Immersion Case Style, Straight Microdot Connector, spherically focused at 12.5mm OLF includes Test Form Certificate	01
7a	Cable, LEMO 00 to Waterproof Microdot, RG174, 4.5m	02
7b	Immersion Transducer, 5 MHz, 19mm. Element Diameter, Large Diameter Case Style, Straight UHF Connector Includes Test Form Certificate	01
8	Contact Transducer, 15.0 MHz, 6.25 mm Element Diameter, Fingertip Case Style, Right Microdot Connector Includes	01
9	Immersion Transducer, 20 MHz, 0.25 in. Element Diameter, Standard Case Style, Straight UHF Connector	01
10	Cable, Lerno 00 to UHF, RG174, 4.57 m, Waterproof. Gage Single, Flaw Detector Single	01

Terms & Conditions

1. **General Overview**

   This document outlines the terms and conditions (T&Cs) that apply to the procurement of Ultrasonic Flaw Detector, which will be provided as part of this tender. All prospective suppliers must adhere to these T&Cs to participate in the tender process.

2. **Submission Guidelines**

   i) Submission Deadline: Bids must be submitted no later than 21 days from publication on the Ahmedabad University Portal. Late submissions will not be accepted. All the bids should be submitted in hard copy and through the portal.

   ii) Submission Format: All tender submissions must be made through a sealed copy to the Procurement Office, Ahmedabad University, Gate No. 2, Commerce Six Roads, Navrangpura, Ahmedabad – 380009.

   iii) Tender Validity: The tender must remain valid for a minimum of 60 days from the submission deadline.

3. **Technical Specifications**

   i) Product Requirements: Tenderers must provide an Ultrasonic Sealing Machine that meets the specified technical and performance criteria outlined in Technical Specifications Sheet (attached technical specification).

   ii) The Supplier is responsible for ensuring that all equipment and material are delivered in full working order and meet the specified technical requirements.

   iii) The Supplier shall also provide any necessary training, documentation, or additional services as stipulated in the tender.

4. **Pricing and Payment Terms**

   i) Price Structure: The tender price must be inclusive of all costs, including but not limited to delivery, installation, training, and any other charges.

   ii) The bidder should submit an accessory one-year AMC proposal along with the commercial proposal.

   iii) Payment Schedule: The payment terms will be processed against satisfactory delivery and installation.

   iv) **The payment shall be processed through the Public Financial Management System (PFMS) Portal upon the receipt of funds from the Ministry of Textiles to Ahmedabad University.**

   v) Taxes: The price should be exclusive of any applicable taxes, which must be indicated separately.

5. **Delivery and Installation**

   i) Delivery Timeline: The Ultrasonic Flaw Detector Machine must be delivered within Ten (10) weeks of the date of order confirmation.

   ii) Installation: The Supplier must be responsible for the installation of the Ultrasonic Flaw Detector at the Composites Laboratory or at the dedicated space as instructed by the University.

6. **Inspection and Testing**

   i) Pre-Delivery Inspection: The Contractor must provide pre-delivery inspection and acceptance testing for the Ultrasonic Flaw Detector.

   ii) Post-Delivery Testing: Upon installation, the machine must undergo functional testing to ensure it meets the specified technical requirements.

iii) Defects and Non-Conformance: If any defects or non-conformance to specifications are identified during testing, the tenderer shall correct them at their own cost.

7. Training and Documentation
   i) Operator Training: The tenderer must provide on-site training on the operation and maintenance of the Ultrasonic Flaw Detector.
   ii) Documentation: The tenderer shall provide detailed user manuals, technical documentation, and maintenance guidelines in both hard copy and electronic format.

8. Warranty and Support
   i) Warranty Period: The Ultrasonic Flaw Detector shall have a warranty period of One (01) year from the date of installation.
   ii) Warranty Coverage: The warranty should cover repairs, parts replacement, and labor for any defects in materials or workmanship.
   iii) Service Level Agreement (SLA): The Contractor must provide an SLA for post-installation support, including response times for maintenance and repairs.

9. Confidentiality
   i) Confidential Information: Both parties should treat all information shared during the tender process and contract execution as confidential.

10. Termination Clause
   i) The University reserves the right to terminate the Agreement without cause by providing 30 days written notice to the Supplier. In such cases, the University shall pay for any Goods delivered and accepted by the Buyer up to the date of termination.

11. Dispute Resolution
   i) Any disputes arising out of or in connection with this Agreement shall be resolved through amicable negotiations between the parties.
   ii) If the dispute cannot be resolved through negotiations, the parties agree to submit the dispute to Arbitration in accordance with the rules of Arbitration and Conciliation Act 1996.

12. Force Majeure
i) Impact on Obligations: Neither party shall be held liable for failure to fulfil obligations under this contract due to force majeure events.

13. Compliance with Laws and Regulations
   i) Legal Compliance: The Contractor must comply with all applicable laws, regulations, and standards governing the manufacture, delivery, and installation of the Ultrasonic Sealing Machine.
   ii) Environmental Compliance: The Ultrasonic Sealing Machine must meet environmental standards and regulations related to energy consumption, material disposal, and recycling.

14. Governing Law
   i) Jurisdiction: This contract is governed by the laws of India, and any disputes will be resolved within the courts of Ahmedabad.