



CENTER FOR NON-DESTRUCTIVE EVALUATION

INDIAN INSTITUTE OF TECHNOLOGY MADRAS

Training
on
Phased Array UT, FMC, TFM

Organized by the
National Consortium for Non-Destructive Evaluation

APRIL
21-25, 2026

CNDE - IIT Madras

The Centre for Non-Destructive Evaluation (CNDE) at the Indian Institute of Technology Madras, established in April 2001, is Asia's leading academic center for Non-Destructive Evaluation (NDE) research and technology translation. The CNDE focuses on advanced research in NDE, Structural Health Monitoring (SHM), and harsh environment measurements, with state-of-the-art experimental facilities for X-ray, Phased Array Ultrasonic Testing, Infrared Thermal Imaging, Terahertz Imaging, and advanced Digital Radiography Systems.

Mission

Deep research-based non-destructive technologies for improved performance, enhanced safety, and extended service life for industrial applications and societal well-being.

Vision

To become the world's largest deep-research and technology translation center in the field of NDE.

National Consortium For Non-Destructive Evaluation (NCNDE)

The NCNDE was established in November 2024 under CNDE to promote collaborative research in Nondestructive Imaging & Evaluation, SHM, and online process parameter measurements. The consortium bridges industry and academia to tackle real-world NDE and SHM challenges through innovative research and technology development.

The major benefits of NCNDE for its members are as follows:

- Collaborative research reduces research costs by allowing multiple parties to share their investments.
- Industry-focused research driven by the management board of the consortium.
- Early engagement of industries facilitates testing of technologies in real-world environments.
- Reduction in research cycle time due to inputs at various stages of technology development.
- Access to cross-industry and cross-platform technologies.
- Increased likelihood of successfully transitioning to a commercial product.
- Enhanced understanding of risks and regulatory requirements at an early stage of the project.

Program Overview

This comprehensive five-day hands-on training program focuses on advanced Phased Array Ultrasonic Testing (PAUT), Full Matrix Capture (FMC), and Total Focusing Method (TFM) techniques for non-destructive evaluation. The program combines theoretical fundamentals with intensive practical experience using state-of-the-art equipment and real-world inspection scenarios.

Program Highlights:

- Deep dive into PAUT fundamentals, equipment, and probes
- Full Matrix Capture (FMC) technology and data acquisition strategies
- Total Focusing Method (TFM) for advanced imaging and defect evaluation
- Comprehensive coverage of applicable codes and standards (ASME, ISO, ASTM)
- Hands-on practical sessions with industry-standard equipment
- Real-world case studies and component evaluation
- Data collection, processing, and presentation techniques

Key Learning Objectives

Upon completion of this training program, participants will be able to:

- Understand the fundamental principles, equipment configurations, and probe technologies used in PAUT
- Configure, calibrate, and operate PAUT systems effectively for industrial inspections
- Apply relevant inspection codes and standards (ASME, ISO, ASTM) in planning and execution
- Understand and implement Full Matrix Capture (FMC) data acquisition strategies
- Apply Total Focusing Method (TFM) for advanced ultrasonic imaging and improved defect characterization
- Acquire, analyze, and present PAUT/FMC/TFM data using standardized industry practices
- Perform comprehensive evaluation of industrial components using advanced ultrasonic imaging techniques

Faculties and Trainer



**Prof. Krishnan
Balasubramanian**

Professor In-Charge, GDC;
Professor of Mechanical Engineering,
Head of Centre for Nondestructive Evaluation
(CNDE), IIT Madras

Prof. Krishnan Balasubramanian is an internationally recognized leader in advanced ultrasonic NDE, serving as Institute Chair Professor at IIT Madras and Head of CNDE. With 25+ years of pioneering research, his expertise spans PAUT, FMC, TFM, wave propagation, and structural health monitoring for aerospace and heavy engineering. He has authored 500+ publications, leads advanced NDT imaging research, mentors PhD/MS scholars in PAUT/FMC-TFM, and serves on leading NDE journal editorial boards. His translational work drives industry adoption of PAUT standardization and FMC/TFM imaging across aerospace, power, and infrastructure sectors.

Prof. Abhishek Saini is an Assistant Professor in the Department of Mechanical Engineering at the Indian Institute of Technology Madras and is affiliated with the Center for Non-Destructive Evaluation (CNDE). His research focuses on developing advanced technologies for Non-Destructive Evaluation (NDE) and Structural Health Monitoring (SHM), integrating phased array, ultrasonic imaging, sensing, intelligent imaging systems, and data-driven approaches. His work aims to enable high-resolution defect detection, material characterization, and predictive maintenance in complex engineering structures, bridging fundamental physics with deployable industrial inspection solutions.



Prof. Abhishek Saini

Assistant Professor,
CNDE, IIT Madras



Mr. Gunasekar Sambandam

Proprietor,
Sana Institute Of NDT, Trichy

Mr. Gunasekar Sambandam, M.Tech NDT (NIT Trichy) and ASNT Level III (UT/RT/MT), is Proprietor of SANA Institute of NDT, Tiruchirappalli, and invited PAUT/FMC/TFM trainer at CNDE, IIT Madras. Formerly Senior Manager at BHEL Welding Research Institute (2010-2025), he pioneered PAUT procedures for power boilers and pressure vessels, designing ASME/API validation blocks. As General Manager at FORT Technical Services (2025), he trained PAUT Level II personnel for pressure piping applications. With 17+ years in PAUT calibration, data interpretation, and OmniScan MX field experience, he strengthens CNDE's practical training sessions.

Coordinators

Mr. Venugopal Manoharan is the CEO of CNDE, IIT Madras, with 35+ years of experience in Radiographic Testing (RT) and advanced X-ray based NDE systems. He has led the development and industrial deployment of digital radiography, X-ray CT, and automated RT inspection solutions across aerospace, nuclear, and manufacturing sectors. An ASNT Level III certified professional, he brings deep expertise in RT image quality, interpretation, radiological safety, and inspection reliability. Actively involved in RT and PAUT training, certification, and competency development, he has shaped national-level NDT education and standards. A National NDT Award recipient and ISNT Fellow, he currently serves as Chief Controller of Examinations at ISNT, mentoring the next generation of NDT professionals.



Venugopal Manoharan

CEO,
CNDE, IIT Madras.



Dr. Arovinda Kumar Mitra

Postdoctoral Researcher,
CNDE, IIT Madras.

Dr. Arovinda Kumar Mitra is currently a Postdoctoral Researcher at the Centre for Non-Destructive Evaluation (CNDE), IIT Madras. At CNDE, his research focuses on metamaterial-assisted ultrasonic wave control, particularly on achieving sub-wavelength resolution in both lossless and highly attenuative viscoelastic media. His work involves advanced wavefield manipulation and defect characterization using B-scan and C-scan based imaging methodologies. His broader interests include guided waves, metamaterials, and high-resolution ultrasonic imaging for structural diagnostics.

Target Audience

- NDT Level II and Level III professionals in Ultrasonic Testing
- Senior NDT technicians and field inspectors
- NDT trainers and technical instructors seeking to extend expertise
- Quality assurance and inspection engineers
- Engineering managers overseeing NDT programs
- Aerospace, power generation, petrochemical, and manufacturing inspectors
- Technicians transitioning to advanced UT platforms and FMC/TFM systems
- Institutions planning to establish or upgrade PAUT facilities
- Researchers and academics in NDT and ultrasonic engineering
- Consultants specializing in advanced NDE technologies



AGENDA

Phased Array Ultrasonic Testing (PAUT), FMC - TFM - 1 (FMC) and Total Focusing Method (TFM)					
Time	Apr 21, 2026	Apr 22, 2026	Apr 23, 2026	Apr 24, 2026	Apr 25, 2026
09:00 -10:00	Registration And Inauguration	Testing Techniques	Codes & Standards-1	Data Presentation & Evaluation-1	FMC - TFM - 4
10:00 -11:00	Basic Principles of PAUT	Standardization-1	Codes & Standards-2	Data Presentation & Evaluation-2	Practical-5
11:00 -11:15	Tea Break				
11:15 -13:15	PAUT Equipment-1	Standardization-2	Applications	FMC - TFM - 1	Practical-6
13:15 -14:15	Lunch break				
14.15 -15.15	PAUT Equipment-2	Data Collection 1	Components Evaluation-1	FMC - TFM - 2	Practical-7
15.15 -15.30	Tea Break				
15.30 -16.30	PAUT Probes-2	Data Collection 2	Components Evaluation-2	FMC - TFM - 3	Practical-8
16.30 -17:30	Practical-1 (Equipment/Probes Familiarizations)	Practical-2	Practical-3	Practical-4	Practical-9

Registration Process:

Number of Participants allowed: 25

Registration fee: Rs 45,000 + GST (18%)

Contact for Registration:

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Executive Secretary,

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If you are interested, register here:



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