



2024



**Center for
Non-Destructive Evaluation**

**National Consortium For
Non-Destructive
Evaluation**

Indian Institute of Technology-Madras

1. Background

1.1 Center for Nondestructive Evaluation (CNDE)

The Center for Nondestructive Evaluation (CNDE) was established at the Indian Institute of Technology, Madras (IITM), in April 2001. The CNDE is Asia's leading academic center for Nondestructive Evaluation (NDE) research and technology translation.

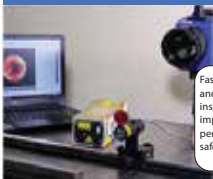
The mission and vision of CNDE are:

Mission: Deep-research based non-destructive technologies improved performance, enhanced safety and increased life for industrial applications and societal well-being

Vision: To become the world's largest Deep-research and technology translational center in the field of NDE

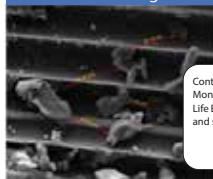
CNDE is uniquely positioned in the field of NDE research due to IITM's innovation ecosystem, which includes the Center for Innovation, Nirman-Pre-incubation support, the Incubation Cell, Research Park, and Center for Industrial Consultancy & Sponsored Research- an administrative framework to manage projects and financial and legal compliance. CNDE has been focusing its research efforts on the following areas:

Nondestructive Imaging & Evaluation



Faster, Economical, and Reliable inspection for improved performance and safety

Structural Health Monitoring



Continuous Monitoring for Life Extension and safety assurance

Measurements



Temperature and process parameter measurement at hostile & harsh environments

Applying the entire spectrum of Ultrasound and Electromagnetic for Industrial Inspection

Some of the key technologies developed at the CNDE and spun off as businesses are

- Robotized ultrasonic scanners
- Guided wave based inspection for annular plates and pipe supports using Guided wave UT
- Robotics solutions for inspecting pipelines, railway tracks, and submerged structures.
- Affordable non-destructive evaluation (NDE) simulation tools.
- Accurate temperature and multi-parameter measurements using Waveguide ultrasound sensors.
- Fiber optics-based sensing to measure critical parameters across extensive distances and numerous points
- Automated aerial drone based inspection, monitoring, and 3D digital-twin reconstruction

The focus on translational research has created a strong foundation for technology entrepreneurship, resulting in 13 spin-out ventures in the past 14 years.

CNDE is currently defining the NDE 5.0 framework for the future, having identified five research themes in this direction and is making progress in each of the themes



Ubiquitous Sensing

FO and UWS.
Nano-functional
Sensors.



Structured Materials for Imaging

Meta-materials based
imaging & sensors.
Patterned surfaces for
improved inspection.
Nano-structured coatings.



Edge Intelligence & Soft-Sensing

AI enabled rapid
computations.
Simulated Assisted
Decision Process.
Distributed computational
Algorithms.
Reduced Order
Computations.



Wide Inspection Technologies

Wide Multi-spectral
Imaging
(THz, IR, X-ray).
Multi-modality
Fusion Algorithms.



Remote and Pervasive Inspection

Autonomous Robots.
Swarm Inspection
Robots.



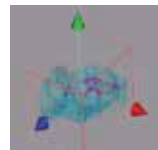
Ubiquitous Sensing



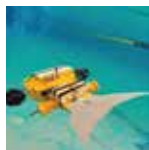
Structured Materials for Imaging



Edge Intelligence & Soft-Sensing



Wide Inspection Technologies



Remote and Pervasive Inspection

Recognizing the significance of stakeholder collaboration, CNDE has established the National Consortium for Non-Destructive Evaluation (NCNDE).


1.2 National Consortium For Non-Destructive Evaluation (NCNDE)

NCNDE was established in November 2024 under CNDE to promote collaborative research in Nondestructive Imaging & Evaluation, Structural Health Monitoring (SHM), and Online process parameter measurements.

The NCNDE aims to tackle the real-world challenges that stakeholders face in non-destructive evaluation (NDE) and structural health monitoring (SHM) through collaborative research and creating top-tier resources for NDE.

The Major benefits of NCNDE to the members are the following


- Collaborative research reduces research costs by allowing multiple parties to share their investments.
- Industry-focused research driven by the management board of the consortium
- Engaging industries in the early stages of research facilitates the testing of technology in real-world environments.
- Reduction in research cycle time due to inputs at various stages of technology development.
- Accessing cross-industry & cross-platform technologies.
- Likelihood of successfully transitioning to a commercial product.
- Enhanced understanding of risks and regulatory requirements at the project's early stage.
- The members of the consortium are open to recruiting top talent from CNDE.



NCNDE is dedicated to advancing technologies that are at the early, mid, or low stages of the Technology Readiness Level (TRL) and transitioning them for commercialization. We categorize these projects into three distinct timelines: long-term projects for those at the early stages, mid-term projects for those in the mid stages, and short-term projects for those at low readiness levels. This structured approach enables us to systematically develop innovative solutions while addressing the unique challenges and opportunities at each phase of technological maturity. Additionally, it will assist stakeholders in evaluating new technologies or products for specific applications and provide training in specific application areas.

Technology development will primarily occur at the Center for Non-Destructive Evaluation (CNDE), situated at the Indian Institute of Technology Madras (IIT-M). This dynamic center is renowned for its supportive ecosystem that fosters innovation and collaboration. Furthermore, CNDE hosts several spinoff organizations that can assist in the commercialization of technology.

The Board members of NCNDE will identify key issues that require attention. Industry experts and the International Advisory Committee will offer guidance on the direction of technological development.



2. Membership of NCNDE

There are two categories of membership available:

1. Industrial membership
2. University/Educational Institution membership

2.1 Industrial membership

Organizations across various sectors, including industries, government entities, and public sector undertakings, that seek advanced Non-Destructive Examination (NDE) technologies are invited to join the National Consortium for Non-Destructive Evaluation (NCNDE). Membership is available in three distinct tiers, each offering unique benefits and resources: Platinum, Gold, and Silver. These membership levels cater to the diverse needs of organizations, providing access to cutting-edge technology and a network of expertise in the field of NDE.

2.1. A Platinum category

Membership fee: Rs. 30 lacs for 3 years (can be paid in installments: Rs. 10 lacs every year)

- Management Board of NDEC – 1 member. This is an opportunity to steer research programs to meet industry needs.
- The overhead cost of funded research projects by members will be 10% of the project cost
- Members will get first preference in project scheduling
- Credits towards project funding – 30% of payment
- First preference for investing in Startups of CNDE
- Training and outreach programs – 25% Discount
- Access to use state-of-the-art lab facilities for service purposes -20 hours free of charge (additional hours chargeable with a discount of 20% hourly rate)

- Feasibility study on a specific problem – 2 weeks free of charge (chargeable for additional days)
- Early access to new technologies, research reports, IP
- Access to industrial experts from the global network of CNDE for any specific NDE problem (with a discounted hourly rate of 30%)

2.1.B Industries membership-Gold

Membership fee: Rs. 15 lacs for 3 years (can be paid in instalments: Rs. 5 lacs per year)

- The overhead cost of funded research projects by members will be 15% of the project cost
- Members will get preference in project scheduling
- Credits towards project funding – 20% of payment
- Preference for investing in Start-ups of CNDE (second)
- Training and outreach programs – 15% Discount
- Access to use state-of-the-art lab facilities for service purposes -10 hours free of charge (additional hours chargeable with a discount of 20% hourly rate)
- Feasibility study on a specific problem – 1 week free of charge (chargeable for additional days)
- Early access to new technologies, research reports and IP
- Access to industrial experts from the global network of CNDE for any specific NDE problem (with a discounted hourly rate of 20%)

2.1.C Industries membership-Silver

Membership fee: Rs. 7.5 lacs for 3 years (can be paid in installments: Rs. 2.5 lacs per year)

- The overhead cost of funded research projects by members will be 20% of the project cost

- Members will get preference in project scheduling
- Credits towards project funding – 10% of payment
- Preference for investing in Startups of CNDE (third)
- Training and outreach programs – 10% Discount
- Access to use state-of-the-art lab facilities for service purposes -5 hours free of charge (additional hours chargeable with a discount of 10% hourly rate)
- Feasibility study on a specific problem – 2 days free of charge (chargeable for additional days)
- Early access to new technologies, research reports
- Access to industrial experts from the global network of CNDE for any specific NDE problem (with a discounted hourly rate of 10%)

Industrial Membership Benefits - Summary

Benefits	Platinum	Gold	Silver
Member of Management Board	Yes	No	No
Overhead cost Projects	10%	15%	20%
Preference in scheduling projects	First	Second	Third
Feasibility study (Free of charge)	2 weeks	1 week	2 days
Access to lab facilities (Free of charge)	20 hours	10 hours	5 hours
Discount on Consultancy Charges	30%	20%	10%
Discount on Training and Outreach programs	30%	20%	10%
Early access to IP, Research reports, Technology	Yes	Yes	Yes
Preference to Invest in Start-ups of CNDE	First	Second	Third

2.2 University/Educational Institution Membership

NDEC plans to play a crucial role in advancing the fields of NDE science and technology within Indian educational institutions. By fostering a deep understanding of these vital areas, NDEC aims to cultivate the next generation of leaders who will drive innovation and excellence in NDE practices. As part of this initiative, the Council offers memberships that are accessible to all universities and educational institutions, encouraging widespread participation and collaboration across the academic community.

2.2. A University/Educational Institutes membership-Platinum

Membership fee: Rs. 7.5 lacs for 3 years (can be paid in instalments: Rs. 2.5 lacs per year)

Benefits:

- One-day visit of students and faculty (Group of 25) to CNDE – Twice a year
- Two faculty members can spend 30 days at CNDE to get awareness of NDE
- Student internship for a period of 6 months- 10 students
- 50% discount on paid training and workshops conducted by CNDE
- Mentorship for any research programs carried out by the institute on mutually agreed conditions
- Use of NDE lab facilities for research work – 20 hours free of charge(additional hours chargeable)
- Exchange of Ph. D students-5
- Exchange of master's students-10

2.2.B University/Educational Institute membership-Gold

Membership fee: Rs. 4.5 lacs for 3 year (can be paid in instalments: Rs. 1.5 lacs per year)

- One-day visit of students and faculty (Group of 25) to CNDE – once a year
- One faculty member can spend 30 days at CNDE to get awareness of NDE
- Student internship for a period of 6 months- 5 student
- 25% discount on paid training and workshops conducted by CNDE
- Use of NDE lab facilities for research work – 10 hours free of charge (additional hours chargeable)
- Exchange of Master students-5
- Exchange Ph.D. students-2

2.2.C University/Educational Institute membership-Silver

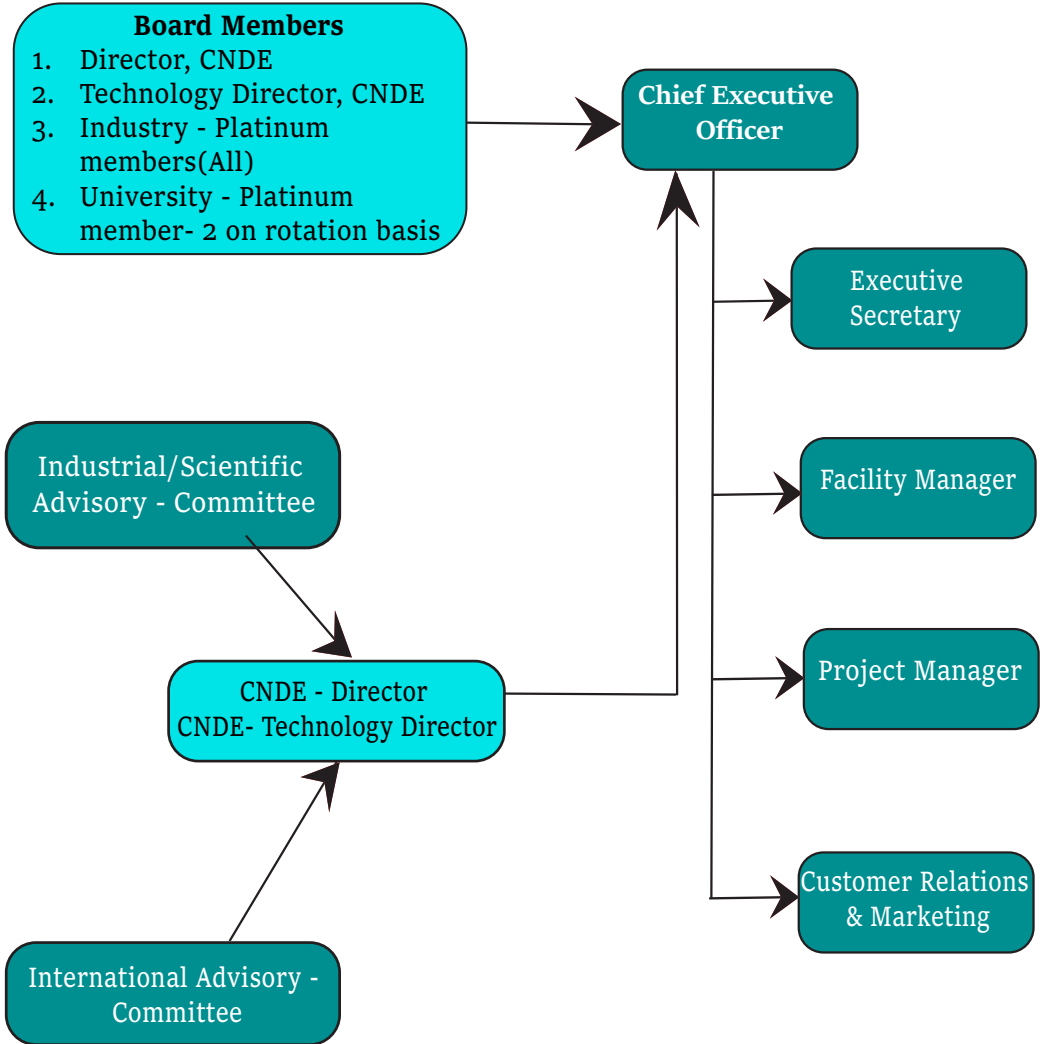
Membership fee: Rs. 3 lacs for 3 years (can be paid in instalments: Rs. 1 lac per year)

- One-day visit of students and faculty (Group of 25) to CNDE – once a year
- One faculty member can spend 10 days at CNDE to get awareness of NDE
- Student internship for 6 months-2 students
- 15% discount on paid training and workshops conducted by CNDE
- Exchange of master's students – 3 nos
- Exchange pf Ph.D student- 1 no

University/Educational Institutes Benefits - Summary

Benefits	Platinum	Gold	Silver
Exchange of Ph.D students	5	3	1
Exchange of Master's Students	10	5	3
Sabbatical for Faculty of Member Institute at CNDE	3 months	2 months	1 month
Discount on Training /Outreach programs	50%	25%	15%
Access to lab facilities (Free of charge)	20 hours	10 hours	5 hours
Mentorship for students/Faculty	Yes	Yes	Yes
Discount on Training and Outreach programs	30%	20%	10%
Access Research reports of CNDE	Yes	Yes	Yes
Visit to CNDE (group of 25)	3 visits /Year	2 visits/year	One visit per year
Internship for students (up to 6 months)	10	5	3

3. Organizational Structure of NCNDE



3.1 Management Board of Consortium

The Management Board is the highest authority of the consortium. It consists of the Director and the Technology Director of CNDE as permanent members. Additionally, the board includes members from the industry platinum category. Furthermore, two members from the University-Platinum category will serve on the board on a rotational basis.

The CEO of the consortium reports to the Management Board. The Board meetings will be chaired by one of the members of the Management Board. Each member of the Board has one vote. The management board is responsible for all the activities of the consortium which includes 1. Project to be funded 2. The policy decision of the consortium. The CEO will communicate the decision taken by the Management Board to all members of the consortium.

3.2 CEO of Consortium

CEO of the consortium with the support of the Management team which consists of the facility, project, and marketing team, and the Executive Assistant will execute projects at CNDE. Director of CNDE and Technology Director of CNDE will oversee the technological aspects of the project. The CEO will report to the Management Board as well as the Director of CNDE.

3.3 The Industrial and Scientific Advisory Committee

The Industrial and Scientific Advisory Committee will be established by the Director, Technology Director of CNDE, and CEO. This committee will comprise experts from various industries and non-destructive evaluation (NDE) technology fields. Their role will be to provide technical guidance and direction to the consortium. It will be a committee of ten members.

3.4 International Advisory Committee

The International advisory committee will be formed by the Director and technology director of CNDE which will have Industrial and academic experts from the International Community. Their role is to review the consortium's technology roadmaps and high-risk projects and provide independent feedback to the Consortium.

4.0 How to become a member of NCNDE?

The Industries, Government organizations, public sector undertakings, and Educational institutes that will be interested in becoming members of NCNDE, can approach:

**Prof. KRISHNAN
BALASUBRAMANIAN**

Head of CENTER FOR
NONDESTRUCTIVE EVALUATION
Indian Institute of Technology
-Madras

Mail ID: balas@iitm.ac.in

Prof. PRABHU RAJAGOPAL

Deputy Head of
CENTER FOR
NONDESTRUCTIVE EVALUATION
Indian Institute of Technology
-Madras

Mail ID: prajagopal@iitm.ac.in

V.Manoharan

CEO, NDEC

Center for
Nondestructive Evaluation
Indian Institute of Technology
-Madras


Mail ID: ceocnde@iitm.ac.in,
ceo@cnde.in



CONTACT US

 www.cnde.in

 cnde.in@gmail.com

 Room 312, Machine Design Section,
IIT Madras , Chennai - 600036