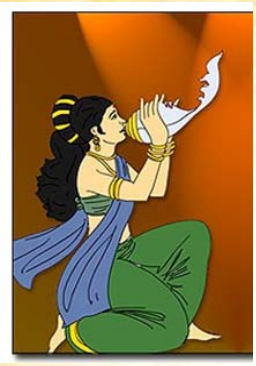

# SOUND BYTES - 19


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**Email ID: soundbytesisnt@gmail.com**

**Official Newsletter of ISNT Chennai Chapter**



## PROVOCATION


Dear Readers,

**Happy New Year and Lavish Pongal wishes to you all from the board .**

A communication from Shri. Parthapratim Brahma to some of us is the basis for this message and the article on Quality System by Shri.Dwaraknathan.

A well implemented Quality Management System is essential for any type of organization to perform its activities in a professional, transparent and efficient manner. It provides the opportunity to identify areas for improvement and take corrective actions leading to better customer satisfaction. A documented Quality Manual (QM) is a part of a quality management system. Being a major stakeholder of non-destructive testing fraternity, ISNT has an important role to focus on quality NDT education delivered through system-based training organizations including its own Chapters. The Quality System of an NDT training organization (Authorised Training Centres -ATC) must have two components covered:

1. General quality management system for all business process related activities such as management functions, authority responsibilities, contracting, procurement, service delivery, complaints handling etc. This is typically achieved by implementing ISO-9001 standard.
2. Quality management system to focus on specific nature of NDT training and compliance with those requirements as demanded by ICN certification programme.

To obtain TMB accreditation for conducting ICN/ISO9712 training as ISNT Authorised Training centre (ATC), there are well laid procedures to follow. There is a specific requirement of a documented quality system according to ISO-25108 for NDE training organisations. The ISNT TMB standard ISNT_TMB_01, prepared in line with ISO-25108 , covers the requirements in detail. This quality system demands a written QM. The QM must address some of the mandatory policy requirements and commitments from the management of training organization. Some of the duties of management are:

1. Engaging a Course Director responsible for training delivery and its quality
2. Approved tutor selection process based on competency
3. Training service delivery (which includes training facilities, equipment, safety/radiation safety, sub contracting process)
4. Review and updating course materials
5. Process of induction of trainees
6. Feedback and complaints handling
7. Performance measurement and Management review

Some of the requirements are specific to NDE training process and others are general quality system elements taken from ISO9001. Examples are management commitment, contract and subcontracting, performance measurement, complaints handling, management review. If an ATC is not ISO 9001 compliant, it must address all these mandatory elements in QM which is subject to audit by TMB. It is important that a QM is approved for implementation by a member of top management since this would require resource allocation, management commitments and more importantly for continuity with policy in future even if there is change in management personnel.


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*Module 59, 3rd floor, Readymade Garment Complex. SIDCO Industrial Estate, Guindy, Chennai 600 032. Phone 044-45532115, 7200086075.*
*Email: isntchennaichapter@gmail.com; Website: www.isnt.in*

There is a general mis-concept that a quality management system like ISO 9001 applies to only commercial or business organization and not to societies like ISNT. It applies to any organisation producing any product or providing any kind of services to provide a framework for measuring the effectiveness of the product or service. It is applicable equally to all commercial, non commercial, charity organization or societies like ISNT, irrespective of the nature of organisation and whether run by employed people or volunteers. The purpose of a quality system is to bring transparency in the operations, set authority and responsibilities of individuals, be it employed or volunteers. The key is the "accountability" of people at all level for the tasks they perform or decisions they make. It helps cutting down a lot of bureaucracy by setting clear objectives and accountability of individuals. It also adds to the credibility of decisions being made objectively. A documented quality system or simplified form of it such as SOPs help measure the performance against a set norm. If not satisfactory, it always gives us a chance to check back and correct the system. Therefore it can be useful for a society like ISNT and its Chapters, if implemented appropriately.

Chennai Chapter has been in the process of designing and establishing a Quality Manual for effective service delivery for some time now. Several attempts were made in past but didn't meet the desired objective. Based on past learnings and root cause analysis ,EC at Chennai Chapter has prioritized the need for a quality system after due deliberation on above. It has been agreed to implement the QM at the earliest for the purpose of running the Chapter as a model professional body.

Mr.Dwarakanathan, presently Senior General Manager – QA & QC of Ramkrishna Titagarh Railwheels Limited has spent considerable amount of his time to prepare the Quality Manual . The editorial board of Sound Bytes is embarking upon taking this QM to its members and implement it if need be with modifications and additions with the aim of making ISNT Chennai Chapter a world class professional society and set a bench mark in NDT training. Our Chapter seeks your involvement in doing so.

In order to fulfill it a series of articles on it will appear on your monitors from this issue onwards. Kindly partake in the process and make it possible.

Happy Reading

Ram

# ISNT Chennai Chapter News

**I M Rao**
**25/4/33 to 30/9/25**

## In fond memory of Late I.M.Rao.

With profound grief Sound Bytes informs the demise of our first chairman when ISNT Chennai Chapter was formed in 1990 at Connemara hotel after amalgamation of the two societies (IINDIE & ISNDT).

Basically he did his marine engineering course at Kolkata and rose to the level of chief engineer. After serving various shipping companies he started his own ship repair shop at Madras and was highly successful. During this time he understood the importance of NDT in general and was attracted to it and was instrument in propagating the awareness of NDT and partook in various activities of IINDIE. Incidentally he was one of the first monitors for ASNT Level-III examinations conducted by IINDIE.

A keen observer of the progress of our chapter he felt the need for funds for propagating this branch of engineering and donated a sum of Rs.5,00,000/- to be used for creating awareness. ISNT CC has earmarked the proceeds of this large sum for awarding the best student in the post graduate & doctoral levels. The endowment has been created under the banner of his late wife Mrs.Bala Rao. We are grateful for your generous gesture and will carry forward your intentions without fail.

## Addition of Members –

1. Mr.Ponnappan S, L&T Construction – Life Member
2. Micro Lites, Chennai – Corporate Member
3. Planys Technologies Private Limited – Life Corporate Member

MEMBERSHIP STATUS UP TO DECEMBER 2025

| PARTICULARS | September 2025 | Newly added | December 2025 |
|---|---|---|---|
| LIFE CORPORATE MEMBER | 60 | 1 | 61 |
| CORPORATE MEMBER | 3 | 1 | 4 |
| LIFE FELLOW | 14 | | 14 |
| HONORARY FELLOW | 9 | | 9 |
| LIFE MEMBER | 624 | 1 | 625 |
| MEMBER | 21 | | 21 |
| ASSOCIATE MEMBER | 8 | | 8 |
| STUDENT MEMBER | 202 | | 202 |
| TOTAL | 941 | 3 | 944 |

## EC meeting

The 7th EC Meeting for the financial year 2025-2026 was held on 16th November 2025 at ISNT Chennai Chapter and was presided over by Chairman, Shri.R.Balakrishnan.

## Course Conducted

| Sl.No | Course | From | To | No. of participants | Course Director |
|---|---|---|---|---|---|
| 1 | RT Level-II | 12.11.2025 | 22.11.2025 | 13 | Sri.S.Chockalingam |
| 2 | MT & PT Level-II | 11.12.2025 | 20.12.2025 | 25 | Sri.C.Karuppasamy |

**Important Announcement**

**UT Testing Competition to be conducted between 25th to 27th January 2026 by ISNT Chennai Chapter for all. For details kindly contact email ID: isntchennaichapter@gmail.com.**

## Courses Planned for the next 3 months

1. **Leak Testing Level-II course from 19th January 2026 to 31st January 2026.**
2. **Ultrasonic Testing Level-II from 3rd February 2026 to 14th February 2026.**

## Technical Meeting

| S.No. | Date | Topic | Speaker | Venue |
|---|---|---|---|---|
| 1. | 16.11.2025 | "CASE STUDIES IN NDE AUTOMATION" | **Mr. Shyamsunder Baskaran,** Industrial Quality Concept Group of Companies, Chennai. | ISNT Head Office Conference Hall , Chennai |

Respected teaching and non-teaching staff of ISNT Chennai Chapter,
Thanks a lot from the bottom of our hearts for giving us memorable experience during the past 10 days with valuable informative sessions and other related services.
These days are truly an unforgettable chapter in our life.
Thank you once again
Participants from:
Naval Aircraft Yard, Naval Base, Kochi,


## Mr.C.Saravanan, Staff Retirement function

Mr.C.Saravanan joined ISNT during 1993 and served ISNT Chennai Chapter dedicatedly and passionately for around 32 years. His sincerity, devotion, and hard work have been exemplary, and his contributions have played a significant role in the growth and success of our society. He undertook responsibilities, willingly and went to the extent of arranging materials for training programs (Reading materials and consumables for practical as well as scrutinizing the application. He created a stress free ambiance for the candidates and looked after their needs while at our class room. For this reason he was most sought after among the participants.

On behalf of all of us, we extend our heartfelt wishes to you for a happy, healthy, and peaceful retired life. May this new chapter bring you joy and fulfillment.

# STANDARD- ESSENCE OF EXPERIENCE

# DISTINGUISH THE STANDARDS

# STANDARDS FOR RADIOGRAPHY TESTING

By Mr.M.Manimohan, Manager (Retired), NDTL, BHEL, Trichy

## INDIAN STANDARD

| | |
|---|---|
| IS 1182 | Recommended practice for RT of butt joints in steel plates |
| IS 2595 | Code for practice for Radiographic testing |
| IS 3657 | Radiographic Image Quality Indicators |
| IS 12938 | RT Acceptance for Castings |
| IS 14419 | RT Acceptance for Welds in Ship |

## ASTM STANDARDS

| | |
|---|---|
| E 94 | Standard Guide for Radiographic Examination |
| E192 | Reference Radiographs of Investment Steel Castings for Aerospace Applications |
| E 543 | Standard Specifications for Agencies Performing Nondestructive Testing |
| E 592 | Standard Guide to Obtainable ASTM Equivalent Penetrameter Sensitivity for Radiography of Steel Plates 1/4 to 2 in. (6 to 51 mm) Thick with X-Rays and 1 to 6 in. (25 to 152 mm) Thick with Cobalt-60 |
| E 746 | Standard Practice for Determining Relative Image Quality Response of Industrial Radiographic Imaging Systems |
| E 747 | Standard Practice for Design, Manufacture, and Material Grouping Classification of Wire Image Quality Indicators (IQI) Used for Radiology |
| E 748 | Standard Practices for Thermal Neutron Radiography of Materials |
| E 801 | Standard Practice for Controlling Quality of Radiological Examination of Electronic Devices |
| E 999 | Guide for Controlling the Quality of Industrial Radiographic Film Processing |
| E 1000 | Standard Guide for Radioscopy |
| E 1025 | Practice for Design, Manufacture, and Material Grouping Classification of Hole-Type Image Quality Indicators (IQI) Used for Radiology |
| E 1030 | Standard Test Method for Radiographic Examination of Metallic Castings |
| E 1032 | Standard Test Method for Radiographic Examination of Weldments |
| E 1079 | Practice for Calibration of Transmission Densitometers |
| E 1165 | Standard Test Method for Measurement of Focal Spots of Industrial X-Ray Tubes by Pinhole Imaging |
| E 1254 | Standard Guide for Storage of Radiographs and Unexposed Industrial Radiographic Films |
| E 1255 | Standard Practice for Radioscopy |
| E 1316 | Standard Terminology for Nondestructive Examinations |
| E 1390 | Standard Specification for Illuminators Used for Viewing Industrial Radiographs |
| E 1411 | Standard Practice for Qualification of Radioscopic Systems |
| E 1441 | Standard Guide for Computed Tomography (CT) Imaging |
| E 1453 | Standard Guide for Storage of Media that Contains Analog or Digital Radioscopic Data |
| E 1475 | Standard Guide for Data Fields for Computerized Transfer of Digital Radiological Examination Data |
| E 1570 | Standard Practice for Computed Tomographic (CT) Examination |
| E 1647 | Standard Practice for Determining Contrast Sensitivity in Radiology |
| E 1672 | Standard Guide for Computed Tomography (CT) System Selection |
| E 1695 | Standard Test Method for Measurement of Computed Tomography (CT) System Performance |
| E 1735 | Standard Test Method for Determining Relative Image Quality of Industrial Radiographic Film Exposed to X-Radiation from 4 to 25 MeV |
| E 1742 | Standard Practice for Radiography Examination |
| E 1815 | Standard Test Method for Classification of Film Systems for Industrial Radiography |
| E 1817 | Standard Practice for Controlling Quality of Radiological Examination by Using Representative Quality Indicators (RQIs) |
| E 2002 | Standard Practice for Determining Total Image Un-sharpness in Radiology |
| E 2003 | Standard Practice for Fabrication of the Neutron Radiographic Beam Purity Indicators |
| E 2007 | Standard Guide for Computed Radiology (Photostimulable Luminescence (PSL) Method) |
| E 2033 | Practice for Computed Radiology (PSL Method) |
| E 2339 | Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) |
| E 2422 | Standard Digital Reference Images for Inspection of Aluminum Castings |
| E 2445 | Standard Practice for Qualification and Long-Term Stability of Computed Radiology Systems |

| | |
|---|---|
| E 2446 | Standard Practice for Classification of Computed Radiology Systems |
| E 2597 | Standard Practice for Manufacturing Characterization of Digital Detector Arrays |
| E 2660 | Standard Digital Reference Images for Investment Steel Castings for Aerospace Applications |
| E 2669 | Standard Digital Reference Images for Titanium Castings |
| E 2698 | Standard Practice for Radiological Examination Using Digital Detector Arrays |
| E 2699 | Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) for Digital Radiographic (DR) Test Methods |
| E 2736 | Standard Guide for Digital Detector Array Radiology |
| E 2737 | Standard Practice for Digital Detector Array Performance Evaluation and Long-Term Stability |
| E 2738 | Digital Imaging and Communication Nondestructive Evaluation (DICONDE) for Computed Radiography (CR) Test Methods |
| E 2767 | Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) for X-ray Computed Tomography (CT) Test Methods |
| E 2903 | Standard Test Method for Measurement of the Effective Focal Spot Size of Mini and Micro Focus Xray Tubes |
| E 2934 | Standard Practice for Digital Imaging and Communication in Nondestructive Evaluation (DICONDE) for Eddy Current (EC) Test Methods |

ASTM Reference Radiographs

| | |
|---|---|
| E 390 | Steel fusion welds |
| E 155 | Aluminium & Magnesium castings |
| E 186 | Heavy wall (50-115 mm) Steel Castings |
| E 280 | Heavy wall (115-305 mm) Steel Castings |
| E 446 | Steel Castings up to 51 mm |
| E 505 | Aluminium & Magnesium die castings |

BRITISH STANDARD

| | |
|---|---|
| BS 2600 | Radiographic testing of fusion welded butt joints in steel |
| BS 2910 | Radiographic testing of fusion welded butt joints in steel pipes |
| BS EN 1435 | Radiographic examination of welded joints |

ISO

| | |
|---|---|
| ISO 4993 | RT of Steel& Iron Castings |
| ISO 5579 | RT of Metals by X and Gamma Rays |
| ISO 5580 | Industrial radiographic illuminators — Minimum requirements |
| ISO 10675-1 | RT Acceptance for welds Steel, Nickel, Titanium and alloys |
| ISO 11699 | Industrial radiographic film Classification for industrial RT |
| ISO 14096 | Qualification of radiographic film digitization systems |
| ISO 17636-1 | RT of welds-Film |
| ISO 17636-2 | Requirements for Digital Radiography by X and Gamma rays by Computed Radiography or Digital Detector Arrays system |
| ISO 19232-5 | RT Image Quality |

MILITARY STANDARDS

| | |
|---|---|
| MIL-R11468 | Radiographic inspection, soundness requirements for arc & gas welds in steel |
| MIL-S D453 | Radiographic inspection |

AUSTRALIAN STD

| | |
|---|---|
| AS 2177 | RT of Butt Welds |

## Birthday celebration of EC members during October to December 2025

Mr.V.Pari during October 2025

Mr.S.Chockalingam during October 2025

Dr.Joseph J.Kakkassery during November 2025

# The Innovation Sutras - Impact creates impact! (Sutra 5)

(Professor Prabhu Rajagopal, Faculty in-charge, Centre for Innovation (CFI), IIT Madras; recipient of prestigious early career awards including the IEI-National Design Award, and the National Swarna Jayanti Fellowship)

An IIT Madras professor explains how embracing boredom, setting clear missions, and harnessing impact can transform everyday challenges into innovative solutions.

Authors and poets experience a ‘writer's block’ that curtails their creative outputs for long periods of time, sometimes even lasting up to several years, requiring special efforts to break past.

Many other creative professionals also face the equivalents of this phenomenon that are perhaps a psychological reaction to the routine, mundane and quotidian nature of most such work at the start.

**ASTRONOMY AND INNOVATION**

Within the scientific community, the work of Danish astronomy pioneer Tycho Brahe has long been admired for his path breaking effort in cataloguing the motion of planets and mapping the positions of stars in the sky.
Brahe’s observations of the motion of Mars later helped the German astronomer Johannes Kepler to formulate the laws of planetary motion.

These developments revolutionalised physics, providing support to the Heliocentric model of our solar system and ultimately leading to Isaac Newton formulating his laws of motion which till today form the basis of most of our engineering advancements.

Yet, the bulk of Brahe’s work was in painstakingly collecting information on the movement of celestial objects in the sky, night after night, in seclusion from the ‘outside world’ over a lifetime.

**DATA COLLECTION: A HUMBLE BEGINNING**

Much of the work at the start of many scientific and technological developments consists in data collection, generation and analysis, a task that is the quagmire of many would-be scientists and scholars at the start of their careers.
One of the ways in which the psychological recoil to boredom from such work, is to have a clear understanding of the goals and impact of the effort being undertaken.

**THE POWER OF CLEAR MISSIONS**

In the face of a severe crunch in knowledge-base in crucial areas such as cryogenics and international embargoes on sharing technology and expertise to India in several domains, the Indian Space Research Organisation (ISRO) successfully and indigenously developed its own set of launch vehicles, riding the success of which today we have the awe-inspiring moon and sun missions.

India’s space programme is unique across the world, for its focus on solving everyday challenges such as predicting rainfall for aiding agriculture and studying weather patterns to prevent catastrophic loss due to natural disasters.

For example, advanced models that leverage satellite-based observations and predict cyclones well in advance have mitigated the disastrous effects such events have had in the past.

The stories of our defense and nuclear programmes are similar, yielding several dual-use solutions, while also driving self-sufficiency for domestic energy and security needs, such as in prosthetics and electronics.
Among everyday cases, examples such as the Green Revolution, the Milk Revolution and even the Delhi Metro, show that when tasked with a clear mission and understanding of the impact, we can overcome enormous challenges and carry past the dying of the initial inspiration.

At IIT Madras’ Centre for Innovation, the competition teams working on themes such as electric and solar-powered racing vehicles, extra-terrestrial autonomous vehicles and rovers, Hyperloop and sounding rockets have achieved incredible feats on shoestring budgets and with marginal support, thanks to the well-digested understanding of the impact made possible by multi-student-generational efforts.

**IMPACT CREATES IMPACT**

This brings us to the next Sutra -- Impact creates impact (Sutra 5)
Impact is a feedback loop. While not all projects can afford the ignition and inspirations provided by grand motives and challenges, even finding little impacts that can be delivered meaningfully can circle back to motivate further innovation.

For example, even the simple exercise of presenting findings to colleagues at scientific conferences and gaining appreciation from peers can catalyse young researchers.

This is also further illustrated in the evolution of one of the projects close to the author's heart, the development of the HomoSEP robot for mechanised cleaning of septic tanks and sewer manholes at his laboratory.

**THE HOMOSEP REVOLUTION**

What was at the start of the pandemic just a technological dream to create a customised and scalable robotic solution to eliminate the demeaning practice of manual scavenging, has today developed into a functional and integrated solution deployed at over 20 locations across India.

The author is witness to how interactions with sanitation workers and field visits fundamentally transformed the research team's outlook and fired up their motivation to develop a solution that will work in the tough practical conditions than merely a laboratory demonstration.

Bhavesh Narayani, an MS alumnus from the author's laboratory and now the technology lead for HomoSEP at Solinas the acclaimed startup piloting this solution, comments: "The successful testing of the simple but mechanised blade homogenizer system for septic tanks ignited my drive to develop an end-to-end solution for eradicating manual scavenging in septic tanks and sewer manholes."

"My interactions with safai workers and understanding their expectations deeply moved me to innovate further," he says.

"Today, HomoSEP is on a vehicle-mounted system that integrates homogenization, suction, storage, and camera-based control functionalities, built as per their specifications and needs," Bhavesh Narayani adds.

We will conclude the sutras on the 'generation' phase of innovation in the next article which discusses the value of working across boundaries. This series will then discuss further sutras on growing and nurturing an innovation culture in organisations.

**Acknowledgement: The above article authored by Prof.Prabhu Rajagopal was published in India Today (20th September 2023) is republished in this Sound bytes, as we found it informative and an excellent guide for people in any walk of life. Our sincere thanks to India Today for publishing it.**

## This matter concerns us

In a stunning breakthrough, scientists have discovered an entirely new state of matter that challenges the very foundations of modern physics. Unlike the familiar solid, liquid, gas, and plasma states, this new form of matter exhibits properties never before observed in nature, behaving in ways that defy conventional theories. Researchers suggest that it may involve quantum-level interactions that rewrite our understanding of how particles can organize and function under extreme conditions.

This discovery not only opens up new frontiers in theoretical physics but could also have profound implications for technology, potentially leading to revolutionary advancements in computing, energy, and materials science. By uncovering this strange and exotic state of matter, scientists are once again reminded of how much we still have to learn about the universe—and how its deepest mysteries often lead to the most extraordinary innovations

# NPCIL QUALITY MANAGEMENT SYSTEM REQUIREMENTS FOR NDT (NON-DESTRUCTIVE TESTING) AGENCIES

**By Mr.V.SANKARANARAYANAN, Ex-AD(QA), NPCIL**

## I. NPCIL-INTRODUCTION

- Nuclear Power Corporation of India Ltd (NPCIL) was established by Government of India for construction & operation of Nuclear Power Projects in India
- NPCIL has constructed 22 reactors of various capacities-220 ,500 Mwe & 1000 Mwe which are under operation.
- Six Reactors are under construction in various stages at Kudankulam-4 X 1000 Mwe, GHAVP, Kaiga 5-6.
- Proposals for construction of 10 numbers of 700 Mwe PHWR reactors in different states of India is sanctioned by Government and in pre project stage.
- NPCIL has directorates to perform Design, procurements, QA, Construction, Operation and maintenance of Nuclear power plants.

## II. NPCIL- QAWING – ORGANISATION STRUCTURE

- Corporate guidelines are issued by CMD of NPCIL for all the activities of NPCIL.
- Executive Director (QA) under CMD is responsible for QA& Management of all projects & stations of NPCIL and heads QA directorate.
- ED (QA) operates through group heads- Section heads and task performers stationed at various places in India.
- NPCIL QA has regional QA centers at 12 cities in India giving QA coverage for the materials manufactured by various suppliers.
- NPP (Nuclear Power Projects) and NPS (Nuclear Power stations) are having separate QA units looking after the QA aspects and reports to unit head (Project director/ Station director) and functionally to ED (QA)
- NPCILQAdirectorateisISO9001:2008certifiedbyBUV.

## III. SCOPE OF WORK FOR NDT AGENCIES IN NPCIL

- NDT is used widely in all the stages of Nuclear power plants (NPP).
- During procurement and manufacturing of materials and equipment NDT requirements like PT, RT, UT and leak tests are performed by the Nuclear Industry all over India as per NPCIL specifications.
- During construction of the NPPs EPC contractors perform Fabrication and erection of equipment which includes NDTs in every stage as per NPCIL specifications.
- During Operation and Maintenance of NPS, In service inspection of critical equipment is performed during plant shutdown using remote controlled NDT tools. UT, PT and leak tests are widely used.
- In all the three stages NDT agencies services are used by NPCIL through manufacturers, contractors or directly.

## IV. QA REQUIREMENTS FOR NDT AGENCIES

- NPCIL demands best quality products from suppliers due to the Radiation safety requirements and to ensure safety of Reactors.
- NPP Systems are divided in to four safety/ quality categories depending up on the criticality of the function performed by the system. NDT requirements are decided based on the same.

### A. Graded approach of QMS

- NPCIL follows graded approach for achieving the desired quality and reliability of the components of the systems. Same approach is followed during manufacturing, Construction, Operation and maintenance of the systems.
- The QA/QCrequirementsdecreasefromQA1toQA4qualitycategory
- NumberofstageInspectionandquantumofNDTismaximumforQA1systems
- NumberofstageInspectionandquantumofNDTisMinimumforQA4systems

### B. NPCIL QA activities on NDT Agencies

In general Vendors election and management is performed by QA groups with participation of other groups. NPCIL QA group performs following activities for NDT.

- Evaluation of NDT agencies, labs, welding consumables
- Review of the QA Management systems.
- Review of quality manual & system procedures.
- Review of NDT procedures.
- Authorization of NDT personal through assessment. Agencies need to submit the records with self-review and approval to NPCIL Performance of QC activities as per approved QAP.
- Identification & Review of non-conformances and suggesting possible remedies to designers & suppliers.
- Monitoring the performance of QA/QC activities of NDT agencies through Vender audits.
- Coordination with the supplier & other NPCIL sections for the issues related to supply.

**C. NPCILQC/Inspection activities on NDT Agencies**

- Witnessing and accepting Non destructive testing like LPT, RT &UT of weld joints & equipment parts
- Witness of Final testing like Hydro testing, Performance testing etc
- Verification of final report and NDT deliverable like RT films submitted by NDT agency.

**D. Qualification requirements for NDT agencies**

- NPCIL prefers Agencies accredited to ISO 17025 OR ISO 17020. Agencies need to meet the requirements of NDT, which includes acceptance of qualification, certification, competency and authorization of NDE personnel including availability of at least one Level-III certified person for the method planned to be subcontracted.
- Non-Destructive Testing (NDT) personnel of agency shall be qualified and certified in accordance with a nationally or internationally recognized NDT personnel qualification practices or standards such as SNT-TC-1A, ISO 9712,IS 13805 etc.
- Agency is adequately equipped and staffed (Agency shall have sufficient quantity of calibrated & working equipment).
- The agency needs to have necessary authorization from controlling authority to store radiographic sources and perform RT.
- The agency should have knowledge about requirements of calibration block preparation and capability for design and getting them manufactured.
- The procedures for training, certification and recertification for each level of personnel qualification shall be available with agency (in the form of written procedure).
- Agency shall have experience in the field of conducting NDE of more than 3 years in the equivalent jobs being planned to be contracted.

V. **CONCLUSION**

- Nuclear Power Project /Plants are unique due to the safety requirement of the plant during operation.
- To achieve the desired quality more stages of inspection by NPCIL QA /QC is performed at every stage.
- Regulatory inspection by the Atomic regulatory Board is conducted to monitor the quality & safety of systems.
- Insistence on documentary evidence of the work & performance of audit by NPCIL (External), are part of QA procedure.

Above is only guidelines and for information. For actual requirements NPCIL may be contacted.

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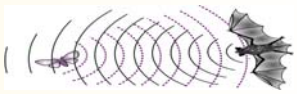
# ECHO BITES



Dear Sir,

Faculty Feedback

As an NDT faculty member, I find this newsletter to be an exemplary blend of academic rigor and industrial relevance. The technical articles, particularly the exhaustive compilation of magnetic testing standards and the deep dive into thermal imaging applications, are invaluable teaching resources. The "Innovation Sutras" series provides a crucial philosophical framework that bridges theoretical concepts with real-world product development, a perspective often missing in standard curricula. The inclusion of student contributions and industry expectations offers students a clear view of their future career landscape. The consistent quality, diverse topics covering both foundational and advanced NDE 4.0 concepts, and the focus on practical safety protocols like toolbox talks make this publication an essential, all-in-one resource for educating the next generation of NDT professionals. Finally the teaching of Mr.Balakrishnan sir is so informative it motivates me to learn more and more. My special appreciation for the entire newsletter team for their tireless effort.

Yours sincerely,
Dr.R. Gowri Shankar Rao
Professor & NDT Lab Coordinator,
Dept. of Physics, Vel Tech

**Dear Sir,**

I had immense pleasure after reading Sound Bytes 17. It gives more information about the distinguished standards details.

NDT service Providers' important qualities to sustain in the market to adhere to continual improvement in their process & Inspection, Laboratory experiments are used to validate the simulations & set limits to the theory. The importance of the Laboratory experience to achieve the goal has been explained with practical evidence. While going through the Toolbox, it reminds me of the "Gemba" meetings that took place on the shop floor before commencing the production activities. ToolBox speaks about safety activities. It is an essential requirement to perform the NDT activities. This issue reveals more information about ultraviolet radiation. Titbits are increasing the interest in knowing about surrounding activities. In the principles of Kaizen, we were advised to use **continual improvement** in place of *continuous improvement.*

**Thanking Mr. Manimohan, Dr.R.J.Pardikar, Dr. Prabhu Rajagopal, Mr.UmaKanthan Anand, Mr.John David, Mr.R.Balakrishnan, Mr. B.Ram Prakash, Chief Compiler and other Members of the Board, who shed their valuable time & effort to make the Great successes of this issue 17.**

**Congratulations to the office bearers for releasing the sound Byte regularly amidst obstacles.**

Thanking you,

**R.Jayagovindan, Life Member.**

# QUALITY MANUAL OF ISNT CHENNAI CHAPTER

**By Mr. Dwarakanathan S (SDN), Ramakrishna Titagarh Railwheels Limited**

## QUALITY POLICY

*At **INDIAN SOCIETY FOR NON-DESTRUCTIVE TESTING (ISNT)**, we are committed to delivering excellence in Non-Destructive Testing (NDT) education, training, certification, and services that meet or exceed the expectations of our students, clients, regulatory bodies, and industry standards.*

**We strive to:**

- Ensure competency-based training aligned with national and international NDT standards (e.g., ISO 9712, ASNT, etc.).
- Promote continual improvement of our training methods, assessment processes, and service quality through regular reviews and feedback.
- Maintain integrity and impartiality in all certification and evaluation activities, upholding the highest standards of professionalism.
- Develop skilled and competent professionals by providing practical and theoretical knowledge using industry-relevant techniques and technologies.
- Comply with all applicable statutory, regulatory, and accreditation requirements, ensuring credibility and recognition of our institution.
- Foster a quality-driven culture among our faculty, staff, and trainees through awareness, accountability, and training.

**Vision Statement**

To be a globally recognized center of excellence in Non-Destructive Testing by advancing knowledge, fostering innovation, and developing highly skilled professionals who uphold the highest standards of quality, safety, and integrity in the industry.

We aspire to lead the way in shaping the future of NDT through world-class training, cutting-edge technology, and a steadfast commitment to industrial growth and public safety.

Mission Statement (Road map to attain the derived vision statement)

**Mission Statement**

**ISNT** mission is to:

- Deliver high-quality education and training in Non-Destructive Testing, aligned with national and international standards.
- Develop competent and ethical NDT professionals through hands-on learning, technical excellence, and continuous skill enhancement.
- Promote a culture of safety, quality, and innovation to meet evolving industry needs and support structural integrity across sectors.
- Collaborate with industry, regulatory bodies, and academic institutions to ensure relevance, compliance, and advancement in NDT practices.
- Continuously improve our programs, infrastructure, and services through feedback, research, and emerging technologies.

Through these efforts, we aim to support industries in achieving operational excellence and maintaining the highest levels of safety and reliability.

Chairman & Managing Director

**To be continued ….**

DO YOU KNOW?

# Importance of Training for Industry Technicians and Inspectors

R Balakrishnan, Manager-CQ-BHEL (Retd)

Training is a critical component in ensuring the safety, efficiency, and quality of industrial operations. For technicians and inspectors—who play key roles in manufacturing, maintenance, and quality verification—systematic and continuous training is essential for the following reasons:

**1. Ensures Safety and Reduces Risk**

Technicians and inspectors often work in challenging environments involving heavy machinery, high temperatures, pressure systems, electrical equipment, hazardous materials, and other unpleasant working conditions. Training enables them to:

- Understand safe operating practices
- Follow risk reduction and emergency procedures
- Comply with safety regulations
- Identify unsafe conditions early
- Prevent accidents and improve overall workplace safety

**2. Improves Technical Competence and Skill Level**

Modern industries increasingly rely on advanced technologies such as NDT systems, automation, CNC machines, robotics, and digital inspection tools.

Through training, personnel can:

- Operate equipment correctly and confidently
- Troubleshoot technical issues effectively
- Apply relevant standards and approved procedures
- Perform inspections with accuracy and consistency

This results in improved productivity, precision, and reliability of work.

**3. Guarantees Quality of Products and Services**

Inspectors and technicians are responsible for ensuring product and process quality. Training helps them:

- Understand quality requirements (ISO, ASME, ASTM, API, AWS, etc.)
- Conduct inspections such as MPI, UT, RT, VT, PT, and DT effectively
- Identify defects accurately
- Minimize rework, scrap, and customer complaints

This ensures consistent, high-quality output throughout manufacturing and fabrication.

**4. Ensures Compliance with Standards and Certifications**

Industries such as oil & gas, aerospace, automotive, and power generation require well trained and certified personnel. Training through reputed training institutions ensures:

- Compliance with statutory and regulatory requirements
- Fulfilment of customer and third-party audit expectations
- Qualification as per ASNT, ISO 9712, AWS, API, and other standards

This promotes legal compliance and strengthens the organization's credibility.

**5. Supports Innovation and Adoption of New Technology**

With industries evolving toward digitalization, automation, and Industry 4.0, continuous training allows technicians and inspectors to:

- Learn emerging technologies and methods
- Adapt to advanced inspection systems (phased-array UT, digital RT, drones, AI-based inspections)
- Apply modern tools effectively

This helps industries maintain a competitive edge and encourages innovation.

**6. Enhances Productivity and Work Efficiency**

A trained workforce can:

- Complete tasks faster
- Reduce mistakes and delays
- Improve work planning and coordination

This directly contributes to higher productivity and operational efficiency.

**7. Builds Confidence and Supports Professional Growth**

Training improves employee morale by:

- Increasing job satisfaction
- Building confidence in performing critical tasks
- Opening pathways for career advancement

Organizations also benefit by retaining skilled and experienced personnel, which strengthens their reputation in a competitive market.

**8. Reduces Operational Costs**

Proper training helps industries avoid:

- Rework and scrap
- Equipment damage
- Inspection errors
- Unplanned maintenance

These reductions translate into significant cost savings and improved profitability.

**9. Strengthens Organizational Reputation**

Well-trained technicians and inspectors consistently deliver:

- High-quality work
- Accurate and reliable inspection reports
- Fewer failures, complaints, and field issues

This builds strong customer trust and enhances the overall reputation of the organization.

# STUDENT'S CORNER.

## ROLE OF NDT IN AEROSPACE INDUSTRY

**INTRODUCTION:**

Increasing demand for safe and reliable air and space transportation has led to rapid growth in the aerospace industry. This sector depends on the flawless performance of critical components such as fuselage structures, wings, engines, landing gear, and spacecraft systems. Aerospace components are subjected to severe operating conditions including cyclic loads, vibration, aerodynamic forces, temperature variations, and harsh environments. Over time, these conditions cause material degradation such as fatigue cracking, creep, corrosion, impact damage, and delamination in composites. Therefore, effective inspection and maintenance are essential, making Non-Destructive Testing (NDT) a vital tool for ensuring structural integrity, airworthiness, reliability, and safety throughout the service life of aerospace systems.

**NDT ENSURES:**

1. **Safety and Structural Integrity:** Safety is the foremost requirement in aerospace engineering, and NDT helps in detecting critical defects such as fatigue cracks, corrosion, delamination, and voids at an early stage. By identifying these defects before they crosses the thresh hold levels, NDT prevents sudden structural failures in wings, fuselage, engines, and landing gear. This ensures structural integrity and protects human life by maintaining a zero-failure tolerance approach.
2. **Quality Control and Material Reliability:** Aerospace components are manufactured using advanced materials such as aluminium alloys, titanium, and composite materials like GFRP and CFRP. NDT techniques are applied during manufacturing to verify weld quality, bonding integrity, fibre orientation, and proper curing of composite parts. This ensures consistent product quality, minimizes material rejection, and guarantees that components meet stringent aerospace standards.
3. **Maintenance, Certification, and Service Life Assessment:** NDT is essential for periodic inspection and maintenance of aerospace structures without dismantling or damaging components. It supports compliance with regulatory authorities such as DGCA, FAA, and EASA by ensuring airworthiness certification. Regular NDT inspections also enable the assessment of damage progression and residual service life, facilitating predictive maintenance and enhancing the overall reliability and operational efficiency of aerospace systems.

**CONCLUSION:**

Non-Destructive Testing plays an indispensable role in the aerospace industry by ensuring the safety, reliability, and structural integrity of critical components throughout their entire life cycle. From manufacturing quality assurance to in-service inspection and life assessment, NDT enables early detection of defects without compromising component usability. By supporting strict regulatory compliance, preventing catastrophic failures, and enabling predictive maintenance, NDT significantly enhances operational efficiency and airworthiness. As aerospace systems increasingly adopt advanced materials and complex designs, the importance of NDT continues to grow, making it a vital tool for sustaining safe and dependable aerospace operations.

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**FINAL YEAR OF AERONAUTICAL ENGINEERING**
**RAJALAKSHMI ENGINEERING COLLEGE**

ISNT
INDIAN SOCIETY FOR NON DESTRUCTIVE TESTING

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