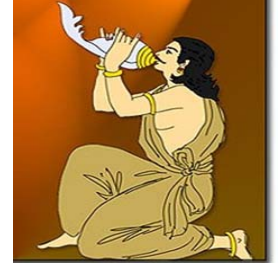


# SOUND BYTES

DECIBEL 21  
FREQUENCY 2



Official Newsletter of ISNT Chennai Chapter



## OUTLOOK

Jai Ho! My chest swelled with pride every time our tricolor was hoisted at the Tokyo Olympic stadium. It is an indication of the transformation taking place to create a resurgent India. I shudder to visualize the magnitude of the loan burden if Vaccines were not produced in India along with syringes and PPE. We have clearly marched away from dependency to self-sufficiency and more.

This is possible, since we had shed the mental block of slavery and are really getting liberated. This new found self-confidence along with "Made in India" movement has ushered in a result oriented approach culminating in generating innumerable opportunities. Let us logically analyze the present scenario.

This country with a population of 1.4 billion is a huge market place. Every country of the world will vie for a slice of this pie through various paths. Our choice is either we turn inwards and build wealth & wellbeing or turn outwards and become beggars.

We can compete in the world market only if we are able to manufacture products or provide services that are of world class at an appropriate cost. NDT is synonymous with both Quality and avoiding waste. To test we need certified personnel. This aspect is emphasized in the article -Experience Essence of Efficiency. ISNT, had envisaged this situation and through its training arm NCB, (ncb@isnt.in) had successfully designed its own world class Training & Certification program (ICN) apart from IS:13805. We invite you to partake in the process of paradigm shift and reap the benefits.

*B. Ram Prakash*

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**Contact Person**  
**Er.N.Karunanidhi, CEO**  
**Ex- Sr. Asst. Director of Boilers, TamilNadu**  
**Phone No. 044-24329697, Cell: 09360308049**

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## Opportunity

Desire to contact > 10,000 individuals connected with NDT, then we invite you to become a sponsor

Indian Society for



Non-Destructive Testing  
Chennai Chapter

## Indian Society for Non-Destructive Testing Chennai Chapter

Module 59, 3<sup>rd</sup> floor, Readymade Garment Complex. SIDCO Industrial Estate, Guindy, Chennai 600 032.

Phone 044-45532115, 7200086075.

Email: [isntchennaichapter@gmail.com](mailto:isntchennaichapter@gmail.com); Website: [www.isnt.in](http://www.isnt.in)



## CHALLENGES AND SOLUTIONS

ULTRASONIC EXAMINATION OF BEARING OVERLAYS – SIMPLE CASE STUDY  
- BY SHRI R. SUBBARATNAM( RETD. IGCAR SCIENTIST)



### INTRODUCTION:

Rotating parts are vulnerable for their wear and tear. These parts are overlaid by either hard materials or soft materials depends on the service conditions to reduce / not affected by wear and tear. Particularly heavy rotating parts like turbine bearing is overlaid with soft Babbitt material. Whereas some of the critical machineries are over layed by hard Satellite or Colmonoy materials. In these cases NDE plays a vital role of finding overlay thickness and discontinuity detection. Out of other NDEs Ultrasonic plays important role based on the discontinuities expected and the thickness criteria's.

### THE REQUIREMENTS:

As stated above mostly Babbitt (softer material than base material) is deposited in the outer casing of turbine bearing, as shown below. The Babbitt overlay has to be checked for thickness and for any discontinuity. Mostly the discontinuities are interface fusion (debonding) and crack. These are best detected by ultrasonic examination than other NDEs.



### PROBLEM:

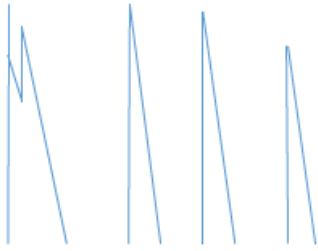
These type of overlays has to be checked for two features namely thickness and discontinuities. One of the **main discontinuity is lack of bonding / fusion in the interface** between the Babbitt and the base material. These are best detected by ultrasonic examination now a days. But previously the detection was done only by destructive tests by breaking the layer of Babbitt. This will be loss of component.

Generally the **overlays are characterized** with respect to Ultrasonic examination as **Reflective interface or Transmissive interface** according to the overlay material and their impedance. The Satellite and Babbitt overlay is reflective interface whereas Colmonoy is Transmissive interface. This reflective interface is **disadvantage in detection of debonding / interface fusion**. As these overlays **produces continuous interface echoes**, hence difficulty in identifying the lack of bonding.

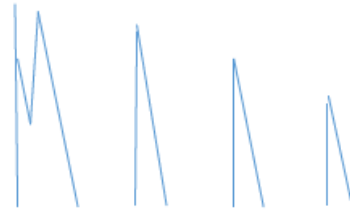
As stated above, it is a reflective interface and this will produce multiple echoes equivalent to the thickness of Babbitt overlay. This interface signal from good bonded area has to be fixed for particular amplitude (60% - 70%) for acceptance. Please note all examination area will provide this interface echo. Any increase in this amplitude indicates presence of debonding.

Examination was done with transducers when conducted from Babbitt side, after rough machining keeping ~4 - 5 mm of Babbitt. 4/5 MHz 5/10 dia transducers used when conducted from base metal side.

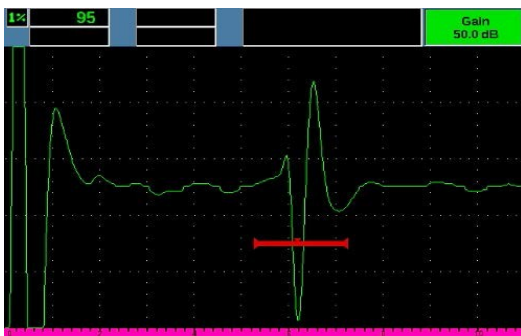
Many turbine bearings were tested based on the above procedure. The same is depicted in the following pictures for information.



**Multiple High amplitude interface signals than the set value, indicating debonding**



**Multiple interface Signals with AMP equivalent to set value (say 60%) indicating bonding**



**Signal indicating debonding**

(High amplitude sharp signal)



**Signal indicating bonded area**

(Equivalent to set amplitude and wide signal)

Above pictures taken from M/s Olympus for reference.

**Details of Babbitt material:**

Babbitt metal is characterized by its **resistance to galling**. Babbitt metal is soft and easily damaged, which suggests that it might be unsuitable for a bearing surface. However, its structure is **made up of small hard crystals dispersed in a softer metal, which makes it a metal matrix composite**.

Babbitt can be tin or lead based; 86% tin, 7% copper, 7% antimony used normally; Density-7.3 gm/cc. typically ultrasonic velocity will be 3350 m/s for tin-based Babbitt alloys and about 2285 m/s for lead-based Babbitt. Impedance (Z) value: Steel 46 & Babbitt 26.,



The essence of  
a successful  
work experience

Experience Essence of Efficiency

### Importance of the engagement of certified NDT Personnel For carrying out NDT operations.



During my early quality surveillance activities at many sub-vendor works, I observed that the importance given to performing Penetrant Test in some of the Indian Industries was not up to the acceptable level. I wish to narrate an incident as a proof of my statement.

In one of my inspections during witnessing the **Visible Dye Penetrant Test** performed on the weldment of a component I noticed relevant indications after the application of the developer on the testing area. I marked them as the defects, since they exceeded the permissible limit as per the specification.

The MD of the Company who had accompanied me had a doubt on my evaluation since the component was cleared by their NDT personnel after Internal Penetrant Testing. He wanted clarification whether the indications were due to non relevant reasons. He also expressed that the indications appear only when the testing was carried out in my presence.

I immediately called their NDT Technician who had earlier performed a PT test and asked to perform a PT test on another component that was cleared by them, in the presence of their MD.

The procedures adopted by them were as per code up to the step of application of the developer. There after red indication appeared on the surface after the application of the developer, confirming presence of true relevant indication. Immediately, the technician proceeded to wipe the indication. At once I stopped him and questioned about his action. Then he replied that since his supervisor has instructed that **no red** indication is permissible on the component after the application of the developer, he wiped all red indications wherever they appeared on the component. Further when I questioned him about training I learned that the technician was not a certified Level-I or Level-II personnel from a recognized institute.

Now the MD of the Industry realized the problem and accepted to engage qualified NDT personnel for Penetrant Testing of their components thereafter.

From then on whenever I went for inspection I insisted that any NDT test shall be conducted by a certified NDT technician and the report prepared and signed by a level-II or Level-III as per the standard.

R.Balakrishnan

## ISNT CHENNAI CHAPTER NEWS



### 1. Addition of Members - Nil

Total Members - 695

### 2. Courses Conducted

1. RT Level-II Course Director: Mr.E.Sathya Srinivasan  
Examiner: Mr.K.Subramanian
2. UT Level-II Course Director: Mr. E.Sathya Srinivasan  
Examiner: Mr.P.Anandan / Mr.Nicolas
3. MT Level-II Course Director: Mr.R.Vivek

### 4. Courses Planned

S.No	course	From	To
01.	UT Level-II	15.09.2021	26.09.2021
02.	RT Level-II	20.10.2021	31.10.2021
03.	MT & PT Level-II	11.11.2021	21.11.2021

### 5. Technical talk held from June 2021

S.No	Date	Topic	Speaker	Venue	No. of participants
01.	13.06.2021	'Fiber Optic Technologies for NDE & SHM'	Prof. Balaji Srinivasan, Head Fiber Lasers and Sensors Laboratory, Department of Electrical Engineering, IIT Madras, Chennai,	Video Conferencing - MS Teams	74
02.	30.07.2021	"In-situ testing of wire ropes used in suspension bridges and other installations"	By Dr. Alexander Shalashilin, INTRON	Video Conferencing - Zoom	325

### EC meeting

1. The Second EC meeting was held on 1<sup>st</sup> August 2021 both physical and virtual formats. Out of a total of 20, 5 were physically present and 15 attended through video conferencing.

### HO news & other chapter news

ISNT Head office announcement and Webinar of other chapter were uploaded in the ISNT Website [www.isnt.in](http://www.isnt.in).



## TECHNICAL TALK ABSTRACT

28.03.2021 - **“Probability of Detection and its relevance to practical NDT”** By Dr. Phani Surya Mylavarapu, Defence Metallurgical Research Laboratory, Kanchanbagh P.O., Hyderabad-500058



Modern day requirements pose unique challenges in the design and development of structures/components/products across various industries. In order to successfully develop these challenging component and products, a consortium approach of academia, R&D and industry is envisaged. However, the role of each of these three facets of personnel in design and development is restricted by the availability of funds and opportunities available. In spite of several successful partnership models between academia, R&D and industry, the challenge of reliability of a component is paramount in nature. This poses severe demand for successful implementation of non-destructive techniques all through the design, development and production stage. In addition, the role of NDT is far more envisaged during the life enhancement or revision stage due to the high cost in developing new technologies. Amongst the existing life enhancement methodologies based on fatigue design, damage tolerance occupies a prominent role.

The current generation of aircraft structures are being designed using a damage tolerance based approach. The concept of damage tolerance was introduced in an attempt to allow each individual component in an engineering structure to be used to the limit of its ability. Depending on the materials used in manufacture, many engineering components can tolerate the presence of defects provided they do not exceed some critical size. The critical size is the point at which the defect becomes unstable and very rapid crack growth to final failure may be expected. Damage tolerance allows each individual part to be operated until a crack is detected by the best available inspection method. Hence, knowledge of conventional and advanced NDT techniques reliability is of paramount importance in the structural integrity analysis and lifing of aero engines.

This presentation will discuss the NDT methodology generally adopted for efficient implementation of damage tolerance concept (lifing) to aero engines. In this regard, knowledge of Probability of detection which is a function of crack size/orientation/location with detectability of technique is important. The presentation will discuss the definition, significance and challenges involved in estimating the probability of detection of NDT techniques.

### Biography

Dr. M. Phani Surya Kiran has received his Bachelor of Engineering Degree in Mechanical Engineering from Andhra University, Visakhapatnam in May 2001. After his graduation he pursued his masters at the Department of Mechanical Engineering at University of Missouri- Kansas City, U.S.A and graduated in Aug 2003. Further, in 2007, he obtained his Ph.D. degree from Louisiana State University, Baton Rouge, U.S.A with specialization on “Non-Destructive Characterization of Advanced Composites used in Aerospace and Defence Applications.” After couple of internship experiences at M/s Olson Engineering, Inc., Wheatridge, Colorado, USA working on "Applications of NDT in Concrete Industry", and M/s Intel Corporation, Chandler, Arizona working on "NDT applications for reliability in electronic industry", he has joined Defence Metallurgical Research Laboratory, in the year 2010. He is currently working as Scientist “E” in Non-Destructive Testing Group. His current research interests include, reliability assessment of NDT techniques for aerospace applications, modelling of NDT techniques, surface treatment techniques for beneficial residual stresses in aeroengine components and applications of residual stresses in life revision studies of aeroengine components, characterization of powder metallurgy based ceramic composite materials used for advanced armour and structural applications using advanced NDT Techniques. He has over 50 publications including various international journal papers, conference proceedings and presentations. In the year 2019, he has been awarded the laboratory scientist of the year.



07.04.2021- "Innovative investigation techniques and data processing for the assessment of bridges" by Dr. Guido Tronca of Italy, - ISNT Chennai Chapter in association with SRM Institute of Science & Technology (Ramapuram Campus) and Proceq of Singapore.

### Abstract

This talk will provide an overview of the Investigation techniques that are currently being evaluated, with specific emphasis on the most innovative and non-conventional approaches. More, specifically, the use of ultrasonic tomography will be illustrated by means of some of the typical applications on conventional and post-tensioned concrete structures.

The whole lecture will be held under a strong practice-driven perspective discussing all applications by means of explanatory real-life cases.

### Biography

Dr. Guido Tronca has over 20 years of experience in the field of non-destructive Testing for civil engineering, gained in academic research. Currently active in the industry as a service and training provider.



18.04.2021 - "Digital Radiography – Image Quality Metrics & Factors affecting Image Quality" by Shri V. Manoharan, Former Senior Scientist at GE Global Research and Scientific Officer at BARC/IGCAR.

### Abstract

Aerospace, Automotive, O&G and other Industries are moving towards film replacement by Digital Detector Arrays considering the benefits of digitization. Several standards/ Codes have been published by International Standards Organization (ISO), American Society for Testing Materials (ASTM) to support the transition from film radiography to DR.

This presentation will cover various image quality metrics such as Basic Spatial Resolution (BSR), Normalized Signal to Noise Ratio (SNRN), Contrast Sensitivity, Contrast to Noise Ratio (CNR), Lag and measurement procedures of image quality as detailed in standards. Various system parameters such as a type of phosphors used, thickness of phosphor, pixel pitch, calibration procedure, focal spot, geometrical magnifications that control image quality will be discussed. Compensation principles, optimization of system parameters, evaluation of image quality performance and long-term stability, and selection of DR system for a given application will also be discussed.

### Biography

Venugopal. Manoharan has recently retired as Senior Scientist from GE Research, Bangalore. Prior to joining GE, He worked as scientific officer at Advanced Fuel Fabrication Facility, Bhabha Atomic Research Center (BARC) and Division of Post Irradiation Examination and NDT development, Indira Gandhi Center for atomic research for 13 years. He has more than 32 years of experience in the field of Research in NDE.

He received National NDT award from Indian Society for Non-Destructive Testing for his contribution in NDE research.

ASNT Level-III certification in RT, IR, UT, PT and ET

His area of interest is Industrial Radiography, Digital x-ray imaging, Positron annihilation spectroscopy, quantitative radiography Model based PoD, Applications of Micro and Nano x-ray computed tomography, Pipeline and pressure vessels integrity and Training in NDE.

He has more than 15 issued patents and 30 technical publications in national and international journals & conferences

## Chat room



2 line introduction to yourself (education, experience, current role) after the affiliation

Maria completed her Doctorate in NDT from the University of Bristol in 2014. She worked in NDT Research & Development roles for 3 years and joined Screening Eagle Technologies in 2018.

**Dr. Maria Felice**



**Dr. Prabhu Rajagopal**

1. What attracted you to the NDT industry?

As an engineering undergraduate student, I was interested in various topics from material properties to manufacturing efficiency, so I was attracted to NDT because it covers such a broad range of topics. NDT techniques themselves are very technical and their applications are extremely broad. I was also strongly attracted to the ultimate aim of NDT which is to save lives.

2. Please tell us about your role at Proceq/ Screening Eagle and how you are driving change in this sector?

I was a Regional Sales Engineer for 2.5 years, providing commercial and technical support on all our products to partners and customers in Asia. This gave me a very good introduction to the NDT business, for both metal and concrete. I am now Product Marketing Manager for the region, which involves explaining and publicizing the benefits of our products; through social media, writing case studies and providing online training and webinars. Screening Eagle products are differentiated from other NDT products because they are ultra-portable, wireless and cloud-connected. And importantly the focus is no longer on the hardware but on cutting edge software. Part of my role is therefore to encourage people to make the shift from a 'hardware' mindset to a 'software and data' mindset.

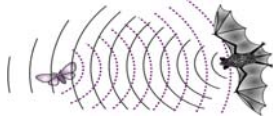
3. What are the core technologies at Screening Eagle that you are excited about?

I am excited about our Ground Penetrating Radar (GPR) technology. This uses radio waves to detect structural elements such as rebars inside concrete and utilities in soil or under roads etc. When I joined the company in early 2018, Screening Eagle had just launched its first GPR instrument. Now, 3.5 years later we have 4 GPR instruments on the market, all of them doing very well. Our GPR hardware is unique because it is the only commercially available compact SFCW technology. SFCW stands for Stepped Frequency Continuous Wave which means that the instruments sweep through a range of frequencies instead of only transmitting energy around a center frequency (which is what pulsed systems do). Our GPR software is revolutionary because it enables users to do advanced processing instantaneously on the field, with swipes and taps of fingers on a tablet.

4. What upcoming NDT technologies do you find exciting? Which of these are coming out of Screening Eagle?

To be honest it is not upcoming NDT technologies which excite me the most, but more the enabling technologies which make NDT more effective. Things like automation, mobile devices and cloud computing. Many people seem complacent when it comes to old-fashioned technology in their workplace, like only being able to access data from one PC, or sending faxes! Whilst they would never settle for such inconveniences in their personal lives. At Screening Eagle, we utilize all the latest technologies to make inspectors' work more efficient, safer and even enjoyable!





## Echo Bites

**Congratulations to Chennai team and best wishes,  
Thanks and best wishes,**

**Diwakar Joshi**

**Congratulations to the Chennai chapter, it looks good, keep going.**

**Regards**

**ISNT-Bengaluru chapter**

I like to congratulate you & the Chennai Team for the efforts in bringing out an informative newsletter.

I know what it takes to make a newsletter possible, which is a high appreciation of the team work.

All the best for future issues & keep up the good work.

Best Regards,

Rajul Parikh

**The E - News letter is very impressive and informative. Congrats**

**Regards,  
K.Viswanathan  
Advisor**

On behalf of NCB, I would like to congratulate the entire team from ISNT Chennai Chapter for launching the e\_Newsletter successfully. I am sure it will be a great success amongst the members and will be an important communication tool for widely spreading information of relevance and importance.

Wishing the venture our very best.

Dr.Shyamsunder Mandayam  
Chairman, National Certification Board

**Best wishes for the the E-Newsletter.**

**-elankumar  
Department of Physics  
RKM Vivekananda College  
Chennai-600 004.**

## READERS DID NOT DIGEST



Dear sir,

Thanks for your reply. I got it. You mean ASTM 5-1T means, 5 means penetrameter selection shall be 5% of material thickness 1T means least wire dia visible?. Here we have jacket pipes which carries sulphur. In this in longitudinal weld achieving sensitivity is very hard mainly in 3 inch and 4inch dia. Here we are using wire type IQI , how to calculate sensitivity for wire type IQI in jacket piping?. Any code references?

Please give some examples for

Pipe outer dia 4x6.02

Inner dia 3x5.49

Thanks for you valuable reply sir.

Solaimuth G

219318

Sir

Please note that Your understanding is wrong. Kindly note that ASTM 5 - 1T means it is a plaque (Plate) type penetrameter (IQI) and not wire type. ASTM - Represents the ASME type. Number 5 represents 5 thou the penetrameter thickness and 1 T represents the center hole having diameter equivalent to 1 time thickness.

Wire type penetrameter (IQI) sensitivity is calculated by {The least wire dia seen on the radiograph / Material thickness}/ 100.

The basics of these you can have in ASME Section V.

Please provide complete details regarding yourself along with NDT qualifications.

With Regards

R. Subbaratnam

## DO YOU KNOW?

# BACK BASICS 2

### Ultrasonic Practical Questions

- When a 30mm plate is tested by using a 5 MHz, 15 mm dia, normal beam probe, the second back wall echo is obtained at scale division 2 and the third back wall echo at scale division 8. The equipment has been calibrated for the test range of:
  - 0 to 100 mm
  - 50 to 100 mm
  - 20 to 70 mm
  - 20 to 50 mm
- When setting metal path range using the V-2 block, keeping a 70 degrees probe facing the 25 mm radius, the echo from the 25mm radius appears at scale division 0 and the next echo appears at scale 7.5; the flaw detector has been calibrated for the test range of
  - 0 to 100 mm
  - 0 to 75 mm
  - 25 to 125 mm
  - 25 to 150 mm
- A 45 degrees, 4 MHz angle beam probe is used to test a butt weld in a 40 mm thick flat plate. The CRT is calibrated to read 0-50 mm in Depth Range Calibration. An indication is observed on the screen at 6.0 division. The calculated surface distance of the reflector from the beam index is :
  - 60 mm
  - 30 mm
  - 26 mm
  - 59 mm
- Can a double crystal probe be used as a single crystal (normal beam) probe in case of emergency?
  - Never, since the crystal will be damaged
  - No, since the flaw detector will not work in this case
  - Yes, provided required sensitivities at required metal paths can be demonstrated on reference blocks.
  - Yes, only when the frequency is not very high
- To set metal path range using V-2 block, prior knowledge of the probe angle is necessary. This statement is
  - true
  - false
  - true for only miniature angle probe
  - false for only high frequency probes
- A longitudinal wave having frequency of 4MHz takes 2 microseconds to travel 25mm in a material. The longitudinal waves of 25MHZ will take how much time to travel 50mm in the same material?
  - 2 microseconds
  - 4 microseconds
  - 100 microseconds
  - data is insufficient for calculation.
- A normal probe has near field of 40 mm in steel. Therefore its near field in water will be approximately
  - 10 mm
  - 20 mm
  - 160 mm
  - more data is required for calculation
- A 2 MHz, 10mm dia 45 angle beam probe is used for testing a steel plate. A discontinuity indication is obtained at a beam path of 35 mm. The depth of the discontinuity from the scanning surface is
  - 25 mm
  - not possible to be determined from the given data
  - 35 mm
  - 10 mm
- For steel, the range is set for 0-100 mm. For Cu, what will be the range, if no. of division is 10?
  - 10 mm/div.
  - 7.9 mm/div.
  - 12.6 mm/div.
  - 5.6 mm/div.
- In the above case if a copper bar is 75 mm, at which division BWE will appear?
  - 7.5
  - 9.5
  - 8
  - 6.5

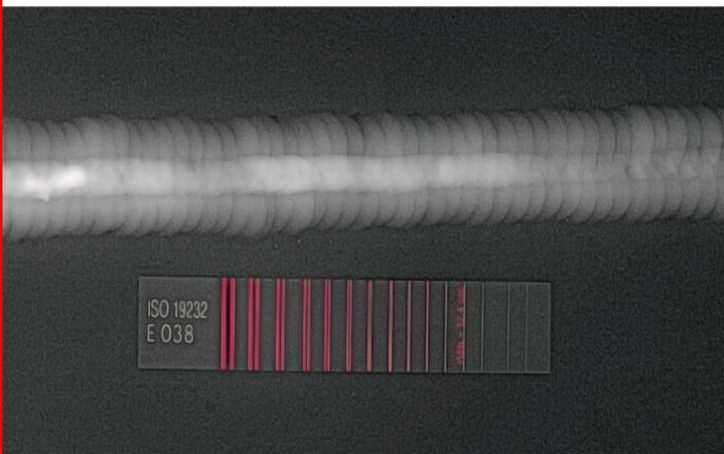


Within a few years, the landscape of industrial radiography has changed drastically. Whether you are still a huge fan of silver film, or a die-hard proponent of digital radiography, it is hard to ignore the impact of the digital transformation in our lives.

As a pioneer in the NDT industry, **Teledyne ICM** has designed products to answer these new requirements and created a "*Digital Radiography Bundle*".

These packages are made of a Generator, a Go-Scan Detector and our Sherlock NDT software with its touchscreen tablet.

A quick and easy choice for every application



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<p>SPEC-150</p> <p>Iridium-192/Se-75 Projector</p>	<p>SPEC-300</p> <p>Cobalt-60 Projector</p>
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Chennai Chapter**

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