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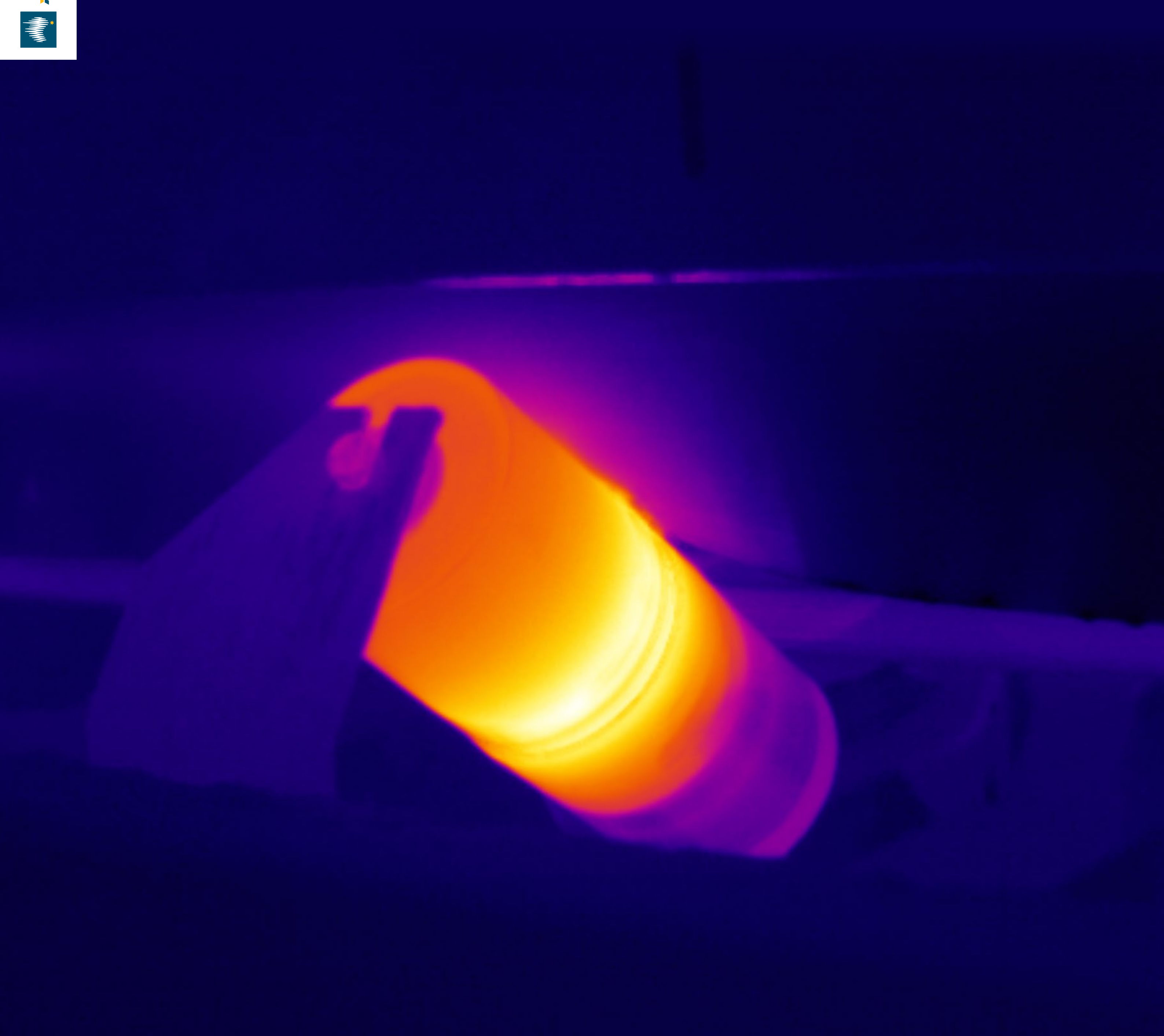
AINDT

INDUSTRIAL EYE

THE OFFICIAL JOURNAL OF THE AUSTRALIAN INSTITUTE FOR NON-DESTRUCTIVE TESTING

RADIOGRAPHY ▪ ULTRASONICS ▪ EDDY CURRENT ▪ PENETRANT ▪ MAGNETIC PARTICLE

VIBRATION ANALYSIS ▪ LUBRICATION ANALYSIS ▪ THERMOGRAPHY ▪ ACOUSTIC EMISSION



2023 OPEN EDITION

President's Message

Richard Stocker

Welcome to the final issue of the Industrial Eye for 2023. As many of you are aware, we are currently working under the leadership of an interim Board of Directors consisting of myself as President, Justin Cavanagh (Vice President), Nick Eleftheriou (Immediate Past President), Damien Clarke (Treasurer) and introducing Angelo Zaccari (General Board Member). Rounding out the team is the Federal Council Delegate, Darren Quinn.

Due to some irregularities in the nomination and ratification process, we will be holding an out of cycle Board Nomination process in the first 2 weeks of January, to vote in the Board until the next Federal Council Meeting in 2024, so I encourage anyone who is interested in a Board position to put your name forward and submit an application through the federal office. Nomination forms will be sent to all financial, honorary and retired members in due course via the federal office. So keep an eye on your inboxes.

As you may know, the year included a very special milestone for the AINDT in which we successfully delivered a world class conference locally here in Melbourne, APCNDT 2023 (the Asia Pacific Conference for NDT). I would like to extend a special thanks to Mr Paul Grosser for taking the lead and showing the world how it's done! Also, the organising committee and many volunteers at the conference along with those who delivered such a high calibre of technical papers.

We also recognised an additional income stream from AICIP through delivering secretariat services which has helped build on our financial position and market share in the inspection industry.

We have further developed our digital strategy by taking our examination process online and we continue to improve on this process and new way of doing things. A refresh of our website is also in its final stages and will be launched very shortly.

I also wish to note that I have an aim this year to enhance the utilisation and communication with the federal council (aside from their representative during the BoD meetings). As long as I can remember, we have always seemed to limit FC meetings to the annual weekend official session occurring over a couple of days. We will commence a quarterly FC catch up, on MS Teams once the new board is voted in during the January election, to ensure we stay more connected and also give the FC ample opportunity to shape the institute and provide direction to our members. This will be a year of transparency and collaboration, which I believe will drive value, trust and a great platform for our institute to thrive.

We are also acutely aware that this year, and in particular over the recent months, has provided some significant challenges.

We have seen a very long term CEO in Mr Peter Milligan depart the federal office, for whom we would like to recognise and thank for his many years of service to the institute, along with the departure of his replacement.

In regards to the recruitment and appointment of an Executive Officer, we will seek a candidate that has strong business acumen, leadership and interpersonal skills, rather than focussing on a deep technical knowledge (this is why we have a Certification Board). We will also be recruiting a Certification Manager to run and streamline this service and function of the AINDT.

To enhance this process:

- We have engaged a specialist third party vendor to facilitate this recruitment process on behalf of the AINDT.
- We have formed a candidate interview and review panel, championed by honorary member and past President Neil Young, that does not consist of majority representation from the Board of Directors or the Certification Board or contain any bias. We sought interest from representation of the FC along with Past Presidents and industry professionals etc. which was warmly received to carry out the evaluation and make recommendations. This panel now has incredible representation from the industry and we look forward to their recommendations.
- We understand the need to make a really strong decision on these positions and quickly, as our members will not and should not wear a revolving door of CEO's.

The AINDT will continue to function as per normal and we have a great team of both dedicated staff and active volunteers to assist with the day to day running of the institute.

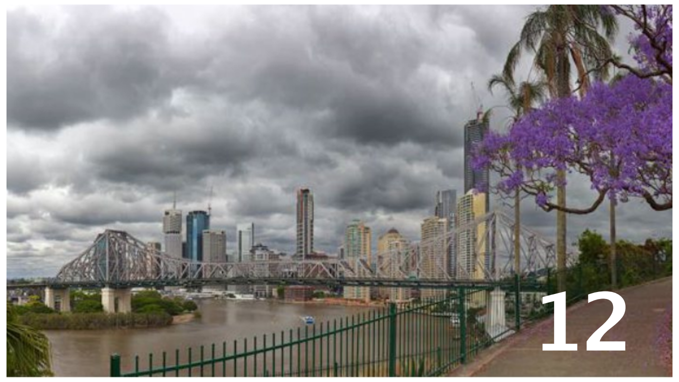
In Closing

I would like to acknowledge the life members, past presidents, current and previous Board of Directors, the Federal Council team, Office bearers, staff, and volunteers for their outstanding efforts over the past 12 months.

We have some of the best people in the institute working at and with the AINDT and their efforts will continue to place the industry in a strong position to capture any and all opportunities ahead.

Thankyou.

Richard Stocker



AINDT News

Industry News

Technical Article

Product & Services

Cover Image
Conveyor belt roller showing signs of failure in service.

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INSTRUCTIONS TO AUTHORS OF TECHNICAL ARTICLES

Manuscripts should be submitted in electronic form:

1. in word
2. typed with single spacing
3. with figures as tif or jpeg files at better than 300dpi

Manuscripts should include:

1. symbols and abbreviations conforming to recognised standards; metric units (SI)
2. references listed, after the text, in the order in which they occur in the paper
3. references indicated in the text by arabic numerals in square brackets
4. tables and figures numbered separately but consecutively with Arabic numerals and brief, descriptive titles
5. a reference in the text to all tables and figures
6. graphs and diagrams made with lines of sufficient thickness to reproduce well
7. titles and address of authors

Procedure for submission of manuscripts:

1. articles should be sent to: journal@aindt.com.au
2. manuscripts will be submitted to referees who will remain anonymous
3. reprints of each paper will be supplied free to the author

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Condition Monitoring Certification Board (CMCB) – Chairperson's Message

Shawn Moore

The Condition Monitoring Board met in October for the annual in person meeting. The meeting was successful meeting covering a broad range of topics.

In summary, the board discussed in summary the following:

- Recording of internal records of approved training bodies.
- A better means for the CMCB to communicate and collaborate board matters. Including data collection and records to enable the board to function more efficiently.
- Better and improved access to certification data associated with the AINDT data base.
- Transition to an online examination rather than tablet computer. This would enable improved access to exams for candidates and provide better security of the examination papers. This is opportunity for the board for better accessibility and security of the examination process for certification.
- Review of the CMCB board record keeping and procedures.
- Review by the board of the Guide to CM Qualification and Certification.
- Review of internal procedures to certification process and compliance.
- Regular review of approved training organisations by the board to ensure the quality of the training meets the minimum standards for ISO certification.
- Updating the assessment procedures for approval of new approved training bodies.

With the appointment of a new certification manager the above planned works will enable the action by the board to efficiency make continuous improvement to the operation of the CMCB.

Left to right (Erik Thorup, Guy Salathiel, Sarel Klopper, Salah Attia, Dana Lake, Juandri Potgieter, Keith D'Cruz ,Shawn Moore, Daniel Campbell, Paul Rand)

Left to right (SK,SA,PR,DL,JP,KA,DC,GS,SM,ET)

The transition to online examinations of candidates for certification is an improvement for accessibility and integrity of certification into the future. Online examination would enable ATB and AQB organisations to have better accessibility to the certification examination.

This will enable easy access to examinations where training organisation conduct training outside of Australia.

Shawn Moore
Chairman – AINDT CM Certification Board

Non-destructive Testing Certification Board (NDTCB) – Chairperson's Message

Due to both work commitments and personnel reasons, I have resigned from the AINDT NDT CB Chair-persons position. Currently, the AINDT doesn't have either a CEO or CSM (Certification Services Manager), and I can't commit to trying to cover the role of the CSM until the role is filled.

I can assure you that the NDT CB will always place the interests of the members first. I wish to thank the office staff for their tireless work during this time of flux.
I will be remaining on the NDT CB for the foreseeable future in a less demanding role.
Thank you. Barry Cooper

CMCB Meeting 2023

Another year has gone, and we met again at this year's AGM. It was a successful meeting attended by all board members. It is always very good to catch up face to face and share the news and developments in all technologies that are included under the Condition Monitoring banner.

The year has been quite successful with an increase in participation in our exams. We are now focusing on a plan to attract more training organisations to use our exam and certification process. This will produce additional income.

To ensure that our current procedures meet the relevant standards, we have discussed our examination and accreditation process. We decided to review and update all relevant documents in the system.

Another topic was the approval of the questions that are used in the exams, as well as who should have access to those questions that have been selected for the examination sets.

We are currently in the process of creating VCAT III exam question sets, so the revised process will come handy during the preparation, review, and approval stages of the whole procedure.

One of the CM technologies that is currently not well represented under the AINDT, is oil analysis. Therefore, we are investigating options on how to attract oil analysis experts and practitioners to join CMCB. That will enable us to create the exam questions for oil analysis and implement the examination process.

CMCB has also approved a new member on our board, Salah Attia Salah offers extensive knowledge and expertise in turbomachinery and all aspects of Condition Monitoring and Vibration Analysis. He is also an accredited trainer with customers in Australia and overseas. This may open additional opportunities for AINDT.

We all look forward to working on all those activities during the year.

Membership Registrar

Hi AINDT members,

AINDT has recently held the 56th Annual General Meeting on the 13th Oct 2023 in Melbourne with a healthy 31 members present.

This included confirmation of previous minutes of the 55th AGM, receipt of annual report, statement of income and expenditure, appointment of auditor report and election of office bearers (directors). Unfortunately, due to election process not following our constitution an out of cycle nomination is required and was sent out on the 6th Nov 2023. In the interim the voted directors will carry out AINDT duties until the re-election is completed.

The Federal Council meeting was held on the 14th to 15th Oct 2023 with the following outcomes:

- Recruitment of a Certification Manager and Executive Officer through 3rd party.
- Recruitment interview panel being formulated for both positions.
- Development of AINDT Certification Board, Federal Council and Board of director members Position Descriptions by Membership Registrar.
- Administration tem to help with backlog at the Federal Secretariat.
- New AINDT website has been distributed for feedback by our members.
- AINDT is working with Standards Australia to offer professional feedback of various standards.

Just a reminder that each branch president meets with the membership registrar and Federal president to discuss AINDT activities.

These include Federal Office updates (Website, social media, and certification), AINDT Standards Board outcomes, Future events (National and International) and state branch reports.

Kind regards

Craig Taylor
AINDT Membership Registrar

AINDT Federal Councillors, Certification Board Members and Convenors of Committees of Federal Council 2022 – 2023

The AINDT constitution requires that each branch nominates councillors to Federal Council, depending on the size of branch membership (i.e. for 20-100 members, 2 representatives; 101-200 members, 3 representatives; and over 200 members, 4 representatives).

The AINDT constitution also gives Federal Council the power to appoint committees to which it can delegate responsibility, to propose policy and perform specific functions.

The two main committees of Federal Council are the Executive Committee; comprising of the Federal President, Federal Secretary, Federal Treasurer, Immediate Past Federal President, Federal Vice-President and Secretariat Liaison, who make decisions on routine matters and any specific matters delegated by the Federal Council and Certification Board, which is responsible for certification scheme.

Convenors of committees are required to report annually to Federal Council on policy and coordination of branch/committee activities in their particular field of activity.

FEDERAL COUNCILLORS

Board of Directors
President: Richard Stocker
Immediate Past President: Nick Eleftheriou
Vice President: Justin Cavanagh
Treasurer: Damien Clarke
Secretariat Liaison: Angelo Zaccari

New South Wales Branch
Darren Quinn
Neil Burleigh
Stuart Smart

Victorian Branch
Paul Trigg
Pranay Wadyalkar
Mark Welland

South Australia Branch
Craig Taylor Membership Registrar
Jordan Beinke
Luke Jones
Tyson Jenke

Queensland Branch
Ian Hogarth
Jim Tibani
Roger Hardy

Western Australian Branch
Colm Kinsella
Mike Needham
Derek Bruns

NDT CERTIFICATION BOARD

Chairman: Barry Cooper
Honorary Secretary: Victor Mierzwa Vice
Chairman: TBA
Nata Rep: Diane Hobday
Member: Angelo Zaccari
Training Provider: Mark Welland
Welding Rep: Bruce Ham
NANDTB Rep: Rodd Smith
Non-Voting member: Irene Pettigrew

CM CERTIFICATION BOARD

Chairman: Shawn Moore
Honorary Secretary: Dana Lake
Vice Chairman: Paul Rand
IRT Application/Exam Panel Chairman: Erik Thorup
LA Chair: Nick Thomas
Member: Joshua Morris
CMCB-Practitioner: Daniel Campbell
End User: Guy Salathiel
Commercial Provider: Keith DCruz
CMCB Practitioner: Sarel Klopper

International Conference – ASNT 2023

The ASNT annual conference (previously known as the ASNT Fall conference) was held at the Marriott Marquis & George R. Brown Convention Centre. Houston, Texas, USA. The venue offered 6,600 square feet (11,156 square meters) of space along with a wide selection of restaurants, bars & event facilities.

The theme of this year's conference was "EVOLUTION"

The NDT world is evolving at a rapid pace. From advances in technology, to artificial intelligence and machine learning, to an everchanging workforce, NDT continues to evolve. ASNT 2023: The Annual Conference was a reflection of this evolution.

ASNT 2023 was the place to mingle with more than 2,220 NDT industry professionals and hear industry experts present high-quality, innovative content, including 71 presentations from international experts. The conference featured exciting general sessions and provided time to connect with peers, plus a vibrant exhibit hall with 218 exhibitors. ASNT 2023 was a great opportunity to share research/work, hear updates on the latest NDT advances, network with colleagues, and meet new ones.

The exhibition hall was well presented, a combination of custom and generic booth shapes and sizes all one level, with all the presentation and meeting rooms also readily available and easily accessible. The vast scale of the centre meant there was plenty of people movement and traffic between the two buildings conveniently connected by an indoor walking bridge.

ASNT continue to be extremely accommodating and engaging with all industry societies, sectors and encourage ongoing involvement and participation. The AINDT has established robust relationships and well received by ASNT staff and officials. This year we renewed our MoU with the ASNT for a further 3 years, to add to our already strong relationship and partnership.

This years conference included an international forum which included representation from Spain, Canada, USA, Japan, Norway, Argentina, Israel, the UK and Australia, among others. Overall 41 countries were represented at the conference.

In an ever-interconnected world, the need for cross-cultural understanding and collaboration has never been more pressing. The International Society Forum was in aid of knowledge exchange and cooperation as the ASNT brought together international societies from

Richard Stocker, Neil Young and Damien Clarke.

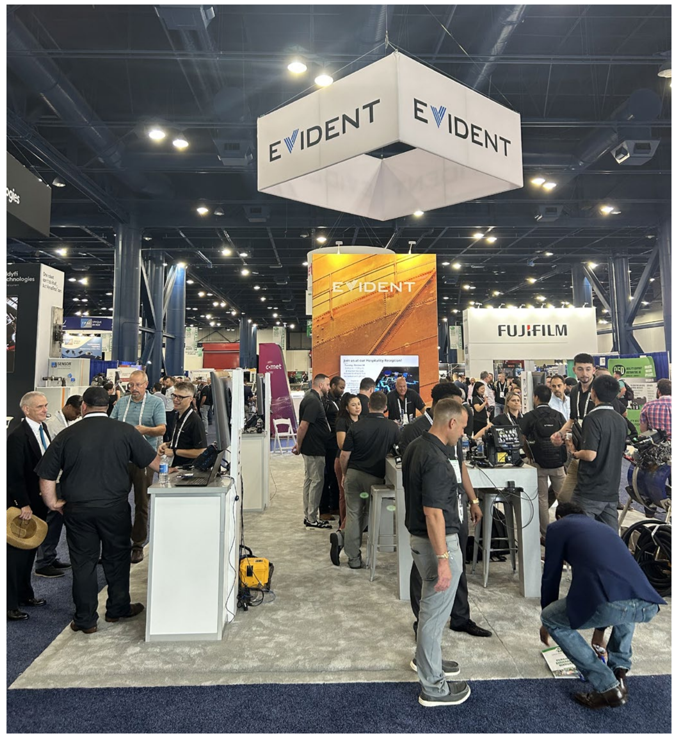
Danny Keck, Richard Stocker, Damien Clarke, Neal Couture and Shohei Ooka.

around the globe. Their mission was to shed light on the information and issues of our societies, to answer questions about the challenges we face, and the myriad experiences that shape us. Through this collective effort, the ASNT sought to foster awareness, bridge gaps, and forge new pathways toward a more harmonious and informed NDT world.

This year's International Society Forum included discussion on a vast array of questions. Each society had time to answer all questions with the goal of open

AINDT NEWS

ASNT International Delegates.



The busy Exhibition Hall.

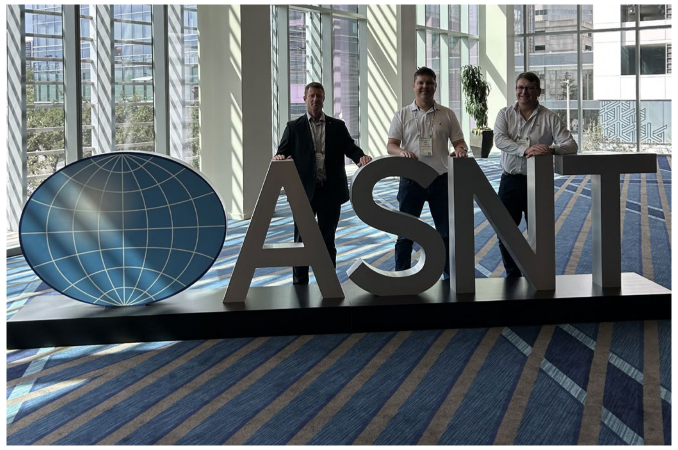
communication and exchange of information between societies and interested parties.

The AINDT was formally represented by Richard Stocker (Federal President), Damien Clarke (Federal Treasurer and Board Member). Other Australians present at the conference were Neil Young and Nick Ferguson of ARI and Jason De Silvera of Nexxis.

Another item of note was the confirmation of the MRA (Mutual Recognition Agreement) of 9712certifications between the ASNT (American) and JSNDI (Japanese) societies.

The American Society for Non-destructive Testing (ASNT) and the Japanese Society for Non-Destructive Inspection (JSNDI) signed a mutual recognition agreement (MRA) in continued support of their long-standing collaboration on the equivalency of certification schemes.

Richard and Damien addressing the international delegates.



"With the launch of ASNT's 9712 Certification Program, we took the opportunity to sign a reaffirmation of our mutual recognition agreement when both societies' board members were together," said Paul Lang, ASNT Certification Services LLC Executive Director. "We look forward to working together in keeping the world safe with mutually competent and certified NDT professionals."

Professor Ikuo Ihara, President of JSNDI; Takamasa Ogata, PhD, Director and Past President of JSNDI; Professor Hirotsugu Inoue, Director of Certification and Qualification for JRSNDI; and Makoto Ochiai, PhD, Vice President of JSNDI, signed the MRA on behalf of JSNDI, cementing ASNT and JSNDI's long-standing relationship and desire to work together and explore synergistic opportunities for both societies.

The ASNT annual conference is generally held October/November on rotation at five separate locations across America, Las Vegas, Orlando, Phoenix, Nashville, Houston. The next conference will be in Westgate Las Vegas Resort & Casino, Las Vegas, Nevada, USA from the 21 – 24 October 2024.

Member List

November 2023

The AINDT is a national peak body that promotes the professional practices of non-destructive testing and condition monitoring personnel. Our mission is to provide members, industry and the community with an independent and professional level of service in relation to the science and practice of non-destructive testing.

Through the State Branches and Federal Office, the AINDT aims to be an efficient and effective technical society by operating as a recognised notification body and providing membership to individuals, companies and government bodies who wish to become informed or have an interest in non-destructive testing, engineering, or materials and quality testing in general.

AINDT provides businesses with the opportunity to be recognised as a contributor of this professional Institute by becoming a Company, Corporate or Sustaining member. By holding such membership, companies can benefit from advertising opportunities, heightened support, staff certification control and much more.

We would like to thank the following companies for their valued support:

SUSTAINING MEMBERS

ATTAR
D R May Inspections
EnerMech
SRG Industrial Pty Ltd

SUPPORTING MEMBERS

Chevron

CORPORATE MEMBERS

Azure NDT Quality Services Pty Ltd
Chemetall (Australasia) Pty Ltd
Evident Australia Pty Ltd
Hofco Oilfield Services
IRISNDT
OMS Engineering Pty Ltd
SafeRad SE Asia Pty Ltd
TR Pty Ltd

COMPANY MEMBERS

NSW

ARL Laboratory Services Pty Ltd (Yennora)
AXT Pty Ltd
Barry Evans Lifting World
Hot Engineering
HVT Inspection Services
Magnetic Analysis Aust Pty Ltd
NDT Equipment Sales Pty Ltd
Nobel Engineering Services
Reliance Hexham
RPG Australia
Russell Fraser Sales Pty Ltd
Simplifi Nii P/L
Sonix NDT Pty Ltd
Thermal Imaging Services (AUS)
NBQC & Inspections Services

QLD

AXS Pty Ltd (Mackay)
Equipment Direct International Pty Ltd
International Tube Testing Pty Ltd
Metal Testing Pty Ltd
M-Test Mackay
Queensland Alumina Limited
Testing Inspection and Calibration Services

VIC / TAS

ABEN Technical Services
ATCL
Defence Science and Techology Organisation (DSTO - Fishermans Bend)
Gippsland NDT Services Pty Ltd
iTest NDT
LMATS Pty Ltd (Williamstown)
NATA
OMS Software Pty Ltd
QENOS
Shantou Institute of Ultrasonic Instruments Co Ltd
Stocks and Partners Ltd
Total Asset Solutions

SA / NT

ASC Pty Ltd
Kuzer Technical
Red Earth NDT Pty Ltd

WA

Applecross Electrical & Testing Service
Asset Reliability Inspections Pty Ltd
Assurity NDT & Consulting
GoldFields NDT
Hofmann Engineering
ICM Training Solutions
Integrity Engineering Solutions
MJ Engineering Inspection Services (Welshpool)
NDT Instruments Pty Ltd
Weld Integrity
Wood - Asset Performance Optimisation

WA Branch AGM 2023

Following the WA Branch AGM in August and the nomination of the new council members and roles, the branch have spent some time settling in to their new structure, and organizing the Annual Golf Day. The AINDT WA Branch Golf Day will be held on Thursday 30th November at the beautiful Collier Park. Included in the price is 18 holes of Ambrose golf, a cart, on course snacks and refreshments, and a BBQ and presentation in the clubhouse afterwards. Prizes will be awarded for Closest to the Pin, Longest Drive, and the inaugural 'Broken Yoke' Trophy for Best Team.

Book your tickets at **aindt.com.au/events**

The WA Branch would also like to welcome the below new members to the council. All four new members will add depth to the council and the additional participation of asset owners, service providers and equipment suppliers across the industry can only be a positive.

Nathan Lenane – Rio Tinto
Andrew Barry – Sonomatic
Nic Chortis – BV
David Carter – Evident

From all at the WA Branch, we hope you enjoy the festive period and hope to see you all in 2024.


Team Sonomatic.


John Millen from Sonomatic (Gold Sponsor) with Josh Wilkinson.


Derek Burns from PCTE presenting the closest to the pin prize to Josh Morris.

Josh Wilkinson awarding the longest drive prize, on behalf of John Duenzl, to Andrew McGregor from Sonomatic.


The winning team from Rio Tinto, Guy Salathiel, Wesley Lawson Lee, Nathan Lenane, and missing from the photo is Ken Seah.

QLD Branch News

G'day from the Sunshine state!

We've had a bustling period here in the Sunshine State with the branch flourishing with new committee and our recent events demonstrating our commitment to the industry.

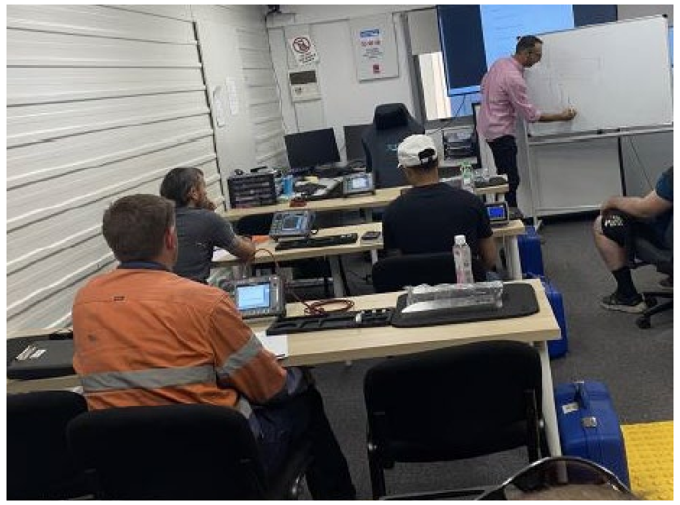
The technical night on October 30th was a landmark occasion with Hamed Madani from Protecs Global imparting his expertise on Mastering Ultrasonic Testing Calibration. Attendees delved into the construction and application of Distance Amplitude Correction (DAC) curves, Time-Corrected Gain (TCG), and gleaned practical calibration insights. This hands-on session at Protecs Global in Sumner was a testament to our commitment to continuous learning and excellence in NDT practices.

Following the success of our technical night in October, we are eagerly anticipating our next event - the catch-up Christmas celebration planned for December 7th in both Brisbane and Gladstone!

This upcoming event promises to be a festive and engaging occasion, offering members a chance to connect and reflect on the year's achievements while looking forward to the opportunities the new year brings. Mark your calendars for a delightful evening. The time and venues to be advised soon!

Looking back, our branch has seen a phenomenal response to the events organized, indicative of the passion and enthusiasm that is the hallmark of AINDT QLD. We're eager to maintain this momentum with upcoming initiatives and invite all members to bring forth their ideas and energy to help steer our course forward.

Regards,
QLD Branch Committee.



Hamed Madani running the show in mastering DAC/TCG Calibration.

"Purple Bloom: Brisbane's Jacaranda Season" Source: Benmessina.com

SA/NT Branch News

On Thursday, 19th October the SA/NT Branch held their first post-AGM technical evening entitled Introduction to Industrial Vibration Analysis. The talk was presented by Mrs Dana Lake, long time member of the Condition Monitoring Certification Board.

Dana explained the basic concepts of condition monitoring, some of the applications and data acquisition, data analysis and some real-life case studies. The attendees were riveted during the presentation and the Q & A session was very interactive with questions posed by most attendees.

The attendees ranged from SA/NT council members to visitors interested in starting a career in the CM/NDT field. The evening was respectively well attended and the venue was ideal.

A big thank you to South Australia's own training and examination centre, Kuzer Technical, for hosting the evening and supplying refreshments. The staff at Kuzer Technical made all who attended feel welcome and relaxed.

Further technical evenings are being planned and hope members will continue to support as well as they can.

Regards

Simon Wilding
SA/NT Branch President

SA Branch Tech Night Dana Lake delivering the Concepts of Condition Monitoring to class.

VIC Branch News

With the AINDT AGM and Federal Council meeting that was held in October, we want to thank the attendance of our FC representatives, Mark Welland, Pranay Wadyalkar and Glen Haberl. Their invaluable insights and support are instrumental in helping us align our branch's goals with the broader AINDT community.

We extend our congratulations to the elected office bearers on the AINDT Victorian Branch Council. It's their dedication and enthusiasm that drives our branch forward for our members. Please feel free to reach out to them with any questions, concerns or ideas you have for the branch.

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Vice President Miro Katouzi (MK)
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The days are growing longer and warmer weather is upon us, bringing a welcomed change in the air. A friendly reminder to stay hydrated, and if you're outdoors use sunscreen and protective clothing. Prioritising our safety and knowing when to take breaks is essential. Keeping our health and well-being in mind will enable us to enjoy the time of year to the fullest.

As we gear up for the festive season, we are excited to announce our upcoming Vic Branch Family Christmas Party. It's an excellent opportunity for our members and their families to come together, celebrate the spirit of the holidays, and network with fellow professionals. Keep an eye on your inbox for more details on this exciting family event.

We are thrilled and eagerly looking forward to the numerous exciting prospects and enriching experiences that lie ahead for our valued members within the AINDT Victorian Branch.

As we embark on this journey, we are committed to fostering a supportive community that promotes learning, collaboration, and growth. These opportunities will encompass a wide range of activities, such as technical nights, seminars, networking events, and hands-on training sessions, all designed to empower our members with valuable knowledge and skills. Our vision is to create an inclusive and dynamic environment where each member can harness their potential and make meaningful contributions to both the branch and the broader industry.

We remain committed to providing you with valuable resources, professional development, personal development and a strong network of peers.

AINDT NEWS

Member Profile: Dylan Fry

Dylan Fry

How many years have you worked in the NDT Industry?

I have worked in the industry for 5 years. I started when I was 16 back in 2018.

Why did you choose a career in NDT?

On my return from Europe after finishing up with my soccer contract. I was unsure about future career prospects. I was invited by my step father, who owns his own NDT company in central Queensland. I assisted him with a couple magnetic particle and Ultrasonic jobs. I was really fascinated by the mechanics of how these methods work and how they can compliment each other.

After my brief introduction to the world of NDT I became interested in the networking capabilities and problem solving that NDT has to offer. I became eager to start learning and gaining experience for my ISO9712 certifications. By learning on the job with technicians from vast backgrounds and training at all levels I was able to unlock a plethora of knowledge whilst building relationships along the way.

Briefly describe your current role?

I am currently a senior NDT technician at QCS-NDT.

How has your career benefited from being a member?

AINDT membership allows me to network with others within the industry. By utilising the free test specimens to refine my skills or give demonstrations to new technicians is beneficial considering how much they are to buy it is without doubt a good opportunity to have.

Do you have any advice for people new to the industry?

Some advice I can offer to new technicians is to have a go and continuously challenge yourself whether that be keeping up to date with new standards, getting involved with your local state branch or taking on courses.

What is the best piece of advice you have ever received?

I was always told to back myself and have confidence in what I do. No matter if it was soccer previously or NDT now, it is important to have confidence as it gives other confidence in you too.

What are your Future goals and aspirations for you're your career?

By the time i reach the age of 30 I would like to have obtained ISO9712 level 3 certification in RT,MT,PT & UT as well as getting involved with AINDT at a federal level. I would also like to be a NATA technical assessor and get involved in audits. With my passion being RT, I would also like to explore ISO9712 Level 2 certification in RT CR/DR.

What are the top 3 things on your bucket list?

- Complete level 3 certifications
- Watch a FIFA world cup live
- Watch the Masters golf tournament live at Augusta

Fun fact that people probably don't know about you!

I played as a goalkeeper for the Under 16 socceroos.

What would be the theme song of your life right now?

After doing lots of RT currently I think the only song I can think of is Blinding Lights by the Weeknd with the constant walking in and out of the dark room and accidentally flashing myself with the viewer after becoming too pedal happy.

AQB Availability

AINDT examinations are available through a network of AINDT Authorised Qualifying Bodies (AQBs) as well as the two scheduled AINDT exam rounds.

AQB's are free to offer AINDT approved training and initial/recertification examinations in any Australian state at any time throughout the year. The scheduled AINDT examination rounds are conducted twice yearly (normally June and November) with dates being advertised in both the *The Industrial Eye* and the AINDT e-newsletter.

Whilst AINDT makes every effort to notify certificate holders of expiry of certification, it is the certificate holders responsibility to initiate the renewal & recertification process prior to expiry of certification (late fees apply to late certification applications).

Listed below are the AQB's for which AINDT has authorised to conduct AINDT examinations and the AINDT examination.

South Australia

Kuzer Technical

Contact: David Suede
Phone: 1300 199 086
Email: info@kuzer.com
Schedule: kuzer.com/schedule/

NDT Methods Levels Industry Sectors offered:

Ultrasonic Testing 1, General Engineering
Ultrasonic Testing 2, Welds
Radiographic Testing 1,2 Welds
Magnetic Particle Testing 1,2 Multisector
Penetrant Testing 1,2 Multisector
Visual/Optical Testing 2 Multisector
Phased Array Ultrasonic Testing 2 Multisector
Eddycurrent Testing 2 Multisector

Victoria

ATTAR – AQB – Advanced Technology Testing and Research

Contact: Mark Welland
Phone: 03 9574 6144
Fax: 03 9574 6133
Email: training@attar.com.au

NDT Methods Levels Industry Sectors offered:

Computed & Digital Radiography 2, 3
Ultrasonic Testing 1,2,3 Welds, Casting, Wrought, Aerospace, Thickness
Radiographic Testing 2,3 Welds, Casting, Aerospace
Magnetic Particle Testing 1,2,3 Multisector, Aerospace
Penetrant Testing 1,2,3 Multisector, Aerospace
Eddy Current Testing 2,3 Multisector, Aerospace
Magnetic Flux Leakage 2
Tank Bottom Testing
Phased Array levels 2 & 3 Ultrasonics 2 Multisector
Visual/Optical Testing 2 Multisector
Time of Flight Diffraction (TOFD) levels 2 & 3 Welds
Heat Treatment
ISO 9712 UT Level 2 Corrosion/Erosion – Detection and Mapping (CDM)
Limited Certification

Western Australia

ATTAR – Advanced Technology Testing and Research – Authorised Examination Centre

Contact: Mark Welland
Phone: 1300 139 155
Email: training@attar.com.au

NDT Methods Levels Industry Sectors offered:

Computed & Digital Radiography 2, 3
Ultrasonic Testing 1, 2,3 Welds, Casting, Wrought, Aerospace, Thickness
Radiographic Testing 2,3 Welds, Casting, Aerospace
Magnectic Particle Testing 1,2,3 Multisector, Aerospace
Penetrant Testing 1,2,3 Multisector, Aerospace
Eddy Current Testing 2,3 Multisector, Aerospace
Magnetic Flux Leakage 2
Tank Bottom Testing
Phased Array levels 2 & 3 Ultrasonics 2 Multisector
Visual/Optical Testing 2 Multisector
Time of Flight Diffraction (TOFD) levels 2 & 3 Welds
Heat Treatment
ISO 9712 UT Level 2 Corrosion/Erosion – Detection and Mapping (CDM)
Limited Certification

SRG Training Academy

Phone: 08 9232 0300
Email: trainingacademy@srgglobal.com

NDT Methods Levels Industry Sectors offered:

Ultrasonic Testing 1,2 Welds
Magnectic Particle Testing 1,2 Multisector
Penetrant Testing 1,2 Multisector
Phased Array Ultrasonic Testing 2 Multisector

Queensland

SRG Training Academy

Phone: 07 3816 5500

NDT Methods Levels Industry Sectors offered:

Ultrasonic Testing 1,2 Welds
Magnectic Particle Testing 1,2 Multisector
Penetrant Testing 1, 2 Multisector
Phased Array Ultrasonic Testing 2 Multisector

Protecs Global

Contact: Hamed Madani
Phone: 07 3492 9213
Email: Hamed.madani@protecsglobal.com.au

NDT Methods Levels Industry Sectors offered:
Magnetic Particle Testing Level 2 (Multisector)
Penetrant Testing Level 2 (Multisector)
Ultrasonic Testing Level 1 (General Engineering)
Ultrasonic Testing Level 2 (Welds)

Condition Monitoring Training Centres

The below training providers offer training in one or more Condition Monitoring methods, categories and industry sectors.

This training program has received approval from the AINDT as it aligns with the national syllabi as endorsed by the AINDT Certification Board.

To ensure comprehensive understanding, learners are advised to obtain a copy of the training module (syllabus) from either the training body, or by downloading from the AINDT website, when undertaking training in an CM method or industry sector module.

For Certification applicants, it is mandatory to successfully complete the training program and training hours as specified in ISO18436 to fulfil the corresponding CM Method, Category and Industry Sector.

All examinations are administered by the AINDT.
For examination dates and other pertinent information, please reach out to the federal office.

CM Training Centre Locations:

Victoria

University of Melbourne

Parkville
Victoria 3010
Phone: +61 3 9810 3348
Contact Email: claudine.evans@unimelb.edu.au

Industrial Precision Instruments

Unit 12, 634-644 Mitcham Rd Vermont
Victoria 3133
Phone: +1300781701
Email: training@ipi-inst.com.au

Wood – Asset Performance Optimisation

Level 3, 171 Collins Street
Melbourne, Victoria 3000
Phone: (08) 6314 2000 / (08) 6314 2280
Email: svt.bu.training@woodplc.com

Western Australia

ICM Training Solutions

45 Delawney Street
Balcatta, WA 6021
0419 993 233
Contact Email: training@icmt.com.au

SRG Training Academy

109 Bannister Road, Canning Vale
Western Australia 6155
Phone: 08 9232 0300
Email: trainingacademy@srgglobal.com

Wood – Asset Performance Optimisation

Level 1, 240 St Georges Terrace
Perth, Western Australia 6000
Phone: (08) 6314 2000 / (08) 6314 2280
Email: svt.bu.training@woodplc.com

Queensland

Advanced Infrared Resources Australia AIRA

PO Box 372 Hervey Bay
Queensland 4655

Phone: 0467 565 836
Email: jeff@irtau.com.au

SRG Training Academy

7 Brisbane Road Riverview
Queensland 4303
Phone: 07 3816 5500
Email: trainingacademy@srgglobal.net.au

Wood – Asset Performance Optimisation

Level 20, 127 Creek St
Brisbane, Queensland 4000
Phone: (08) 6314 2000 / (08) 6314 2280
Email: svt.bu.training@woodplc.com

Standards Report October 2023 AINDT Federal Council & Certification Board

Standards Australia and the new Project Manager (Engagement Officer) Hilary Nobile, who has been leading / assisting greatly in ensuring NDT Standard communication and events are brought to the attention of MT007.

MT007 was bolstered by a number of new members, including David Padfield, an expert in the field of Acoustic Emission. There have been an extensive amount of AE Standards being developed by the ISO Committees and it is great to have David on board as the expert, where he was also nominated as the Australian representative of MT007 on ISO/TC 135/SC 9, this appointment was being ratified on the 12th of October 2023.

We also welcome to the Committee, Ali Hadigheh from the University of Sydney who has diverse experience in Non Destructive Testing and Erik Thorup from IR Technology Australia for his expertise in Thermography.

With regards to ME087 Committee (Con Mon), the MT007 Member was replaced on the ME087 committee with no further reports provided to the AINDT.

The year strongly with two meetings held with a number of Standards being voted on that moved on to public review and adoption. A meeting on the 9th of February 2023 covered proposals for

- Adoption of ISO 3452.1 superseded to 2023.
- Adoption of ISO 3452.2 superseded to 2023.
- Adoption of ISO 9712 superseded to 2023 (from ISO 2021 Version)
- Review and adoption of EN 4179 current 2021 version.

The above proposed Standards were accepted including EN4179 where the NANDTB member on MT007 indicating their Board / Members endorsed EN4179 and would not seek reinstatement of AS 3669.

At the APCNDT Conference held in Melbourne a number of Open Panel Q&A sessions were held where Standards was represented by Paul Grosser, Keith Arcus and Angelo Zaccari (1 session). The QA Panel appeared to be a very well attended event with lots of questions for Standards, plus the Certification Board and NATA Representatives who also made up the full panel.

The public commenting online platform was made easier and simpler for public commenting through the contributor portal, Connect. Registration on the portal was easy and comments made by following the link.

www.standards.org.au/news/standards-australia's-new-public-comment-platform-launched

Keith Arcus represented MT007 at the ISO Committee meetings in Lisboan Portugal. MT-007 is a participating member on ISO TC 135/SC 7 (Personal Qualification), ISO TC 135/SC 8 (Thermographic Testing) and observers on SO/TC 135 (NDT General), ISO/TC 135/SC 9 (Acoustic Emission), they were attended by Keith.

Further ISO memberships for MT007 members are being sort at present, we are awaiting these to be ratified by ISO and are extremely optimistic in the acceptance of MT007 membership submissions.

Some ISO Standards of interest being worked on during the year by ISO Committees include.

1. ISO/AWI 18173 (Project) – Non-destructive testing — General terms and definitions

2. ISO/TC 135/SC 7 – Personnel qualification – Project: ISO/TS 11774:2011: Non-destructive testing. Performance based qualification.

There were an abundance of ISO Standards projects being undertaken, particularly in the AR and IR fields which will continue to be heavily worked on into 2024.

Within the ISO Committee, Darcy Corcoran applied to continue his term as the Chair of SC 7, and it is believed that this application received a favourable vote in August 2023 however, no communication was received by MT007.

Angelo Zaccari
MT007 Standards Chairperson
azaccari@aben-tech.com.au

A change in the National Construction Code brings opportunities for NDT facilities

It is one of the World Health Organisation's top **10 chemicals of public health concern**. And was recently confirmed as irreversibly impacting the neurological development of children, event at relatively low level.

Yes "**lead is the single chemical with by far the largest quantified health effects globally**".

Change is coming in Australia. By May 2025, all copper alloy products in contact with drinking water will need to comply with the updated National Building Code. Clause A5G4 of NCC 2022 Volume Three (Plumbing Code of Australia) specifies that copper alloy plumbing products in contact with drinking water must limit the allowable lead content to a weighted average lead content of not more than 0.25%.

Under the current WaterMark scheme, approximately 335 licenses will be impacted by this change. And within those, hundreds of products must be tested/retested to comply with the new requirements. According to the Australian Building Codes Board, up to 90% of the testing can be done through the screening path - using portable XRF equipment, familiar to those with such equipment.

This represents an opportunity for accredited NDT facilities that are already using portable XRF equipment.

Gary Rake, ABCB CEO, commented that "Verification of the lead content will require a test report provided by a NATA accredited testing laboratory. Based on available data from WMCABs it is estimated approximately 335 WaterMark licences will require testing compliant with NSF/ANSI/CAN 372:2020 in Australia. The number of products listed on a WaterMark licence may range from 1 to 100 or more."

Many NDT facilities have staff who visit client sites for testing procedures, and many already have portable XRF comparative screening on their scopes. If your facility is interested in extending your scope by desktop variation to support the NCC changes, please contact your NATA Client Coordinator, who will assist you with the process.

For more information, please visit **WaterMark.**

AUSPTA General Meeting and Conference 27th October 2023 Grand Chancellor Hotel – Brisbane, Queensland

AUSPTA held its October General Meeting and Conference in Brisbane, Queensland at the Grand Chancellor Hotel.

The event was well attended by AUSPTA's Members and guests and many comments were received by AUSPTA's E&C from attendees regarding the quality of the Presentations throughout the day as well as the stunning venue.

Presentations at AUSPTA's Conferences have always been informative and well received by attendee's and this years Conference was no exception.

The days Presentations ranged from use of drones in Thermographic Surveys to application of other CM protocols which compliment Thermography as well as an array of informative topics in between.

AUSPTA's 2024 Annual General Meeting and Conference will be held on the 22nd March 2024 in Sydney, NSW.

Some of the Attendees at AUSPTA's October 2023 General Meeting and Conference.

Attendees watch on as AUSPTAs Vice President, Peter Milligan, discusses use of drones for Thermographic Surveys

AUSPTA Committee Member Jeff Erichsen presents how his Company, Advanced Infrared Resources Australia, uses Thermography for CM of mining equipment

Attendees during AUSPTA's General Meeting

Ultra-Tek's Managing Director Ian Ware shows how Ultra Sonics can be an effective CM disipline and be used in conjunction with Thermography.

AUSPTA's October 2023 General Meeting and Conference Welcomes all Attendees.

Founding Committee Member Erik Thorup from IR Technology Australia P/L receiving his Certificate of Appreciation following his Presentation

John Donaldson from HikMicro during his Presentation.

AUSPTA's Secretary, Liam Mitchell, during his presentation.

Founding Committee Member Erik Thorup from IR Technology Australia

Digital detector arrays in field radiography

In this article, we will reveal the usage of digital detector arrays in field radiography. Synonyms widely used for DDA is Flat Panel Detector, DR or DXR.

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BAKER HUGHES LTD[2], PERTH, AUSTRALIA

Keywords: DDA, Detector, Digital Radiography, Direct Radiography, Waygate Technologies.

What is direct radiography

Direct Radiography is a technique where digital images can be obtained at a detector with no intermediate processing step required. The method discussed in this paper is called indirect conversion, where a scintillator converts x-rays to light before conversion to an electrical charge that can be read out.

As visible in Figure 1, x-ray photons are absorbed by the scintillator which converts them into light. The most common scintillator used in NDT is Gadolinium Oxysulfide (Gadox or GOS). Also Cesium Iodide (CSI) can be used. Both types of scintillators have their advantages and disadvantages with regards to dose sensitivity, lag, ghost images, …

The light then reaches a low-noise photodiode array and is converted into an electrical charge. Each photodiode represents a single pixel (picture element), and they all individually produce an electric charge that is read out digitally before being sent to the image processor.

This results in the following general advantages for DDA:

- Highly efficient technology: reduced number of photons required to establish an excellent image compared to Film and even CR technology. For the user this results in extreme short exposure times
- Reduced non-relevant signal noise. Resulting in increased resolution and SNR, providing a sharper image.

DDA usage in Australia & Asia

The Asian market already embraced the portable detectors, for efficient use in CUI applications and maintenance work on pipes and structures.

With Singapore being an early adopter, understanding the severe cost savings and hazard reductions when replacing traditional methods, Malaysia, Thailand and Indonesia have also increased system usage and method implementation.

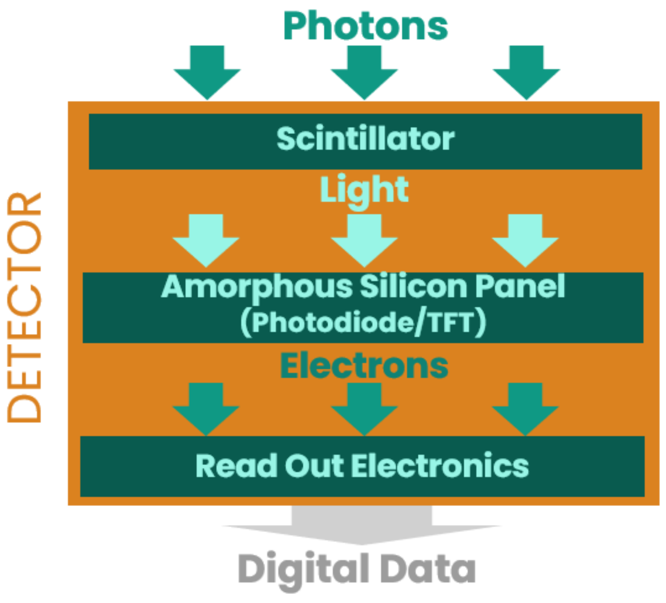

Figure 1: graphic explanation of imaging process in DDA.

The Australian market however is at present for weld applications CR focused and uses portable detectors predominantly for CUI and other profile radiography inspections, including valve operations/faults due to time savings and ease of setup.

With the DXR75P-HR system utilization on small diameter butt welds, DWDI, using an Ir192 source and storage tank bottom strake "T" weld, the application range is now expanding for DDA. In those cases, achieving standard - compliance to international standards such as ASME & ISO with the extreme high resolution DXR75P-HR, is a key enabler.

Trials are now additionally planned for the DXR100P-HP systems on larger butt welds (4"), including utilizing a Pulsed X-Ray system. Again, it is expected to achieve compliance to ISO-17636-2.

Reasons why companies selected dda technology

4.1.1 General Advantages

- Highest throughput technology, providing direct imaging result in Rhythm Review.

- Higher dose sensitivity:
  - Extreme short exposure times, for both x-ray and Isotopes
  - Extended usage of low activity sources (up to 1-2 Ci). For the end user this is currently a real advantage, while new Isotope sources are hard to get and more expensive.
- Ability to optimise exposure settings on the spot. During the exposure of the detector, the exposure parameters (kV, mA, frame time) can be finetuned to reach the ultimate image quality
- Extreme high dynamic range - no reshoots. The direct radiography technology, as well as Computed Radiography, is able to capture both high- and low-density materials in one image. Therefore, reshoots are almost fully excluded.
- Excellent SNR (800+) and SNRn (400+) - fulfilling international welding standards. This technology can average multiple captured frames or images, resulting in very high SNR values and sharp images.
- No consumables, no shelf life issues. Most disadvantages of the consumables and industrial film are solved with this digital technology. No need for ordering, storing and discarding chemistry and film. This is a huge financial gain for those customers switching over.
- No scratch artefacts in the image, excellent image quality. Unlike film and even Imaging Plates, mechanical damage of the detector is hardly existing. Waygate Technologies detectors are IP67 protected, which means fully water and dust tight, and have fulfilled standard required drop tests.
- Flash! image enhancement software for optimal & consistent viewing. This patented and globally used, nowadays even NDT Standard, software can visualise the large variation of image grayscales to the limited human eye. One though: although Flash! is able to show the large greyscale variation, it is no substitute for a poor technique.
- ASTM DICONDE compliant software of Rhythm. This compliance allows easy exchange of the DICONDE data (image, technique & component data into one .dcm file) with other DICONDE complaint systems. This means that images are not saved in a propriety format, allowing full flexibility on sharing, storing and revieing those data.
- Connection options between the DDA and the computer: Wi-Fi or hard cabled.

4.1.2 Environmental advantages

- Reduction of carbon footprint by eliminating transport and storage of industrial film in conditioned rooms for various years
- No longer using chemicals to develop the industrial x-ray film. As environmental legislations are getting more and more unforgiving for the usage of chemicals, this digital technology can help our customers to move on with their inspection activities.
- No longer dealing with film packaging & lead disposal. Local legislation is less forgiving for the discarding of plastics and lead sheet.
- No longer dealing with chemical disposal or spillage
- No longer storing or preparing film & chemistry products
- Reduction of dose and exposure times. Safety zones may be reduced (using lower activity sources and possibly reduced x-ray energies) and needs to be setup for a shorter time period due to the highly reduced exposure times required. This is also a relevant safety increase.

4.1.3 Data Sharing and Storage

Ease of inspection data sharing. DICONDE data can be easily shared from the inspection/analysis site to another site on the globe. It is a common practice that the inspectors/Level3 are located away from the actual inspection site and can make decisions on studies or images that were shared through the companies' network.

Ease and speed of reporting. Using Waygate Technologies' Advanced Reporting allows the user to easily created specific reports for the end-user. Based on Microsoft Word or Excel template, a unique customised report can be generated, included measurement results, annotations and images or image thumbnails.

Positive long term searchable data storage (local archive, on prem or cloud based). Using Waygate Technologies Archive solutions allows the user to archive all available data (studies, images, pictures, reports) on a local, a remote or cloud-based archive system. This ensures availability of the data for many years and allows upgrade of existing hardware to the latest one. Accessibility is controlled with standard user accounts.

Inspection data and results can be improved with support of computer-aided (assisted or even automated) detection. More and more AI algorithms become available in NDT to support these actions.

Data integrity & asset life evaluations, enabling RBI activities. Digital inspection software suites like Rhythm Insight and Rhythm Review with full DICONDE compliance, provide data integrity, because all modifications and updates to the initial inspection data are documented and stored. This means full traceability of previous actions. This data can be used for asset life evaluations, and Risk Based Inspection (RBI) activities.

4.1.4 Inspection workflow improvements

The below Figure 2 shows the different workflows with Film, Computed Radiography and Direct Radiography.

Multiple standard Film workflow steps can be eliminated when switching to Direct Radiography inspection instead, while some other steps can be reduced in time and expenses involved.

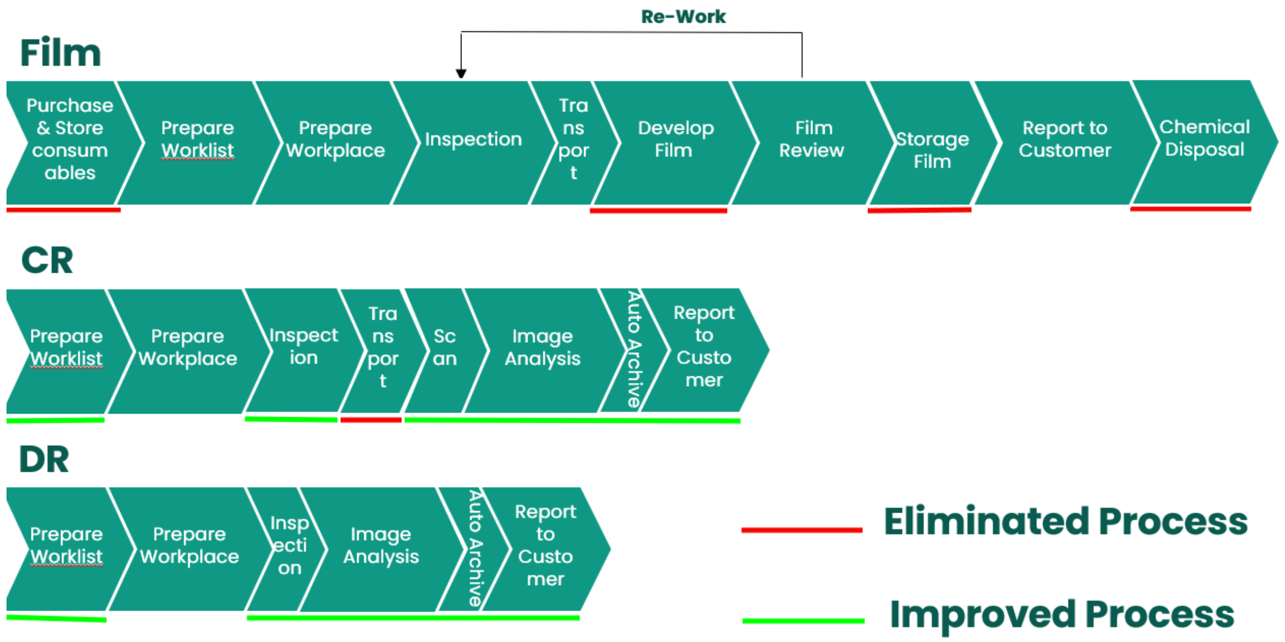

Figure 2: Workflows for different technologies

Going for direct radiography … parameters to consider for the business case

Quite some different parameters need to be taken in account in order to end up with a very detailed business case. Some have a specific technical background; some are more financially related while others are influenced by hardware and software.

5.1.1 Resolution

Pixel size: smallest pixel building the digital image

SRb: basic spatial resolution. The outcome of the inspection with a DDA or sharpness of the system.

The main relevant technical parameter when comparing DDA systems for image quality is SRb, and not the pixel size!

The below Figure 3shows the difference between pixel size and SRb, which is utmost important for the choice of DDA systems to purchase. It also shows the sometimes-large differences between pixel size and actual allowed inspection according to international standards. Every micron counts! The ideal detector system to use are those where its pixel size and SRb are a close match.

Also worth mentioning is the fact that certain suppliers of DDA's can finetune the scintillator used to the application that is targeted. Unlike others that simply use standard medical DDA's, Waygate Technologies is selecting the scintillator type for every DDA released. This means that the 140micron detector (DXR140P-HC) is finetuned for speed and contrast, required for all Oil & Gas inspections, where SRb is not the critical parameter. Most O&G applications have high throughput (short exposure times) as requirement. Contrary, the DXR75P-HR is target at high-resolution and critical weld inspection, where sharpness is utmost important aspect.

	Waygate	Waygate	Brand X	Brand Y	Waygate	Brand Z
Pixel size (µm)	**75**	**100**	**100**	**100**	**140**	**140**
SRb (µm)*	95	123	133	137	210	255
SRb (duplex wire)	11D	10D	9D	9D	7D	6D
Finetuned for	resolution	resolution & speed			speed	

difference between scan-resolution & SRb is paramount when comparing systems!

Figure 3: difference between scan resolution and SRb for available DDA systems.

5.1.2 SNR

Signal-to Noise-Ratio (SNR) is defined in most NDT standards as a critical factor fir image quality. The higher the SNR, the better the image quality.

Noise is generated in every step of the imaging chain creation: energy source, technique used, detector electronics, object scattering, … All these are negatively impacting the final image quality or POD (Probability of Detection).

The pixel size is also influencing the SNR values, as e-noise plays a role in the image creation.

SNR can be normalised, with the following equation Eqn (1):

$$SNR_N = SNR_{measured} \frac{88{,}6\ \mu m}{SR_b}$$

5.1.3 Scintillator type

As mentioned before, the scintillator type has a large influence on the DDA's performance. Cesium Iodide and Gadolinium oxysulfide behave different when it comes to image capturing, sharpness, SNR, dose sensitivity and erase-ability.

Most portable DDA's in NDT are Gadox based.

The thickness of the scintillator is also an influencing factor having a large impact on sharpness and dose sensitivity.

TECHNICAL ARTICLE

5.1.4 Fill factor

The fill factor (FF) is a measure of the efficiency of a digital detector or detector array (DDA) in converting x-rays into electrical signals. It is the ratio of the active area of the detector pixels to the total area of the pixel, including both the active and inactive areas.

A high fill factor indicates that the majority of the pixel area is active and able to detect x-rays, resulting in higher signal-to-noise ratio and better image quality. A low fill factor, on the other hand, indicates that a significant portion of the pixel area is inactive, resulting in lower signal-to-noise ratio and poorer image quality.

The fill factor is typically expressed as a percentage and can range from 0 to 100%. A fill factor of 100% indicates that the entire pixel area is active, while a fill factor of 0% indicates that the entire pixel area is inactive. Most DDAs have a fill factor of around 60-70%.

The fill factor is an important consideration when designing digital detectors, as it affects the overall performance and image quality of the detector. Factors that can affect the fill factor include the size and design of the detector pixels, the materials used in the detector, and the readout electronics.

5.1.5 Backscattering

The scattering of radiation or particles in a direction opposite to that of the incident radiation due to reflection from particles of the medium traversed. This can be caused by the object, but mostly by objects and material behind the DDA.

This effect is mostly witnessed on unprotected DDA's (from medical origin) in combination with low activity isotopes and is negatively influencing the image quality.

Waygate Technologies' portable detectors prevent such backscatter by using and inherent shield-design. It is an exclusive NDT specific modification to the detector. This update results in prolonged dose life and visibly improved image quality.

5.1.6 Standards

Nowadays, most radiographic inspections are well specified in various local and International Standards (EN, ISO, ASTM, API…) and are clearly mentioning all the parameters to comply to (SNR, SRb, energy, distance, shielding, …).

A user needs to make sure that the DDA to be purchased is covering these parameters, as this is not visible in brochure only (e.g., resolution vs. SRb).

Examples:

Using the ISO 17636-2 compensation principle, Waygate Technologies' DXR100P-HP, having a SRb≈125micron, covers inspections Class B >4mm Wall Thickness.

Most other 100micron panels in NDT (having SRb >130micron) can only start as of >8mm Wall Thickness.

DXR75P-HR, with SRb <100micron, can cover inspections >1.5mm WT. In combination with Iridium, inspections are covered as of >8mm WT.

5.1.7 Detector capability

Here is defined the intrinsic capabilities of the DDA system. Potential buyer or user should ask the right questions wrt DDA performance and capabilities.

Is the ingress protection IP67 or lower? Important factor for outdoor use.

How is the communication done between Dda and computer? Most systems offer Wi-Fi communication, but what protocol, which transmission speed is possible. Is an outdoor network cable available for those instances where Wi-Fi is not allowed or where most stable and fast communication is required?

Is the armour case providing backscatter protection to increase lifetime and allow highest image quality?

5.1.8 Detector useability

This section is covering the available and required accessories to make inspection with rigid DDA's more suitable.

Which accessories can help the inspection throughput, like pipe support, allowing easy positioning for profile radiography?

5.1.9 Software package

Probably as important as the DDA itself is the software suite allowing acquisition and analysis of images. ASTM Diconde compliant software allows data integrity and future proof exchange of data. Some software packages also provide 100% compatibility with other modalities like CR and Film Digitizing. This reduces the need for additional operator training and allows easy exchange of equipment over multiple trained crews.

More and more automated tools are available to easy the operator's life: step-by-step guided calibration of the detector, allowing full usage of the capabilities of the DDA, showing best image quality. Also, user-selectable ASTM and ISO complying SRb and SNR tools result in accurate measurement and reporting of performance.

Once the annotations and measurements are performed, reporting of the results - in combination with specific images - needs to take place. Here an Advanced Report generator, based upon predefined and customised Microsoft Word or Excel templates, will help the operator to make reports for the end-user within minutes.

Archiving of DICONDE data is becoming more and more of a important topic for field inspection companies. As the end-user sometimes requires storage of this data for many years, either by himself or the inspection company that performed the inspection, archive systems are available in all kinds of sizes and types. Choices are between small onsite systems up to larger cloud based remote archiving possibilities.

5.1.10 Price

Price is initially the most significant factor, but only when taking in account of all the factors mentioned in the above points, it becomes possible to calculate the total cost of ownership (TCO),

Other factors that need to be taken in consideration to define the business case are (and will be explained in detail):

- Detector lifetime (available additional x-ray and mechanical shielding, IP protection)
- Exposure time and the possibility to use low Curie sources (dose sensitivity)
- Minimal down-time
- Fast local and smart remote support in case of technical issues, availability of service agreements
- DDA system throughput (dose sensitivity, communication speeds & stability, time-to-display, calibration time)
- Archiving volume (file size) and future upgrade possibilities
- Process consistency (software & tools)

FINAL CONCLUSION

DDA technology:

- is widely accepted, now starting to penetrate in Asia & Australia, also for field applications
- is covering film applications and beyond
- has many advantages and hardly disadvantages

When comparing DR systems

- talk to suppliers & early adopters to get the real important details to decide on
- apply for onsite comparison demo in customer's environment and objects: the only way to differentiate good and less performing DDA-systems

Select the DDA-system supplying

- with a high efficiency
- that gives Standard compliance (ASTM, ISO, ...)
- and finally has a good TCO

He joined AGFA NDT in 2002, was acquired by GE Inspection Technologies and is now with Waygate Technologies. He is based in Antwerp, Belgium, the cradle of digital inspection with CR in the industry.

Steven Wissels is Senior Digital Radiography Product Manager at Waygate Technologies, a Baker Hughes company, a position he has held since 2004. He is responsible for all digital field radiography products and technologies.

Phil Lewis is Senior Sales Manager (ANZ) at Waygate Technologies, a Baker Hughes company, a position he has held since 2017. He is responsible for the sales and support of all our film, digital and computerized field radiography products and technologies.

He joined GE Inspection Technologies in 2009 and is now with Waygate Technologies. He was an NDT Radiographer in the UK during the 1980's and is based in Perth, Australia.

NDT Solutions for common damage mechanisms in refineries

Damage mechanisms, also referred to as degradation mechanisms, is a general term referring to any source of problems or failures within process equipment. These mechanisms can range from corrosion, cracking, cyclic heat damage, and everything in between.

We will discuss a detailed nondestructive testing (NDT) solutions checklist for common refinery assets, such as pipelines, tanks, heat exchangers, and storage spheres. We will also talk about common damage mechanisms, including corrosion, high-temperature hydrogen attack (HTHA), and wet hydrogen sulfide. Lastly, we will discuss specific applications and solutions applicable in industry before concluding by addressing current state-of-the-industry issues, such as the management of new projects and big data.

When assessing these damage mechanisms, consider the current state of the equipment and any potential damage the mechanisms may cause later. The equipment's susceptibility to a particular damage mechanism is affected by several variables, including construction materials, process fluids, operating conditions, and environmental conditions. A good understanding of the variety of damage mechanisms that exist is a must for a comprehensive asset integrity program.

Inspection Solutions

Any comprehensive asset integrity program includes a range of NDT inspection solutions to evaluate common damage mechanisms. NDT inspection solutions have multiple advantages. These include the ongoing NDT technology development across a range of industry sectors, global NDT specialized solution applications, the resources of international codes and standards, and a safer world with increased efficiencies.

However, NDT solutions have not received wide attention in literature. The advancement of NDT research in real time and accurate prediction models requires the collection of sufficient data that is connected to digital solutions.

Some of these digital solutions will be discussed in detail using proven phased array ultrasonic technology. The challenges faced in ageing facilities are universal across many industry sectors beyond refineries. Engineers, integrity inspectors, and asset owners rely on current technology and the experience of inspection service companies to deliver workable solutions to a range of applications.

Discussion on the Probability of Detection

The probability of detection (POD) is strongly connected to the topic of risk assessment and probabilistic analyses in the assessment of the integrity of each component. The probability of failure (POF) is calculated based on statistical data for relevant parameters based on the facility location, design, modeling, and the selected test method(s) during the manufacture of components.

Additional parameters that influence POF calculations is the POD of a flaw of a certain size while in service, factoring access, and geometry. Continued integrity assessment of components is an important requirement for reliable and safe operation of refineries, processing plants, and other installations relevant to environmental safety.

Experimental Observations

Figures 1-3 demonstrate inspections of common damage mechanisms such as corrosion and hydrogen sulfide (H_2S) using NDT technology. In particular, corrosion is one of the most critical challenges facing refineries, processing plants, and storage plants. It has received wide attention in recent decades due to the continued dependence of the global economy on industries based in oil and natural gas. With the annual corrosion cost estimated at billions of dollars, suitable corrosion mitigation approaches are required to prevent asset failure due to corrosion.

A comprehensive and up-to-date review of corrosion monitoring in refineries is timely. This review presents the corrosion issues at different areas of facilities, proposes the sources of the corrosion problems, and discusses future research directions.

Corrosion Mapping

Figure 1a. Corrosion inspection scanner.

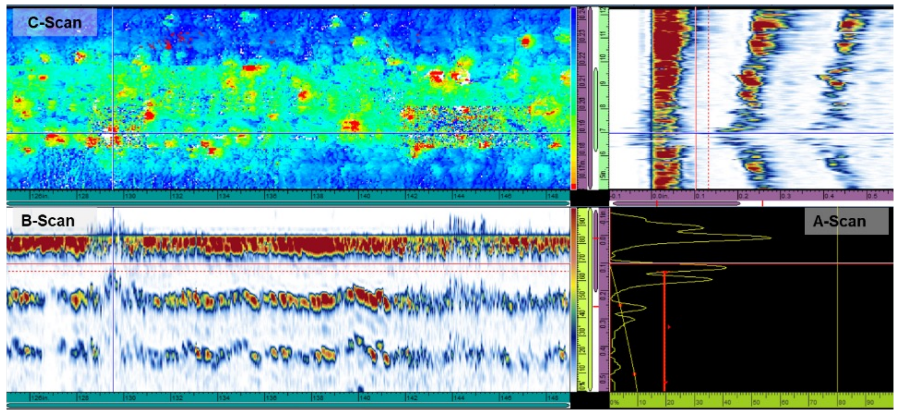

Figure 2a. Acquisition data.

Inspection of Corrosion-Resistant Alloys

Figure 2a. Dual matrix array probe.

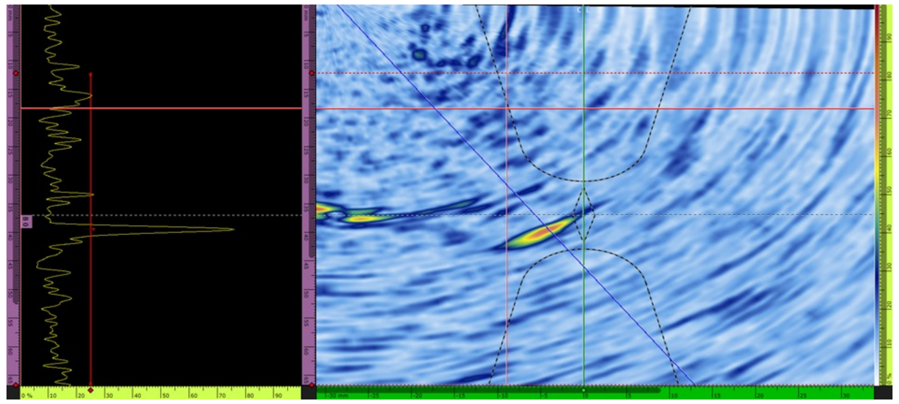

Figure 2b. Acquisition data.

Inspection for Hydrogen Sulfide (H2s)

Figure 3a. 25 mm thick carbon steel component with known H2S blisters and step wise cracking.

Technique	Probe	Wedge	Freq (MHz)	El Qty/FL	Focus (mm)	Angles (˚)
PAUT – Longi/Linear	7.5L64-I4	HydroForm	7.5	3	15mm	0
PAUT – Longi/Linear	5L64 – A2	SA2-0L	5	22	18,5	0
PAUT – Longi/Sectorial	5L64 – A2	SA2-N55S	5			
PAUT – Longi/Sectorial	10L64 - A31	SA31 0L	10	32	18	-30-30
PAUT – Shear/Sectorial	10L64 - A32	SA32-N55S	10	32	19	35-75
PAUT – Shear/Sectorial	5L60 - PWZ1	SPWZ1-N55S	5	32	15	40-70
DLA - Sectorial	10DL32-9.6x5 A28	SA28-DN0L FD25	10	NA	25	-30-30
TFM – LL	5L64 – A2	SA2-0L	5	NA	NA	NA
TFM – LL	10L64 - A31	SA31 0L	10	NA	NA	NA
TFM – TT	5L60 - PWZ1	SPWZ1-N55S	5	NA	NA	NA
TOFD	C563	ST1-45L	10	NA	NA	45
TOFD	C543-SM	ST1-60L	5	NA	NA	45

Figure 3b. Test plan(s).

Conclusions

This paper presented the detection of real and artificial flaws of different sizes and types in a range of applications using NDT solutions. The POD provides the probability for the detection of a certain flaw size based on the application type. This does not exclude the occurrence of an isolated event with a larger indication detected due to variables outside these case studies' parameters. A realistic safety-oriented design and assessment is possible since risks can be evaluated using the proven NDT application's methodology along with robust and leading-edge inspection technology.

Including digital innovations for NDT 4.0, such as cloud computing, connected devices, and digital applications, can further minimize downtime and increase efficiencies throughout the asset inspection process.

Nick Eleftheriou
NDT Applications Manager
Evident Scientific- Industrial

Hot Engineering

Hot Engineering are an engineering company based in Mudgee NSW providing engineering solutions to mining, construction, agriculture and other industries. At Hot Engineering we pride ourselves in having a wealth of knowledge and expertise within the metal fabrication and engineering industry. To ensure our clients visions and needs are met with the highest quality products and that our knowledge and expertise is reflected in the work we produce, we have trained several members of our team as qualified and registered AINDT NDT technicians. Having invested in the necessary training and equipment ensures that we can offer a range of Non Destructive Testing and services to our clients while also ensuring all projects fabricated and engineered within our workshop are compliant and meet current standards. By supplying our clients with NDT maintenance reports we are able to ensure the quality of engineering being produced before our projects leave our workshop.

In the mining industry we have secured contracts repairing and testing mining attachments. The compliance and structural integrity of these attachments is paramount not only to their operation but the safety of their employees also. Through visual testing inspections and Magnetic Particle Testing of the projects structural integrity we can define repairs needed relating to surface cracks, flawed materials, corrosion, paint quality or other damage. We are then able to ensure the integrity of our repairs and welds through NDT testing before the projects return to site.

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- Hydrocarbon Management & Analysis
- VCAT Vibration Analysis
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- Predictive/Proactive Maintenance

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Mobile: 0417772402

Website: www.tubetesting.com.au

Address: PO Box 15171 City East 4002

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We at OMS Engineering are an Australian owned and operated multi-disciplined engineering services provider based in NSW. Providing statutory and project resource services to predominantly the underground coal industry throughout NSW since 2017, we recognised an impending decline in our key operational industry sector within the region.

As such, we have carried out a number of key strategic objectives in order to diversify our services and sustain our reputation as the number one multi-disciplined engineering services supplier in the region.

The immediate success of our Engineering and Design division established in early 2022 set the foundation to further diversify our services at the turn of this year by establishing our Non-Destructive Testing & Asset Inspection division.

On the back of our reputation as a company that values integrity, quality of service and reliability, our NATA accredited laboratory is now rapidly establishing its presence in the region and are actively engaged in further broadening our capacity and technical capabilities.

The four operational pillars of OMS Engineering are led by passionate and experienced industry specialists who are collectively able to provide both the solutions and the assurance that are paramount to the sustainability of our customers assets and operations amid the complex and ever-changing dynamic of today's industrial sectors.

To hear more about our full range of services, please get in touch.

NDT & Asset Inspection Manager: Dan Randall 0434827894

Engineering & Design Manager: David Leslie 0448716736

Project Resource Services Manager: Mahesh Gowda 0421873834

Statutory Services Manager: Michael Roth 0400352414

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