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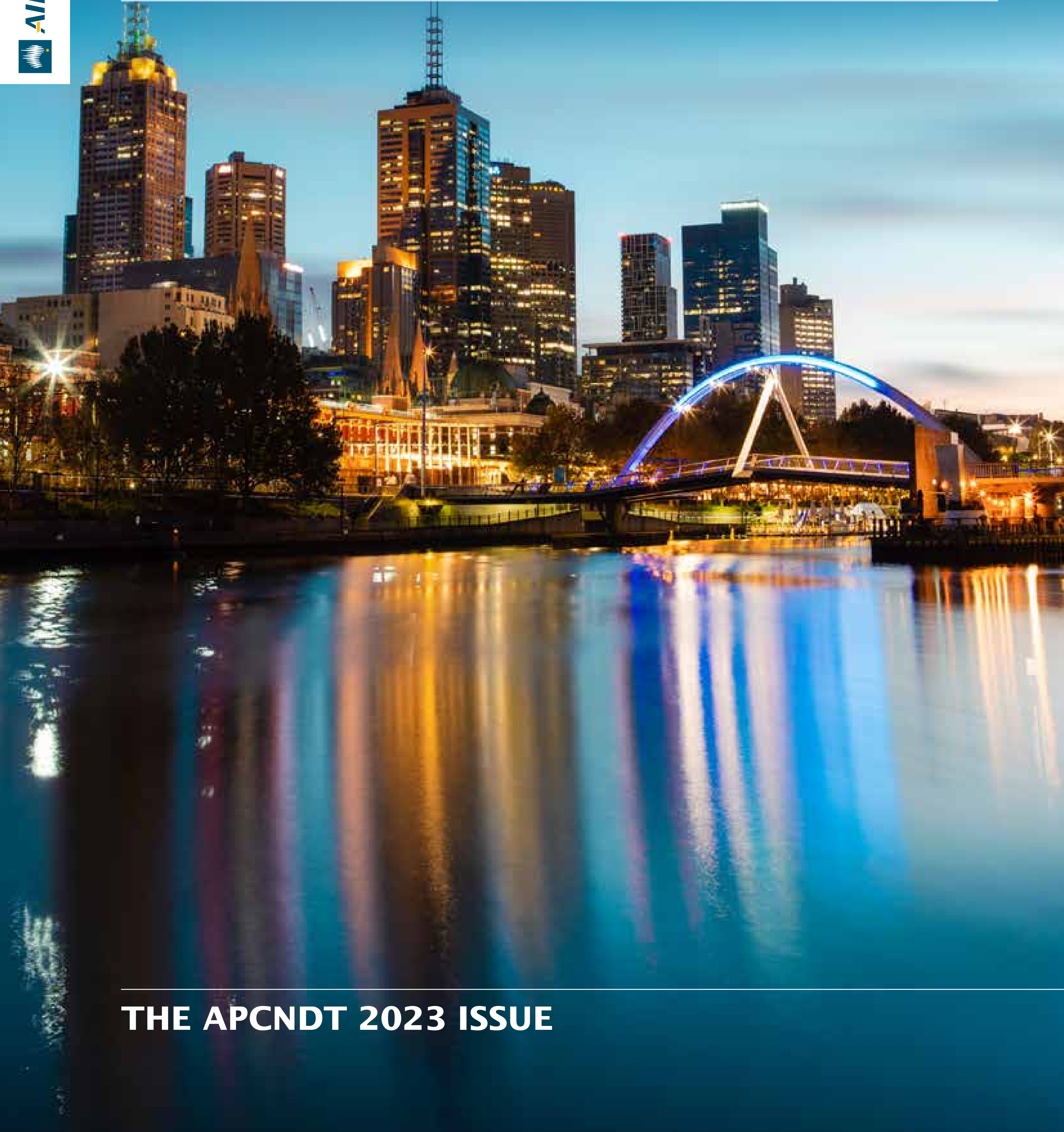
AINDT

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



THE APCNDT 2023 ISSUE

President's Message January/February 2023

Dr. Irene Pettigrew

It's 2023, and it is customary that a new year is often initiated with a New Year's resolution. This usually involves a rinse and repeat of the unsuccessful attempts of the previous year's aspirations of trying to adopt healthier lifestyles, spending more quality time with family and friends, ticking off those items on the bucket list and/or trying something new.

In 2022, the gist of the conversation from peers was that work-wise we were all too busy. Even at the start of this year many of us have decided not to commit to any New Year's resolutions with the excuse we will be too busy to dedicate time to achieve them. The reason for bringing this discussion point into my message is for all of us to stop and reflect upon what our everyday routines involve, whether at home and/ or in the work place. Making time to consider optimisation, change or elimination of an activity could make a small or large difference freeing up time for those New Year's resolutions to be more attainable.

One goal that I would encourage you to include for 2023 is *do it right the first time,* which will in turn maintain your integrity and credibility. "If you don't have time to do it right, when will you have time to do it over?" is some mental nourishment from Hall of Fame basketball player and coach, John Wooden. Doing things right first time minimises quality, health, safety and environmental incidents, optimises productivity, saves time and ultimately reduces costs by not having to rework or revisit the same situation again if there are problems.

The challenge with this is knowing how to prepare to execute an activity correctly without having to rush in unprepared, running the risk of making avoidable mistakes by taking short cuts. The emphasis is planning, preparation, and approaching a task systematically every time regardless of this being a longer lead activity or ad-hoc / action emergent work.

Throughout my NDT career, I regularly embark on those that have the misconception that doing something is better than doing nothing, but if the solution will not provide the desired results, is incompatible with finding the defect mechanism or fails to meet the brief, then doing nothing until the correct approach is sought is the best course of action.

My first six months at the helm have predominately focused and will continue to concentrate on optimisation of the AINDT Federal Office systems and processes. This has also included supporting the AINDT Certification Board with auditing to ensure the AQBs are in compliance with the updated ISO 9712 (2021 edition) requirements. Following a successful JAS-ANZ audit in early December, I'm pleased to report that from January 2023 the AINDT has now transitioned to the latest version of ISO 9712.

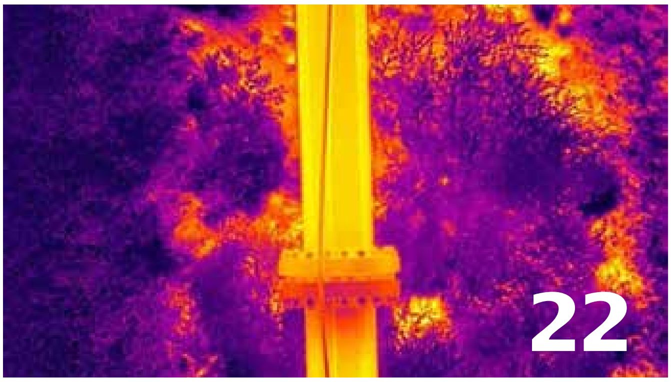
This year has already demonstrated positive changes and growth for the AINDT with the Federal Office relocation in January, as well the relaunched and upgraded online portal for membership and certification applications. We encourage our members and certification holders to provide feedback on their positive experiences and potential improvements to ensure that the online portal provides the right support for you.

The theme of this journal is all about the AINDT's involvement in hosting the eagerly awaited 16th Asia Pacific Conference for Non-Destructive Testing (APCNDT) in Melbourne from 28th February till 3rd March.

This rescheduled international conference is one of the first on the NDT circuit to take place after being postponed from its original 2021 date due to the COVID pandemic.

For me, one of the encouraging and exciting elements of this conference is inclusivity which echoes the core values of the AINDT. We look forward to welcoming delegates, speakers, exhibitors and kindred societies from across the globe to participate in four days of a fully packed conference programme with technical presentations discussing key NDT and condition monitoring challenges currently faced in construction and risk-based maintenance environments within oil and gas, power, mining, aerospace and transportation. The conference technical sessions are taking place in parallel with the exhibition showcasing the latest products, services and technologies. Bridging the gap between the exhibition and technical presentations is the ability for exhibitors to showcase their solutions in the exhibitor technical forum sessions. This is an amazing networking opportunity for everyone, with more information on what to look forward to at APCNDT2023 within the journal.

Haste Ye Back!
Dr Irene Pettigrew



AINDT News

Industry News

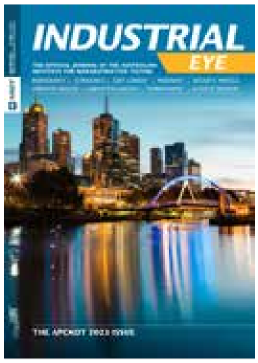
Feature

Technical Article

Product & Services

Cover Image

Beautiful Melbourne, host city of the APCNDT2023. View of the city skyline taken from South Bank.



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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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From the Institute

Welcome to 2023! As we count down to APCNDT2023, much has been happening since the last federal office update.

The office has relocated, we had our JAS-ANZ accreditation audit and successfully transitioned to the latest version of ISO9712, we have revamped the AINDT website, updated the AINDT member/applications portal, and we celebrated Christmas and New Year in between.

As the APCNDT2023 fast approaches, we are in the final push before the conference. Given all the disruptions of COVID-19, it has been nothing less than a herculean effort to get this far!

It is safe to say that without the boundless energy and OCD of Mr. Paul Grosser, we probably would have thrown in the towel and given up. Paul has led the APCNDT organizing committee and driven the event forward to a place where we can confidently say that the AINDT will be hosting a successful event. Our immense gratitude goes to Paul for the countless unpaid hours he has given the AINDT to make this event possible.

As mentioned earlier, the AINDT has been updating the AINDT portal in an effort to enhance its usability and functionality, giving users a straightforward interaction with the federal office. In doing so, we have made the decision to no longer accept paper based or emailed applications for membership and/or certification.

All membership and certification applications are now being processed via the portal, which puts the onus of the applicant to ensure all the information is correct before the staff process any applications. A huge amount of gratitude goes to our Federal President, Dr. Irene Pettigrew and the portal developer Mr. Nick Ferguson for the mammoth effort they have invested into this project for the betterment of the AINDT members and Certificate holders.

Along with the AINDT portal update, we are excited to soon unveil the newly refreshed AINDT website. It's hoped that the fresher look and feel of the website will enable easier navigation when finding documents and AINDT publications.

We have also enhanced the usability of the event booking process. Should anyone have any feedback or would like to make suggestions on how we can further enhance the website, please feel free to contact the AINDT Federal Office.

At our recent JAS-ANZ re-accreditation audit, the NDT Certification Board and staff successfully transitioned the AINDT certification scheme to the latest version of ISO9712 (2021). Whilst this may seem a simple process, a massive amount of work goes on behind the scenes to bring all the new requirements together and then implement them in such a way that doesn't place any undue pressure on the certificate holders who use the scheme. Obviously, we can't ignore requirements, but the NDTCB tries its best to implement new requirements carefully whilst still meeting the intent of ISO9712 in its entirety. It is encouraged that all certificate holders read the new version of the AINDT guide and make themselves fully aware of any new requirements.

Even though it's been very busy at the federal office, it was decided that the AINDT needed to relocate from its base in Abbotsford over to the other side of the city to our new home at 27a Stubbs Street, Kensington. Funnily enough the new AINDT office is only around 500m from our former home at the Chubb Building on Flemington Road. With the welcome addition of office windows (those who visited the office (bunker) in Abbotsford will understand) and proximity to the highway, it's a much better office for the AINDT staff and volunteers who will utilize its space.

We hope you enjoy this edition of the *The Industrial Eye*, and we look forward to seeing as many members and certificate holders as possible at the APCNDT2023. It promises to be an amazing event and one not to be missed!

As always, should any of our readers find themselves in Kensington (not Abbotsford) please feel free to pop in to the new office for a coffee and a chat, members and certificate holders are always welcome and our door is always open!

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

Barry Cooper

Welcome to another busy year ahead. This year kicks off with our much-anticipated Asia Pacific Conference APCNDT 2023 in Melbourne from 28 February – 3 March. This event was postponed from October 2021 due to COVID-19. We look forward to finally being able to welcome and catch up with friends, colleagues and international visitors.

The latest update to the 'Guide to Qualification and Certification' (Issue 22 Rev 03 December 2022) was uploaded to the AINDT website on 2nd of January. This latest revision encompasses the new requirements of ISO 9712-2021. This update to the Guide brings with it many changes which will impact NDT Practitioners, NDT Providers and our AQB's. Our group of volunteers have worked hard to deliver both fair and equitable policy, to ensure the on-going viability of our Certification Scheme and meet the new code requirements. Even as the latest revision of the Code was being released, loose ends were still being found. Please bear with the CB over the coming months as we work to bed down the policy and tidy up any loose ends. If you have concerns with the new Guide, please provide feedback to the Board, so we can review this at the next CB meeting.

A reminder to those that are signing as referees. The Guide states: ISO9712 allows for candidates to gain experience under the supervision of NDT personnel certified in the same method or by non-certified personnel who, in the opinion of the certification body, possess the knowledge, skill, training, and experience required to properly perform such supervision (AINDT, 2023, Guide to Certification., Para 3.7.4). Para 3.7.4 also states: For any type of certification, referees not holding appropriate ISO9712 certification must supply evidence of knowledge, skill, training, and experience commensurate with the nature of the supplied referee statement, as described above. Where extenuating circumstances exist, the candidate may request in writing special consideration from the Certification Board.

I encourage potential Referees who are not certified in the same method to seek special consideration from the CB when the Candidate begins their training and not leave applying for special consideration until the Candidate is applying for Certification.

Lastly, I hope to see you all in Melbourne for our much-anticipated APCNDT2023 Conference.

Barry Cooper
Chairperson – AINDT NDT Certification Board

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

Shawn Moore

As many would be aware the AINDT has updated the process for certification and membership applications. The change is from paper applications to a paperless system with lodgement through the AINDT member portal.

From 1st January 2023 all applications for certification will need to be submitted via the AINDT Membership Portal https://www.aindt.com.au/MemberPortal using the email address registered with the AINDT for logging in to the AINDT portal. The same process also applies to membership renewals.

For new users an account will have to be set up to lodge for Membership or Certification.

The above changes should make the processing of memberships and certifications more efficient and user friendly. If there are difficulties for with the new application process, please contact the federal office for assistance.

2023 will be an exciting year with the 16th Asia Pacific Conference for Non-Destructive Testing, which will include presentations on Condition Monitoring. AUSPTA will have numerous presentations on thermography applications on the Friday 3rd of March at the conference.

Shawn Moore
Chairman – AINDT CM Certification Board

Member List

January 2023

The AINDT is a national peak body which 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 keep 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

ALS Industrial Pty
ATTAR
Stork Technical Services
Intertek-Adelaide Inspections Services
D R May Inspections

SUPPORTING MEMBERS

Chevron
PCTE Industrial

CORPORATE MEMBERS

Azure NDT Quality Services Pty Ltd
Bureau Veritas Australia
Chemetall (Australasia) Pty Ltd
Evident Australia Pty Ltd
Hofco Oilfield Services
MDR Certification Engineers Pty Ltd
SafeRad SE Asia Pty Ltd
Sonomatic Ltd
TR Pty Ltd

COMPANY MEMBERS

NSW

ARL Laboratory Services Pty Ltd (Yennora)
AXT Pty Ltd
Barry Evans Lifting World
Bluescope Steel (Wollongong)
EN DE TEK
HVT Inspection Services
Magnetic Analysis Aust Pty Ltd
NDT Equipment Sales Pty Ltd
Nobel Engineering Services
Reliance Hexham
Russell Fraser Sales Pty Ltd
SmartChem Industries Pty Ltd
Sonix NDT Pty Ltd
Simplifi Nii P/L
Thermal Imaging Services (AUS)

QLD

AXS Pty Ltd (Mackay)
Industrial Mining Inspection Solutions
International Tube Testing Pty Ltd
Lucas Drilling
Metal Testing Pty Ltd
M-Test Mackay
Queensland Alumina Limited
Testing Inspection and Calibration Services

VIC

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

SA

ASC Pty Ltd
NDE Solutions
Red Earth NDT Pty Ltd

WA

Alliance Solutions Group
Applecross Electrical & Testing Services
Asset Reliability Inspections Pty Ltd
Australian Institute of Maintenance Engineering
GoldField NDT
Hofmann Engineering
Integrity Engineering Solutions
Metlabs Australia
MJ Engineering Inspection Services (Welshpool)
Vertech
Weld Integrity
Wood – Asset Performance Optimisation

Membership Registrar's Message

Hi AINDT members,

The Asia Pacific Conference for Non-Destructive Testing (APCNDT) is held every 4 years and is considered the major regional event for the Asia Pacific Federation for NDT, and will be held at the Melbourne Convention Centre commencing the 28th February 2023 (previously held by Singapore in 2017).

The conference includes a technical and scientific program with workshops, which presents the latest developments in the field of research and development as well applications of NDT and CM in all major industry areas. The conference and exhibition combine the best promotion of NDT/CM and at the same time offer unique opportunities to establish contacts and exchange experience and ideas between participants and attendees.

The four-day conference will offer presentations and technical sessions in Oil & Gas, mining, aerospace, defence power and transportation sectors and the regulatory bodies that support these industries relating to both NDT and CM.

As NDT/CM practitioners, this is a fantastic opportunity to support AINDT. Registrations are now open and we encourage to book now to take advantage of early bird savings. More information is available in this special edition of the journal or visit the APCNDT2023 website.

Kind Regards
Craig Taylor

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: Irene Pettigrew
Immediate Past President: Nick Eleftheriou
Vice President: Richard Stocker
Treasurer: Justin Cavanagh
Secretariat Liaison: Richard Nowak

New South Wales Branch
Darren Quinn
Neil Burleigh
Stuart Smart

Victorian Branch
Pranay Wadyalkar
Paul Trigg
Mark Welland

South Australia Branch
Craig Taylor Membership Registrar
Andrew Morris
Karl Saul
Tyson Jenke

Queensland Branch
Ian Hogarth
Damian Clarke
Roger Hardy

Western Australian Branch
Colm Kinsella
Catherine Fleay
Derek Bruns

NDT CERTIFICATION BOARD

Chairman: Barry Cooper
Honorary Secretary: Victor Mierzwa
Vice Chairman: TBA
Nata Rep: Diane Hobday
L2 Technician Rep: Yan Xu
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

Meet our Board Members 2023

Irene Pettigrew

AINDT Position
President

Company/Employer
EnerMech

Company Position/ Title
NDT Level 3 / Technologist

Member Since 2013

Most people are introduced into the Non-destructive Testing (NDT) industry by sheer luck and my story resonates with this. I was introduced to this field in 2003 when developing a new NDT ultrasonic transducer during a 12 week industrially sponsored project as part of my Applied Physics degree which provided a career pathway to complete a PhD in Ultrasonic Engineering in 2008.

Before immigrating to Australia in 2013, I developed and deployed advanced NDT solutions for various components within nuclear power stations in the UK, Europe and South America.

My NDT Level 3 / Technologist role with EnerMech focuses on NDT Level 3 support, quality, R&D, integrity services and technical consultancy services. I am committed to team optimization and influencing team success. My NDT background has now exceeded 15 years of experience and concentrated on being a technical authority and SME specializing in advanced NDT solutions for onshore, offshore and subsea assets.

I am passionate about executing technical excellence to ensure clients are using the appropriate inspection solutions for their integrity threats and issues as well as assisting with training and mentoring of NDT and Integrity personnel.

Continuous Professional Development (CPD) is one of my main drivers and as the current AINDT President and Honorary Secretary for Materials Australia WA Branch, I continue to organise the technical programme for the AINDT members, joint events with other like-minded institutes in WA, and I am a member of the AINDT Certification Board.

I am truly fortunate to be in a profession that I enjoy, continue to grow in and have the privilege of working alongside many inspirational, dedicated and knowledgeable professionals in the asset integrity community.

Richard Stocker

AINDT Position
Vice President

Company/Employer
EnerMech

Company Position/ Title
General Manager

Member Since 2001

Richard started his NDT career as a trainee technician in 2001 obtaining the four base qualifications. Richard also holds qualifications in welding inspection, thermography and vibration analysis with the latter obtaining AINDT Certification.

He has progressed through the industry from technician to supervisor, multi state operations manager and now to a lead commercial role covering the Asia & Pacific region.

During this time he has been able to work across a large range of industries such as oil & gas, mining, power generation and heavy industry etc. Richard has also worked on the other side of the fence directly for some of the larger asset owners in Australia.

Richard has been a member of the AINDT on and off for approximately 22 years and on the AINDT Federal Council for the past three years and is a WA representative, past secretary and current president.

Nick Eleftheriou

AINDT Position
Immediate Past President

Company/Employer
Evident Scientific Industrial

Company Position/ Title
NDT Applications Manager

Member Since 2007

Nick established and operated a maintenance & painting company in South Australia, starting his NDT career much later in life as a trainee in Western Australia. Since then, Nick's passion for the industry has grown with continued professional development including multiple NDT and Inspection qualifications.

During this time Nick has held numerous roles as a technician, manager and technical controller for SME and international companies across Australia within a broad industry cross section such as, manufacturing, construction of major projects, oil & gas facilities.

Nick is a keen advocate of the institute and the services it provides globally. He is an active member of the AINDT as the SA/ NT state branch president and most recently the Federal Council Representative to the BOD.

Justin Cavanagh

AINDT Position
Treasurer

Company/Employer
IMIS

Company Position/ Title
Managing Director

Member Since 2003

Justin became an NDT Trainee in 2001 and progressed on to becoming a technician working for some of Australia's largest refiners and miners. Conducting Advanced Ultrasonics, Radiography, Magnetic Particle and Dye Penetrant.

Though exposure and experience he gained the skillsets to allow him to become a tank inspector, AICIP Inspector and gain a number of level 3 NDT Qualifications. 10 years ago, he branched out and formed IMIS which now services Central Queensland industry and has grow the business to approximately 40 staff.

Justin has been an AINDT Queensland Councillor since 2011 and AINDT Queensland President for the past 3 years. His aim is to assist driving AINDT to new places as the industry evolves with technology.

Richard Nowak

AINDT Position
Board Member

Company/Employer
Retired

Company Position/ Title
NA

Member Since 2011

I have had a long and eventful career in many industries, with interesting technology and problem solving being the common factor. With a BE(Hons) and an ME Electronics I began in electronics engineering, then moved to management, including 12 years managing director of a highly successful PCB manufacturer in New Zealand.

My first introduction to NDT was in 2005 when I joined Maxtech (Graham Maxwell) to look after Victoria for Olympus products. Olympus Australia took this over, and I variously looked after NDT sales for Victoria, New Zealand and South Australia, then spent the last 10 years as NDT Product Manager and Technical Specialist for Olympus.

Key activities were advanced product promotion and support (mostly UT and ET), applications advice and marketing. I was proudly part of the team that built a very strong presence in Australasia for Olympus (now Evident).

At Olympus I worked closely to support the AINDT – sponsoring technical and social events, trade shows, organising Olympus speakers, providing articles and advertising in the Journal. I been on the Vic Council for around 10 years, including being president and secretary, continuing into my retirement.

At Olympus I got to know many of the key technical people in NDT companies around Australia and New Zealand.

My ambition for the AINDT is to provide ever increasing value to our members. AINDT represents the expertise of members, highly valued qualifications, professional growth services, and advocacy for the NDT and CM industry. A strong membership backing helps the AINDT represent the industry, which in turn supports highly skilled work opportunities.

NSW Branch News

Durr NDT & En De Tek, with the assistance HVT Inspection Services, hosted NSW's most recent Technical Night on the 15th November 2022. A good representation across many companies, attended for the practical hands-on demonstrations of the Radiography, High Resolution, Digital Panels of all shapes and sizes. This extremely robust and waterproof digital detector array (DDA) has been specially developed for maximum portability and the harsh conditions of industrial radiography.

Nick D'Ademo, Head of Durr Software Development, was also more than happy to run through a Q&A session after the demonstrations, which also gave insight into Durr's continuous improvement culture and the DICONDE software, D-Text X.

As quoted from Durr "D-Tect X was developed from the ground up specifically for the NDT industry and in close collaboration with Level 3 experts and customers. The result is a software solution perfect for industrial radiography and which sets new standards in terms of both usability and efficiency. D-Tect X provides an optimal and time-saving NDT inspection workflow: from image acquisition and image evaluation to data import and export, everything you need is included."

The NSW Branch also held our Christmas party in December with Karen and Paul Ashby, from HVT Inspection Services, as very accommodating hosts this year. Great food was enjoyed by all and good to catch up on all the latest news from around the industry. We were also lucky with SmartChem Industries achieving their 10-year anniversary and Stuart brought some merchandise, cooler bags and drink coolers, which were generously given away to all the attendees.

The NSW Branch looks forward to a productive 2023 with more technical nights and social catch ups.

NSW Branch councilors holding critical AINDT discussions.

Plenty of delicious food was enjoyed at the Christmas lunch.

Attendees of the NSW Branch Christmas party hosted by Karen and Paul Ashby.

VIC and Tasmanian Branch News

November 2022

The Victorian Branch November 2022 Technical Night was presented at the Golden Gate Hotel in South Melbourne. It was our last tech night of the year and was fantastic to see the good turn out.

The Technical Night topic "Quantifying Corrosion" covered commonly used methods to both screen and quantify internal and external corrosion, applications of different screening methods, quantifying and measurement uncertainty and ultrasonic methods and tips for greater accuracy. Prepared by Glen Haberl from Asset Integrity & Compliance Inspection Services and presented by Paul Trigg of EVIDENT who brought along some equipment to demo some of the applications after the presentation. It was great to see some project examples, practicle uses of corrosion detection methods and images of Glen.

It was a great turn out and thanks to everyone who attended and got involved. Thanks Glen and Paul for your participation on the night.

December 2022

On Friday 9th December the AINDT Victorian Branch Council and members gathered at the annual Christmas party held at the Al Porto Vecchio restaurant in Williamstown. It was great to catch up with the councillors, members, family and friends in the relaxed setting to celebrate the year. A big thank you to Miro for organising the evening as it was enjoyed by all who attended. The Christmas party is also where we can recognise our partners and family for their time supporting the branch councillors while they are dedicating time to AINDT – your effort and support plays a huge part in the councils success, thank you!

A big thank you to the work and time the Victorian Branch Council has dedicated to our members throughout the year. It has been an enjoyable year of face-to-face events, meetings, tech nights and a year to both celebrate the end of, and build on. To the council – Miro Katouzi, Richard Nowak, Glen Haberl, Samad Ashgary, Pranay Wadyalkar, Peter Milligan, Mark Welland, James Burton & Sadegh Abbaspour – all the best for the new year, thank you and I look forward to an exciting and prosperous year.

The Victorian branch committee meet every month voluntarily to discuss how we can deliver the members more events to develop NDT operator's knowledge. At the time of writing this, in the pipeline, some of the ideas for future tech nights are listed below. We are always open to more ideas being put forward to the branch.

Upcoming Events

- APCNDT Conference , Melbourne Convention Centre
- Guidance on ISO 9712 , Golden Gate Hotel

VIC Branch technical night attendees at the Golden Gate Hotel in South Melbourne.

A great turn out for the Vic branch annual Christmas party at Al Porto Vecchio restaurant in Williamstown.

- Welding & NDT , Golden Gate Hotel
- Branch Plate Specimen Testing Night , TBA

Future Events

- RT viewing (interpretation)
- UT transfer correction / attenuation
- UT calibration techniques – dominant frequencies – horizontal and vertical linearity
- Advanced UT
- AS 1554 structural steel – NDT method clarification & acceptance criteria
- Advanced ET systems – possible asset owner to attend and give a presentation

As technology and the never-ending NDT applications list keeps growing, let's lead the next wave of NDT stars coming up through the system and help make Australia and the world a safer place. Getting involved, sharing knowledge and skills, listening to experienced operators, is such an important part of developing your own passion and self-development in NDT.

Regards
Paul Trigg – Victorian Branch President

WA Branch News

The AINDT Western Australian Branch was represented recently by Irene Pettigrew and Richard Stocker at the Annual Materials Australia Sir Frank Ledger Breakfast held at the Frasers Function Centre, Kings Park, Perth on the 30th of November.

As we have a strong relationship with Materials Australia, all AINDT members received the benefit of reduced member pricing to attend the event, which was very well coordinated and delivered.

Whilst enjoying a hearty breakfast and taking in a stunning view of the Perth CBD from above there was a short introduction to the event describing the significant contribution to our industry that Frank had made and this was followed up by a technical presentation entitled "Materials Used for Battery Cathodes and Difficulties Experienced in Materials Selection" delivered by Dr Richard Macoun, Research Manager, Future Battery Industries CRC.

A summary of the main content from the presentation can be outlined by the following:

The use of Lithium-ion batteries (LIBs) is ubiquitous in modern life, we use devices containing them almost every hour of the day. The creation of LIBs is a triumph of materials science as recognised by the 2019 Nobel Chemistry Prize.

The first part of this presentation examines the different materials in LIBs and dives deeper into those materials that have created the batteries we have today. The opportunities for Australia to carve out a position in the global battery industry are highlighted.

The development of batteries is far from over, demands for higher energy density, faster charging and longer life continue to drive battery technology and new materials are constantly emerging.

Attendees listening to Dr Richard Macoun's presentation.

AINDT Federal President Dr Irene Pettigrew and AINDT Federal Vice President Richard Stocker at the Annual MA Sir Frank Ledger Breakfast.

The second part of this talk scans the emerging battery technologies and the challenges they face to become widely adopted. The battery industry provides tremendous opportunities for materials scientists and engineers to contribute to the development of new product and production technologies.

Congratulations to Materials Australia for another well-attended and informative event, be sure not to miss it in 2023!

SA Branch News

Happy New Year and welcome to 2023 from the AINDT South Australian Branch. Hopefully, everyone has had a chance to relax, unwind and get ready for the new year.

The South Australian Branch held its end-of-year social event in late November 2022. It was a great opportunity for branch members to get together, have a meal and a beer without the formalities of a branch meeting. I think everyone enjoyed having a chat and a catch-up and it rounded out the year nicely for the branch.

The SA branch will be resuming its normal activities and meetings on the 30th of January. There are already a number of ideas for technical nights and activities that are being planned for this year. Amongst the hot topics in the branch will be the changes to the certification process, with the release of the new guide to certification. I am sure this will be a popular topic of discussion for technicians at the various companies around Adelaide and will be a talking point at branch meetings.

Also planned for early in the new year is a Radiation Safety and recovery simulation technical evening. Radiation Safety in Non-destructive Testing is an important topic that is rarely discussed other than ‘war stories’ amongst technicians, it was decided that it would be beneficial for the radiographers and radiation safety officers to get together and just run through a few scenarios together. The experiences of the more seasoned radiographers can be leveraged to educate those new to the industry, and there is a lot of value to be gained for everyone involved.

It's looking like it is going to be a busy year, not only the SA branch and the NDT industry in Adelaide, but for the AINDT in general with the changes to the certification process. I think we are all looking forward to seeing what 2023 has in store and the challenges that await!

Cheers
Karl Saul, AINDT SA/NT Branch President

AQB Availability

AINDT examinations are available through a network of AINDT Authorised Qualifying Bodies (AQB's) 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

Lower ground floor, office Q,
1 Tonsley Blvd, Tonsley SA 5042
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

44-48 Rocco Drive
Scoresby VIC 3179
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

ALS Training Academy

109 Bannister Road
Canning Vale WA 6155
Phone: 08 9232 0300
Email: trainingacademy@alsglobal.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

ATTAR – Advanced Technology Testing and Research – Authorised Examination Centre

10/28 Rudloc Road,
Morley WA 6062
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
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

Queensland

ALS Training Academy – Authorised Examination Centre

7 Brisbane Road
Riverview QLD 4303
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

Condition Monitoring Training Centres

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

This training has been approved by the AINDT as meeting the national syllabi as endorsed by the AINDT Certification Board.

Learners are advised to obtain a copy of the training module (syllabus) from the training body, or by downloading from the AINDT web site, when undertaking training in an CM method or industry sector module.

Applicants for Certification must complete the training program and training hours as set down in ISO18436 for the relevant CM Method, Category and Industry Sector.

All exams are conducted by the AINDT please contact the office for dates and other relevant information.

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

SKF Reliability System

SKF Australia Pty Ltd
17-21 Stamford Rd
Oakleigh, Victoria 3166
Phone: +61 3 9269 0763
Contact Email: laszlo.Csernatony@skf.com

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

ALS Training Academy

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

ALS Training Academy

7 Brisbane Road Riverview
Queensland 4303
Phone: 07 3816 5500
Email: trainingacademy@alsglobal.com

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

For more detailed information on training available by each provider, please visit www.aindt.com.au

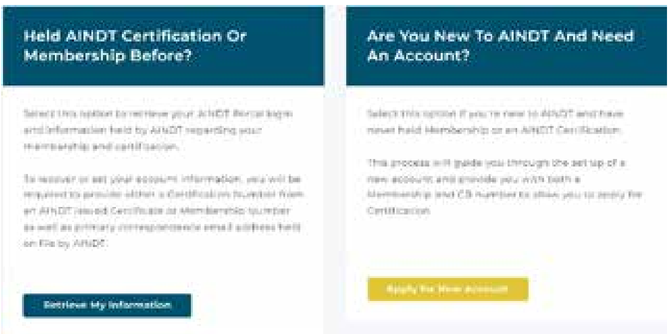
AINDT online Certification

As many readers will now be well aware, from the 1st January 2023 the AINDT will only accept applications for membership and certification via the AINDT online portal.

This will be a huge improvement on the older paper-based application process and should remove some of the ambiguity from the application process.

For those members of certification holders who have yet to access the portal, you will first need to retrieve your password form the database. This can be done easily by accessing the portal login page via the AINDT website. Once you have reached the login page, you can then click the ‘Create Account tab as per the image below:

Once you have been redirected you will be presented with the following page options



At this point it’s extremely important that users **do not apply for a new account** if you already hold membership or certification with the AINDT. Please select ‘Retrieve My Information’ if you already have a Membership or Certification number. If you are a new customer and/or have never had any dealing with the AINDT previously, you should select ‘Apply for New Account’.

To retrieve your information and password from the AINDT database, you will be required to enter the email address you have registered with the AINDT. Please only use the registered email address or you will not be able to receive the retrieval email containing the password reset link. If any users are unsure what the registered email address is, please contact the AINDT Federal Office and our staff will be happy to assist you.

Once you have completed the details requested above you will be sent an email to your registered email account allowing you to reset your access password. Once you have reset your password you will be able to access the AINDT online portal and your membership and certification details which will then allow you to update your deta8ils, apply for membership and/or certification and access and print your certificates.

Should you require any assistance in accessing or using the online system please feel free to contact the AINDT office and our friendly staff will be able to guide you through any issues you may have.

NDT World Event Calendar 2023/2024

Make attending an international conference one of your new year resolutions in 2023... borders are open and travel is beckoning! The following list offers information on upcoming international NDT conferences for your consideration:

February 28 – March 3, 2023

The 16th APCNDT2023, Melbourne Australia

Hosted by the AINDT, we welcome your participation in the 16th Asia Pacific Conference for Non-Destructive Testing to be held in Melbourne, Australia in 2023!

The four-day Conference will offer presentations and technical sessions under a range of industry streams looking at the NDT and CM challenges that industry faces in construction and risk-based maintenance environments, covering various industry sectors including oil and gas, power, mining, aerospace and transportation. Forums and discussions will focus on the current status of national and international standards as well as topics such as fitness for service of new and existing plant and equipment and much more. Technical streams will include;

Ultrasonics

Radiography

Eddy Current / Electromagnetic

Surface Methods (MT/PT/VT)

Pressure Vessels & Structural Health Monitoring

Thermography

Vibration Analysis

Quality Assurance

Qualification & Certification

Other Methods

Integral to the Conference is the exhibition that will showcase the latest products, services and technology in the market. This dynamic marketplace will enable you to learn, research and make valuable connections to assist your organisation and its operation.

And of course, you'll have the chance to relax and mix with colleagues from across the region at the many social events offered during the conference. We also encourage you to arrive earlier or extend your stay after the conference to discover and experience what Melbourne and its nearby surrounds has to offer.

Registration will open in early September and to ensure you receive the latest information on the Conference we encourage you to register your interest at: www.apcndt2023.com.au/16th-asia-pacific-conference-for-non-destructive-testing-2023/eoi/Site/Register

March 12 – 16, 2023

8th International Workshop on Reliability of NDT/NDE, California USA

This Conference will be organized in collaboration with the conference on "NDE 4.0, Predictive Maintenance, Communication, and Energy Systems: The Digital Transformation of NDE" under the umbrella of the ICNDT.

We cordially invite all NDT/NDE scientists and practitioners and early-career colleagues—active or interested in the field of NDE/NDT reliability—to attend the 8th International Workshop on Reliability of NDT/NDE (8th IWRndt), a continuation of seven successful European-American Workshops on Reliability of NDE (EAW), that drew international attention over the years—a tradition we wish to keep and pursue. The IWRndt is organized and supported by the International Committee for Non-Destructive Testing (ICNDT) Specialist International Group "NDT Reliability."

Aims and Content

The reliability of non-destructive testing (NDT) and evaluation (NDE) has been a much-discussed topic since the first applications of NDT. Therefore, various standards and practices have been introduced to ensure that NDT is performed to the highest possible quality standards. In recent decades, various validation methods have been developed to increase confidence in testing methods using deterministic and probabilistic approaches. In addition to physical capabilities, the effects of application, human and organizational factors on the reliability have been widely recognized adding to the understanding of what effects the reliability of NDT/NDE and how it can be improved.

Reliability remains to be a very challenging topic for NDT/NDE and it has been experiencing increasing attention in recent decades. Especially nowadays, considering the development and use of machine learning and artificial intelligence in the industry as well as in NDT/NDE, the reliability of human-machine systems is gaining importance. New standards are required for the inspection of new materials (for example, composites and smart materials) and additively manufactured components. For the integration of NDE, structural health monitoring and prognostics in "Predictive Maintenance," a precise knowledge about the reliability of inspection methods is essential. The cyber-physical transformation of NDE toward NDE 4.0, incorporating NDE modeling into digital twins, etc. requires further development of reliability models. Human factors, on the other hand, remain a challenge. Even though there is hope in automation and NDE 4.0 to relieve of some of the negative effects of human factors, it becomes even more important to design NDE 4.0 systems with the users in mind, assuring new technologies are trusted, accepted, and used. Standardization and quantification of human factors belong also to the current topics of interest. All these challenges drive us to further develop reliability models and pursue the mission of obtaining a holistic view on reliability in the field, encompassing all influencing factors.

The aim of this Workshop is to discuss the present status and future trends and acquire a deeper understanding of factors influencing the reliability of NDE/NDT inspection results and of their interplay in NDE/NDT practice.

The Workshop is organized into oral and poster presentations and topical panel discussions, maintaining its workshop format.

Major topics of interest include but are not limited to:

- Reliability for NDE 4.0
- Applications in industry (nuclear, aerospace, railway, automotive, civil engineering)
- Human factors, quantification of human factors
- Organizational context within an NDT organization and between different organizations
- Standardization of reliability
- Reliability in education
- Reliability for structural health monitoring and predictive maintenance
- NDE modeling and model-assisted POD
- Algorithms for reliability
- Reliability of inspection of new materials and production methods
- Reliability of inspection of additively manufactured components
- Reliability of data handling

June 6 – 8, 2023

The 10th edition of the COFREND Days, MARSEILLE – PALAIS CHANOT

Organised by the French Confederation for Non-Destructive Testing, this conference offers A unique program of highlights, to effectively link exhibitors, researchers, scientists and visitors around Non Destructive Testing. An Open Day on june 7th, dedicated to the students from the Region of Marseille, to discover NDT profession.

- highlighting technological evolution and presenting new possibilities and applications of the various NDE methods in industrial domains through technical conferences and an exhibition

- fostering thoughts on the new industrial challenges of NDE in face of imperatives in terms of competence, employment, and promotion of the inspector's profession through specific debates and « Open Days » centred on training and on the professional career path.

July 3 – 7, 2023

13th European Conference on Non-Destructive Testing (ECNDT 2023)

Centro de Congressos de Lisboa (CCL), Lisbon, Portugal.

The next European Conference, the 13th in the series, organised by RELACRE, the Portuguese Association of Laboratory Accreditation, is to be held in Lisbon, Portugal.

The European Conference on Non-Destructive Testing (ECNDT) is considered the major international event for EFNDT and its member societies.

The conference includes a technical and scientific programme which presents the latest developments in the field of research and development as well as the application of NDT in all major industrial areas. The exhibition organised in conjunction with the conference emphasises the close link between research and development, and the equipment and instruments used by industry.

The conference and the exhibition are combined the best promotion of NDT and at the same time offer unique opportunities to establish contacts and exchange experience and ideas between participants and visitors. ECNDT is organised by a national NDT society which is full member of EFNDT

May 27 – 31, 2024

The 20th World Conference on Non-Destructive Testing (20th WCNDT)

It is our great honour to invite you to attend the 20th World Conference on Non-Destructive Testing (20th WCNDT) hosted by the Korean Society for Non-destructive Testing (KSNT) to be held in Incheon, South Korea in May 2024 under the auspice of ICNDT.

We have been waiting for such a long time this wonderful world conference to take place in Korea, and are now ready to provide a revitalized conference and exhibition.

The Organizing Committee will offer a dynamic technical program that will be highly informative for every participant. The conference will be the place to interchange and integrate of professional colleagues from all around the world with an interest in this field.

We are so confident that the 20th WCNDT will turn out to be the most successful platform for networking and inspiring new technical ideas with the support from all of you.

The venue, Songdo Convensia, Incheon, is a centre of trade and transportation built upon the advanced infrastructure of Incheon International Airport (IATA: ICN). Within an hour's distance from Seoul by public transportation, visitors will be given the opportunity to experience a mix of diverse cultures and world-class urban life.

We look forward to meeting you all at Songdo Convensia, Incheon in May 2024.

Standards Report by Angelo Zaccari, Chairperson MT007

Welcome to the New Year and a new period for MT007 and NDT Standards.

A new Project Manager (Engagement Officer) has been appointed by Standards Australia with the first meeting held with MT007 in December 2022, which allowed for excellent discussions and a positive outlook in 2023.

We also welcomed three new MT007 Committee Members; Paul Grosser, Nick Ferguson and Erik Thorup. A full list of MT07 Committee Stake Holders will be made available within the next Standard News.

It was reconfirmed that Australia would continue participation on ISO/TC 135/SC 7 as a participant (P) member covering ISO9712 NDT Certification and ISO/TC 135/SC 8 as a participant (P) member covering Thermography. In addition, there was movement by MT007 and Standards Australia to allow a larger presence and move ahead in the new year regarding ISO Standards Committee Participants and on Working Groups consisting of TG1 Basic, TG2 Eddy Current Testing, TG3 Leak Testing, TG4 Magnetic Testing, TG5 Radiographic Testing and TG6 Ultrasonic Testing.

Australia also nominated a Chairperson for ISO/TC 25107 NDT Training Syllabi and we expect feedback shortly on nominations.

Standards Australia made all MT007 Working Groups inactive due to no Australian Standards revisions or new projects coming up in the future. These Working Groups that cover all of the Australian NDT Standards can be reactivated as required in the event of a new or revised Australian Standards.

Most importantly current Standards and potentially new ISO Standards were reviewed with the outcomes as follows

- ISO 3452 Pt1 & Pt2: 2021 penetrant testing – revised version was adopted.
- AS ISO 4993: 2020 radiography of castings - version was adopted. This will be replaced by ISO/AW 4993.
- AS3669 Aerospace NDT Certification – this standard was reopened. The National Aerospace NDT Board were to further review and provide feedback.

Although a number of ISO Standards and responsible Committees below appear to be strange, these are correct and as directed by ISO. Activities occurring that include responses to drafts and voting are as follows:

1. NDT – MT007

ISO/FDIS 18251.2 – Infrared thermography – Test method for integrated performance of system & equipment

ISO/TS 25107:2019 – Non-destructive testing – training syllabuses

Liaison with CEN/TC 138 – CIB to establish a liaison with CEN/TC 138

N0146 Proposal for the new convenor of ISO TC135 SC8 WG1

Proposal for the new convenor of ISO TC135 SC8 WG1

ISO 12714:1999 – Acoustic emission – Secondary calibration of acoustic emission sensors

ISO 12716:2001 – Acoustic emission – Vocabulary

ISO/CD 24489.2 – Acoustic emission Corrosion of atmospheric pressure metallic storage tank floor

2. Con Mon – ME087

Ballot – ISO PWI 18436-9_Initial Draft for Ballot

TC108/SC5/WG 5 Ultrasonics – Call to ELECT New WG Convenor.

ISO 13374-3:2012 – Condition monitoring & diagnostics of machines – Data processing, communication & presentation.

ISO 18434-1:2008 – Condition monitoring & diagnostics of machines – Thermography – General

ISO 16079-1:2017 – Condition monitoring & diagnostics of wind turbines – General

Future reporting of Con Mon may not be available as I will no longer be obtaining updates from ISO relating to ME087.

We are looking forward to further advancements of NDT Standards of Standards in 2023, including far more activity with ISO.

Please contact me using the details below if you have any questions or require further information and I will reply at the first opportunity.

Angelo Zaccari
azaccari@aben-tech.com.au

Thermography in Action

Welcome to *Industrial Eye's* regular feature on infrared thermal images from the Australian Professional Thermography Association. (AUSPTA). Every infrared image tells a story. These images and information are presented as brief snapshots to show examples of thermography in action in the real world.

AUTHOR PETER MILLIGAN, COMMITTEE MEMBER, AUSPTA AND OWNER OF TOTAL ASSET SOLUTIONS

Complementary thermography tools

Since the COVID 19 global pandemic, the inspection industry has seen a huge rise in the use of UAV's & ROV's to ensure assets remain fit for operational purpose: safe and reliable. Thermography inspections are certainly no different in this regard.

Background

Generally, inspections of assets present certain levels of risk, resulting in WHS issues and increases in insurance premiums, and excesses when claims are made. Drones allow for a detailed assessment without the need for scaffolding, abseilers and scissor lifts.

When a UAV inspection detects an issue, further inspection can then be targeted, and effective repairs addressed efficiently.

Utilising thermography for the inspection of asset integrity requires the operator to take into consideration a large amount of information, which could affect the inspection. Variables such as distance from object, angle of incidence, orientation/direction, imager specification, lens, time of day, weather, position of the sun, and more, all play their part.

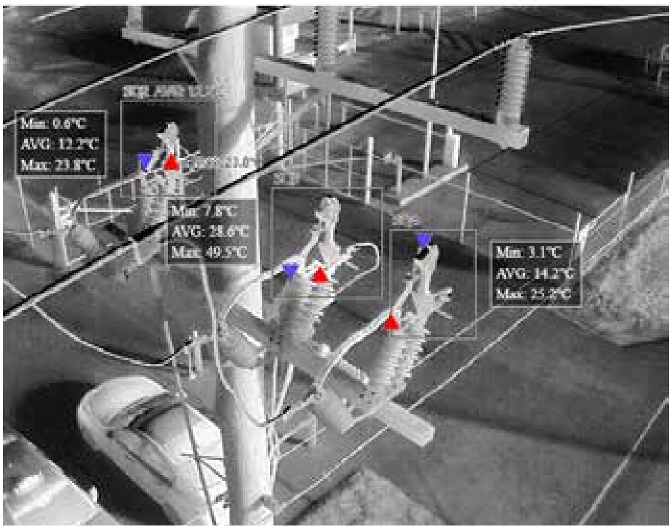
One of the most important considerations is the angle, or direction, from which a survey is conducted, and the orientation of a possible fault being detected by the thermographer.

In this article, looking at three examples, we will focus more on the difference between ground-based and UAV inspections and how the angle of inspection can significantly affect the survey results and characterisation of findings, based on the position, or location, of a possible fault

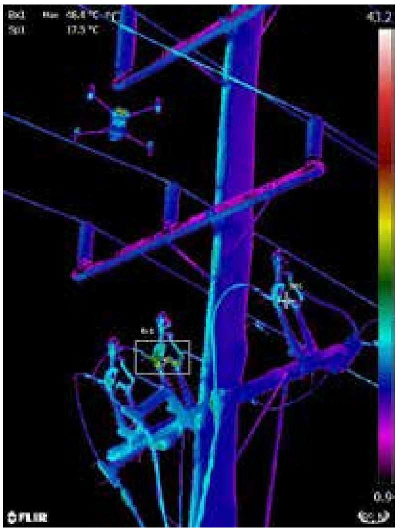
Example #1

The images below show the same asset which is a 22KV connection. It looks like a higher resistance connection on one of the phases of a three-phase system.

The first image was taken using a UAV (DJI M30T). The second image was taken from the ground using a handheld thermal imager.



Above: Aerial image show a 25.7 Delta T on the centre phase as compared to the left hand phase showing a max temp of 23.8 degrees C.



Above: Same objects but this time taken at ground level.
While there is a different inspection angle, compared to the UAV (shown in background), the fault temperatures are very similar.

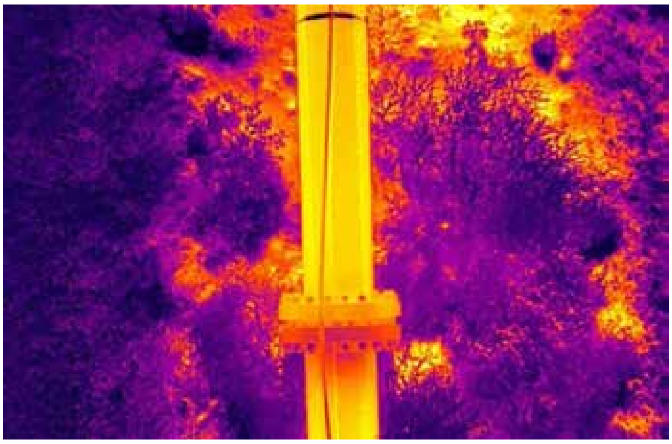
With both of the images above, the max temps are very similar. The UAV image showing a max temperature of 49 ˚C and the ground based image showing a max temp of 48 ˚C.

However, with the ground-based image, it could be difficult (to the untrained eye) to ascertain what the potential fault could be. With the UAV image it can clearly be seen that there appears to be a higher resistance connection on the centre phase switching link.

Both aerial and ground inspections can (and should) work hand in hand. For example, the UAV could fly the line relatively quickly and conduct a "scan" of the line to identify possible problems which could then be followed up with a ground-based inspection of any particular location.

Example #2

This image shows a pipeline inspection, note only the upper side of the pipeline can be inspected so potential faults/leaks on the underside of the pipeline could be missed when conducting aerial surveys. In this instance, it would be beneficial to use both aerial and ground based survey methods to conduct the inspection.



Above: UAV pipeline inspection using IRT.

Above: Same UAV pipeline inspection using visual.

As we know, pipelines are used to transport fluids such as liquids and gases, as well as liquid mixtures with solid particles. Thermographic pipeline inspections are an important component of the effective operation of long-distance piping systems supplying variable media. Because the temperature of the transported media differs from that of the surrounding air, thermal cameras can provide a vital role in inspection and maintenance efforts. By using thermographic systems, one can quickly detect and localise defects to pipeline insulation, as well as leaks. In some cases, leaks may even be detected and localised in underground pipelines.

Thermal imaging analysis and diagnostic tools can aid in the operation and maintenance of a wide variety of systems: hot water piping, water mains, steam piping, product piping (crude oil or gas piping), piping in chemical operating units, food industry, agriculture, power plants, mines, and more. In most cases, pipelines do not only transport material – they also supply heat energy to the transferred medium. This heat depends on proper pipeline insulation, which can be determined through the detection of pressure losses in pipelines. Thus, the whole transport system must be completely sealed because leaks of media are not only losses of mass, energy and profits, but often ecological losses as well.

Pipeline reliability can suffer because of poor design, improperly selected material, defective transport system construction, and unexpected conditions that arise during construction. The following information deals with external piping systems that are affected by atmospheric conditions and are threatened by non-permitted interventions (mechanical damage due to lack of knowledge, accidents, or intentional actions).

Damage can emerge as a weakening of the cladding on the external insulation, as well as in leaks of heat energy, in addition to pipe breaks and losses of the transported medium. At the same time, risk arises from wear on the thickness of piping through internal corrosion (during the transport of aggressive liquids) and mechanical stressing (in the case of the transport of non-homogeneous materials with solid particles)

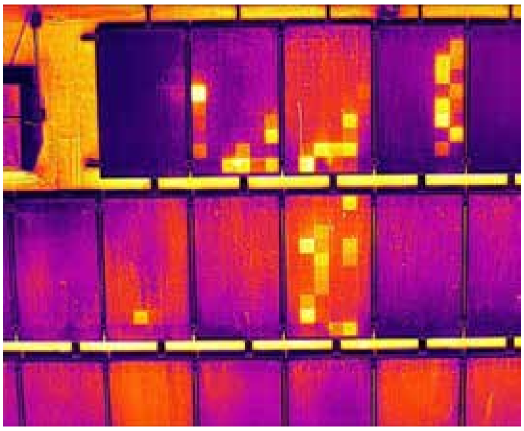
Due to the risk posed by losses arising from piping defects, pipelines must be regularly and carefully inspected. Unfortunately, inspections bring their own risks. Pipeline systems are often located underground. Above-ground pipelines often extend for hundreds of kilometres in areas where access is difficult or restricted. are restricted, and the surrounding countryside is impenetrable. This can make access to pipelines incredibly difficult or impossible. It is simply not humanly possible to visually check every inch of piping, and built-in measuring systems (such as pressure meters and flow meters) are financially demanding and unreliable because even they cannot cover every high-risk area.

Now, a simple solution to the inspection problem facing long-distance pipeline operators is available through the utilisation of a UAV equipped with a thermal camera. A drone can fly above the whole length of a pipeline while recording and displaying the monitored scene in real time. When an issue is highlighted during the survey, a ground-based inspector can be dispatched to take a closer look and report back on findings.

With this solution, the inspector benefits from an immediate overview of the condition of the pipeline. If a defect is detected, they can focus in at greater detail and, if possible, personally check the location. However, a traditional camera for the visible spectrum would be limited to a fraction of potential pipeline defects, as it only records visible damage or leaks. For example, a traditional camera cannot detect defects to internal heat insulation, nor leaks that occur below ground.

Only with the timely detection of areas with thinning insulation and damaged cladding can major accidents that threaten the lives and health of workers and/or the public – to say nothing of financial losses – be prevented. This is where a thermal camera comes in. Thermal cameras see what cannot normally be seen and record the thermal radiation of the objects being inspected. Defects are identified on the basis of the difference between the pipeline's surface temperature, a reference temperature, and the knowledge of the operator. Thermography enables asset owners to locate where the insulation is damaged, and identify where heat losses occur during the transport of heating media.

Example #3



Above: UAV inspection of solar panels.

In this inspection, we see a UAV utilised to conduct a thermal inspection of solar installation. In the image you can clearly see individual cells which appear to be dysfunctional. However, the UAV is unable to access the underside of the panel to inspect the panel wiring, or the invertors.

This is an example where both aerial and ground based thermography technology can be used to inspect assets comprehensively and effectively.

These assets are expected to be delivered fully operational. However, issues arise. In many cases, you may not know there is a problem without the use of thermal imaging to identify it. By performing a thermography inspection of solar panels immediately after commissioning, it provides for the gathering of a baseline data set.

This initial inspection gives us data from when the field was fully operational to compare with future panel conditions, from ongoing preventative maintenance inspections

When a baseline inspection is completed, it is then time to consider an ongoing maintenance inspection program. These panels are exposed to the environment and harsh conditions. It is safe to assume that over time, problems will arise in the solar farm from normal operation, let alone hail or windstorm damage.

Through a routine inspection program, you can stay ahead of these concerns. The cost to stay ahead of maintenance concerns far outweighs the potential cost of lost income by neglecting maintenance over time. In the event of a string of panels goes out without knowing it, it may cost many thousands of dollars. Our goal is to help the client mitigate that risk and ensure the solar farm continues to generate as much power as possible to provide the highest return on investment.

Conclusion

Ideally, both ground based and aerial thermal inspections need to work hand in hand. One method may able to see potential issues which the other may not.

In the long run, timely and correct diagnosis of failing assets is the most cost-effective maintenance management program.

AUSPTA

APCNDT2023, proudly hosted by the AINDT

The Australian Institute for Non-Destructive Testing and APCNDT2023 Organising Committee warmly invite you to participate in the 16th Asia Pacific Conference for Non-destructive Testing from Tuesday 28 February to Friday 3 March 2023 in Melbourne, Australia.

Superbly located right in the heart of Melbourne is the venue, the Melbourne Convention and Exhibition Centre (MCEC), just a 20-minute drive from Melbourne airport. Surrounded by a wide range of accommodation within easy walking distance, restaurants, cafes, city centre, the MCEC connects you with everything you need.

This conference is important for our region and the AINDT is proud to be hosting the event and bringing our community from across a range of related disciplines together in Melbourne. Whilst the past three years have been challenging, we are looking forward to welcoming you in person to participate in what promises to be an innovative, informative and engaging experience.

The four-day conference will offer presentations and technical sessions under a range of industry streams looking at the NDT and CM challenges that industry faces in construction and risk-based maintenance environments, covering various industry sectors including oil and gas, power, mining, aerospace and transportation. Forums and discussions will focus on the current status of national and international standards as well as topics such as fitness for service of new and existing plant and equipment and much more. Technical streams will include;

- Ultrasonics
- Radiography
- Eddy Current / Electromagnetic
- Surface Methods (MT/PT/VT)
- Pressure Vessels & Structural Health Monitoring
- Thermography
- Vibration Analysis
- Quality Assurance
- Qualification & Certification
- Other Methods

Integral to the conference is the exhibition that will showcase the latest products, services and technology in the market. This dynamic marketplace will enable you to learn, research and make valuable connections to assist your organisation and its operation.

The world class venue for the APCNDT2023, the Melbourne Convention and Exhibition Centre.

And of course, you'll have the chance to relax and mix with colleagues from across the region at the many social events offered during the conference. We also encourage you to arrive earlier or extend your stay after the conference to discover and experience what Melbourne and its nearby surrounds has to offer. Don't miss this opportunity to attend a world class conference right here in Australia!

Register now at: www.apcndt2023.com.au/16th-asia-pacific-conference-for-non-destructive-testing-2023/eoi/Site/Register

Over its 50+ years, the Australian Institute for NDT (AINDT) has been the professional association and leading membership body for all those engaged in NDT and CM in Australia. The AINDT has established itself as one of the country's leading engineering institutions. It is concerned with the education and training of its members, and the advancement of the science and practice of the subjects.

The objective of the Institute is to promote the advancement of the science and practice of non-destructive testing, condition monitoring, diagnostic engineering and all other materials and quality testing disciplines.

In achieving this aim, the Institute, which employs a permanent secretariat at its Melbourne headquarters, relies on the support of personnel, companies and other organisations in the NDT and CM industries.

APCNDT2023 Conference Sponsors and Exhibitors, as of 18th January 2023

The success of any conference is largely dependent upon its participants, and the AINDT is pleased to announce the following companies as confirmed sponsors and exhibitors of the APCNDT 2023.

As an integral component of the conference, these companies will be showcasing the latest offerings in NDT/ CM training and equipment. Make sure you stop by, say hello and have a chat with our exhibitors, they have a wealth of knowledge and are keen to share information about advances and innovations in our industry.

Platinum Sponsor

Evident/ Olympus

Evident supplies advanced solutions that help make the world safer and healthier. Committed to developing new technologies and delivering world-class customer service, our responsibility goes beyond manufacturing products—we are pioneers.

We strive to exceed expectations by listening to our customers while anticipating future challenges to offer solutions optimized for your needs.

With a rich history, we support our customers with solutions that give them the information they need to do their work, whether it's researching new medical breakthroughs or inspecting infrastructure to help ensure the safety of society. Through researching and developing advanced technologies, we create leading-edge products used in numerous applications, including clinical and life science research, quality control and assessment, non-destructive testing (NDT), precision measurement and analysis, and environment and natural resources.

www.evidentscientific.com

Gold Sponsor

EN DE TEK Australia

EN DE TEK Australia (formerly Krautkramer Australia) has been supplying class leading quality equipment to the Non-destructive Testing industry since 1989, and with the support of manufacturers including Baugh & Weedon , Duerr-NDT, Dellon, ETher NDE, Flawtech, Guided Ultrasonics, Krautkramer (Waygate Technologies) and more, has developed a reputation for application solutions and after sales support. Covering a range of NDT methods including, but not limited to, Ultrasonics, MFL, Eddy Current, Hardness Testing, Calibration/Test Blocks, Remote Visual Inspection, Computed & Digital Radiography, EN DE TEK Australia's range of products covers virtually every current NDT application.

Our service department team have been to various suppliers for service training and have the capability to repair and calibrate Krautkramer, Ether NDE, Duerr NDT and Silverwing products to name a few, with this list continuously developing to further satisfy our growing customer base. We have started the process to become a NATA registered laboratory to provide calibration of NDT equipment and hopefully this will be completed in the coming months. With the added capacity to produce custom-configurable probe cables for UT and EC applications, our service department delivers a wide range of repair and calibration services to our customers.

We pride ourselves on good customer service and top-quality equipment distribution and as such also offer on-site visits from both our sales team and service technicians to satisfy any customer requests which may be required. Through on-site visits, email or by phone, we aim to provide a range of customer services including general customer visits, NDT application queries, equipment setup/training and the potential for short training courses to be run at our office or on site.

www.endetek.com.au

Gold Sponsor

Baugh & Weedon NDE

Baugh & Weedon is a leading manufacturer of Magnetic Particle Inspection (MPI) Benches and Liquid Penetrant Inspection (LPI) Penetrant Lines. Baugh & Weedon can also provide MT accessories including UV Lamps, dual UV and white light Inspection Lamps (Lumazon) and our dual UV and White Light Meter (LumaCheck) as well as a full range of MPI and LPI chemicals from Pfinder Chemie.

Baugh & Weedon also offer a wide range of Ultrasonic (UT) Thickness Gauges and Flaw Detectors, Ultrasonic

Wall Crawlers, MFL Tank Floor Scanners, Hollow Rail Axle Inspection Sytems, UT Immersion Tanks, Eddy Current (ECT) Sorting Bridges, Gamma Ray and X Ray Pipeline Crawlers.

Established in 1967, Baugh & Weedon has a long history of supplying the NDT industry with high quality products and services. Based in the UK and with a wealth of industry knowledge, we strive to be client focussed at all times, working with you to find the right solution for your NDT needs.

www.bw-nde.com

Gold Sponsor

Ether NDE

We are a dedicated manufacturer of Eddy Current (ECT) non-destructive testing (NDT) equipment, probes and accessories and the 'go to' company for all your Eddy Current (EC) NDT Solutions. ETher NDE was founded on three core principles and to this day they are still what we operate in line with everyday. They are firstly the ability to speak to someone who understands our product, the industry and your applications; secondly industry-leading delivery times on equipment and probes and the ability to respond to your challenges and thirdly that our products are second to none in both performance and quality. We are proud that as a company we operate to these core principles continuously and that we are true to the main reason the company was founded; to offer Eddy Current NDT Solutions to the industry backed up by a wealth of knowledge and sealed with great customer service from real people who care and are passionate about what they do.

www.ethernde.com

Gold Sponsor

Waygate Technologies

Waygate Technologies, a Baker Hughes business, is an industrial inspection solutions provider and the world leader in nondestructive testing (NDT) ensuring safety, quality and productivity. We combine more than 125 years of experience and a collection of heritage brands including Krautkrämer, phoenix|x-ray, Seifert, Everest and Agfa NDT. Today, hundreds of brands in the automotive, aviation, space exploration, electronics, energy, battery and additive industries trust our technologies. We drive digital transformation through a broad portfolio of award-winning solutions in industrial radiography and computed tomography (CT), remote visual inspection (RVI), ultrasound (UT), eddy current, and robotic inspection. Headquartered in Germany, Waygate Technologies is part of the Digital Solutions segment of Baker Hughes (NASDAQ: BKR).

Inspection starts here: www.waygate-tech.com

Coffee Cart Sponsor

ATTAR – Engineering a Safer World

Founded in 1986, ATTAR is Australia's largest NDT Training provider, with multiple locations across Australia. ATTAR trains clients in various techniques such as Eddy Current, Magnetic Particle, Phased Array through to Time-of-Flight Diffraction and Computed & Digital Radiography. In addition, ATTAR's NDT department provides Level 3 NDT consulting and auditing services and performs specialist NDT in industries such as defence and aviation.

ATTAR's forensic engineering division provides independent engineering consulting services to a variety of industries and government bodies. In 2021 the division completed its first strategic acquisition of Hartwood Consulting, and this year, it's second with Exceed Consulting.

Hartwood specialises in fire investigations, forensic investigations, expert witness and electrical and mechanical performance. One unique area is its specialisation in design risk assessments around vehicle homologation, including failure modes effects and analysis of work health and safety regulations across Australia.

Exceed Consulting has been assisting its clients in solving complex problems related to metallurgical failure analysis, welding metallurgy and materials engineering. In addition, Exceed uses cutting-edge equipment primarily for materials testing such as dry sand abrasion, rubber abrasion, slurry erosive wear, Taber abrasion, salt spray testing and polymer testing.

ATTAR can now leverage this wealth of expertise and experience when investigating accidents and failures, conducting product and material testing, corrosion assessment, identifying foreign material contamination and acting as your expert witness.

ATTAR's condition monitoring division includes real-time remote monitoring, primarily of assets in defence, mining, infrastructure and utilities. ATTAR performs condition monitoring on storage tanks, pressure vessels, EWPs, bearings, transformers, cranes and structures such as berths and bridges.

ATTAR continues to deliver world-class services and support clients in engineering a safer world by sharing our expertise; we look forward to working with you.

www.attar.com.au

Satchel Sponsor

NATA

We are Australia's leading national accreditation body, recognised by government to assess organisations against a number of international standards for laboratories, inspection bodies, proficiency testing scheme providers and reference material producers.

We provide accreditation services to conformity assessment bodies which facilitate stakeholders having confidence in test, measurement and inspection data and thus enabling them to gain national and international acceptance of their products and services.

Accreditation by NATA demonstrates an organisation is meeting or exceeding minimum standards in the production and delivery of its conformity assessment activities.

Our world-class, innovative and flexible accreditation services to members provides confidence for their clients and adds significant value to the products and services they provide to the broader national and international community.

www.nata.com.au

Name Badge and Lanyard Sponsor

IRIS NDT

IRISNDT Australia is a nationwide supplier of Engineering, Inspection, Mechanical/Product Testing, and NDT services, with offices located in Brisbane, Newcastle, Sydney, Melbourne, and Perth.

We serve asset owners, operators, constructors, and contractors in the following industry sectors throughout Australia and the Asia Pacific:

- Oil & Gas
- Defence
- Mining
- Power Generation
- Petrochemical
- Infrastructure
- Mineral Processing
- Transportation

All our locations operate a quality management system accredited to ISO/IEC 17025 (Testing and Calibration Laboratories); in addition, we have offices that hold accreditation to ISO 9001 (Quality Management), ISO 45001 (Occupational Health and Safety), and ISO 14001 (Environmental Management).

IRISNDT Australia is a successful blend of forward-looking NDT and engineering companies, providing a broad range of inspection, testing, engineering, and software services to the Power Generation, Oil & Gas/ Petrochemical, Defence, and Mining industries.

Our managers work directly with our customers and keep abreast of developing technology. This is fundamental to our reputation for quality and customer service and an outstanding safety record. We also look after our employees. Our business is built on credibility and reputation, only achievable by retaining long-term employees. In a very real sense, our product is our people. Taking care of our people and their families is what we do because we depend on each other to do our jobs well and safely.

Established in 1953 in Edmonton, Canada, IRISNDT is a global company providing quality NDT & Engineering services through an extensive branch network in Australia, the USA, Canada, and the UK. Globally, we employ over 1500 staff.

www.irisndt.com/au

Exhibitors

ALS Industrial

ALS Industrial is an ISO9001, NATA and IRATA accredited service provider. Our services include conventional non-destructive testing, advanced non-destructive testing, mechanical testing as well as engineering and materials consulting, failure analysis and investigation services, structural inspection for both concrete and steel assets, and equipment reliability & condition monitoring.

ALS is dedicated to assisting constructors, manufacturers, and asset owners alike in achieving compliance with any national and international standards, and customer specifications. The extensive experience of our people and investment in world-leading technologies positions ALS at the forefront of the industry in providing reliable advice, and safe and efficient services.

www.alsglobal.com

Arise Global Pty Ltd

The Arise Global Group provides specialized NDT inspection services to a wide range of industries globally.

Technology and service quality forge our identity in the market place. Arise develops innovative capabilities in-house and through targeted collaborations.

We have track record of overcoming demanding and challenging inspection scenarios. Do engage our experienced and energetic team for your inspection needs.

www.ariseglobal.com

ARPANSA

Australian Government
Australian Radiation Protection and Nuclear Safety Agency
arpansa

Established by the Australian Radiation Protection and Nuclear Safety Act 1998 (ARPANS Act), ARPANSA commenced operation on 5 February 1999. ARPANSA replaced the Nuclear Safety Bureau and Australian Radiation Laboratory. Our strategic objectives are:

- Identify, assess and communicate health, safety and environmental risks from radiation
- Promote radiological and nuclear safety and security, and emergency preparedness
- Promote the safe and effective use of ionising radiation in medicine
- Ensure risk informed and effective regulation
- Enhance engagement with stakeholders
- Enhance organisational innovation, capability and resilience.

www.arpansa.gov.au

Asset Reliability Inspections

ari Asset Reliability Inspections

Asset Reliability Inspections Pty Ltd (ARI) is an asset integrity/compliance company that offers pressure equipment inspection, pressure equipment design verification, weld inspection and non-destructive testing (NDT) services. ARI's head office is based in Western Australia however the company also provides services nationally within Australia and internationally.

ARI is a NATA accredited laboratory to ISO 17025. We also hold JASANZ certification to ISO9001 – Quality Management Systems; ISO14001 – Environmental Management Systems & AS45001 – Occupational Health & Safety Management Systems. These endorsements ensure the technical competency, quality and safety of our services whilst also ensuring our environmental impact is minimal.

Our diverse team are highly experienced and have numerous tertiary qualifications, certifications and professional affiliations with industry bodies. The primary sectors we service are transport, power generation, mining and construction.

The core values of ARI include a commitment to innovation, finding solutions for niche challenges within the asset integrity field, providing quality services with a professional approach and supporting the communities in which we operate.

ARI are proud to support the AINDT and the 6th Asia Pacific Conference for Non-Destructive Testing to be held in Melbourne, Australia in 2023.

www.ari.com.au

Careray Digital Medical Technology Co. Ltd.

CARERAY DIGITAL MEDICAL

CareRay is a global company dedicated to the innovative development of digital X-ray flat panel detectors. We are wholly committed to engineering excellence, world-class R&D, and the highest manufacturing standards. From system upgrades to custom OEM solutions, we offer sophisticated products for diagnostic imaging in all fields. Our commitment to low impact care applies to patients, operators, and the world at large. CareRay flat panel detectors are durable and adaptable, compatible with both single phase and high-frequency generators. We strive to apply the principles of low impact design, waste reduction, and sustainability to all aspects of our daily operation and long-term development.

www.careray.com

CGM Cigiemme S.p.A.

CGM Italy ...since 1958
NON DESTRUCTIVE TESTING
WWW.CGM-CIGIEMME.COM

CGM CIGIEMME S.p.A. is a world-leading manufacturer of NDT equipment – Magnetic Particle Inspection (MPI) and Liquid Penetrant Inspection (LPI) systems - with a worldwide network covering over 30 countries.

CGM is an Italian company situated in Opera (Milan) where all the stages of design, manufacturing and assembling of the equipment take place.

In the MPI field, CGM designs and manufactures the complete MPI equipment range, from small portable systems to the in-line customized automatic systems, offering the whole range of relevant detection products, instruments and accessories.

In the LPI field, CGM designs and manufactures a complete range of LPI systems, from the simple equipment to the automatic systems tailored to fit the customers' specific needs. The production also includes a full range of LPI chemical products, tools, accessories and instruments used in the LPI field.

Over the past 60 years, CGM has established trustful relationships with the customers from various industrial sectors all over the world. The company's major markets include oil & gas / steelmaking, railway, aerospace, and automotive components manufacturing.

www.cgm-cigiemme.com

EDDYFI

Pushing the limits of advanced NDT to new heights

Eddyfi Technologies provides the highest performance Non-Destructive Testing (NDT) inspection technologies in the world, helping OEMs, asset owners and service companies enhance productivity, save lives, and protect the environment. Its mission is to push the limits of advanced NDT to new heights by featuring various NDT modalities and investing massively in product advancement.

We maintain and strengthen our technological leadership by constantly pushing the limits of advanced NDT, anticipating future needs and creating value when and where it matters.

As the world's leading manufacturer of advanced NDT, we are determined to be both the best company to work for, and the best company to work with. Wherever we operate around the globe, we are forever striving to earn the trust and loyalty of our employees and customers alike.

www.eddyfi.com

Extende Civa

CIVA is a multi-technique (Ultrasound, Eddy Current, Radiography, ...) software platform developed by the CEA LIST and its partners.

This software has been developed since the early 90's and is distributed worldwide since 2010 by extende and its local distributors.

Civa is a modules package (UT – ULTRASOUND, GWT – GUIDED WAVE TESTING, SHM BY GUIDED WAVE, ET – EDDY CURRENT, TT – THERMOGRAPHIC TESTING, RT – RADIOGRAPHY) that can be bought or rented, independently or combined, for a single computer or on a network.

Our core values are to give our clients absolute priority, to actively listen to their problematics in order to identify their needs together, to assure them confidentiality, to bring the highest rigor in any task performed and to keep a technical humility in front of difficulties and challenges encountered.

www.extende.com

Gilardoni

Gilardoni is among world leading manufacturers of X-ray and ultrasonic equipment, present in three different sectors: medical, safety and non-destructive testing (NDT). Gilardoni considers itself an industry of great potential oriented to a national and international market, able to offer products of excellence, assisting the customer accurately.

www.gilardoni.it

Kuzer Technical

We provide a range of inspection training courses to meet the needs of individual companies and technicians.

Kuzer Technical is a certified training and examination body recognised by AINDT.

In addition to recognised Non-Destructive testing training, we also offer OCTG drillpipe training for drillpipe inspectors, Non-Destructive Testing training for engineers & managers and a range of other custom training services.

www.kuzer.com

Labino

Labino AB is an Original Equipment Manufacturer of UV, Alternative Light Sources and UV measurement instruments. We are an ISO 9001-2015 certified company, an ISO 80079-34EX certified company and an ISO/IEC 17025 calibration lab with scope in UV and White Light calibrations.

We have a team of highly qualified scientists whose sole duty is working towards providing accurate instruments and constantly improving all products we manufacture. Our products are sold in over 50 countries via a wide network of distributors, service centres and calibration centres. Our overhead UV lights carry a 3-year warranty and our handheld UV lights 2-year warranty.

All products we sell are made only by Labino, in factories owned by Labino, controlled by a Labino quality manager, and audited by a third party.

www.labino.com

Mr Chemie

We are MR Chemie and we make the invisible visible. MR Chemie is a medium-sized family company based near Dortmund in Germany. Over the last 50 years we formed our identity from a local supplier of industrial aerosol cleaner to a global player. Today, we are one of the market leaders for high-quality NDT testing materials and equipment (MR® NDT Materials) as well as 3D scanning spray (REFLECON®) and products from the hygiene sector (MR® Smart & Clean). Our passion for success jointly with our customers made this sustainable journey possible. We believe in new opportunities and better product solutions for our customers today and in the future. Continuous improvement, application development and supply with a clear focus on the needs of our customers and the market is our key to success.

www.mr-chemie.de/en/

NDT Equipment Sales

NDT Equipment Sales has been trading since 1992 and is a leading supplier of equipment and consumables to the NDT industry.

Customers comprise many nationally and internationally leading organisations within the asset management, aviation, defense, mining, petro-chemical, testing and inspection, foundry and manufacturing industries. The company's commitment to supply quality products, allied with quality service, remains the core objective of company management. NDT Equipment Sales continues to remain at the forefront of the NDT industry due to their extensive product range and approach to customer service.

www.ndt.com.au

NDT Instruments

NDT Instruments is a German subsidiary established in 1993 with the mission to identify, source and supply quality products and after-sales maintenance, repair calibration services to our customers in the field of Non – Destructive Testing (NDT) system and Quality Assurance & Control (QA/QC). Since it started its operations, our customers are discerning buyers who demand value in the form of quality at a competitive price.

We are committed to be the leading NDT equipment supplier in the ASEAN region to provide the most reliable yet cost effective inspection, quality assurance and control related equipment and solutions to our highly value customers.

www.ndt-instruments.com

NDT Seals Inc

Founded in 1992, NDT Seals, Inc. is a family-owned and managed business in Houston, Texas. We design, manufacture and distribute the patented NDT Inspection Plug and NDT Inspection Point Labels. These products are used in the Process Safety Management and Mechanical Integrity efforts underway in the refining, chemical, petrochemical, paper and pulp, household products, food processing, and transportation industries.

An ISO:9001:2015 certified business, our products are designed to identify and access Thickness Measurement Locations (TML's) on insulated and non-insulated pipe and equipment to monitor structural integrity. This site is our opportunity to introduce you to our products, the federal regulations and industry codes that are defining these efforts, and to help you connect to the business and professional organizations, events and resources that support this process.

www.ndtseals.com

PCTE Industrial

PCTE specialises in the sale and hire of testing equipment for construction materials. That includes field testing equipment (non-destructive testing equipment), for structures as well as metals, Ground Penetrating Radar (Concrete Scanning and Utility Locating), Construction Material Laboratory test equipment as well as geotechnical and structural monitoring sensors. We supply a range of equipment from around the world to offer you a one-stop centre with all of the latest instruments and sensors.

PCTE have a long history in the development and assessment of concrete testing equipment. Reuben started selling a range of Proceq's testing equipemnt and working on research project in the construction industry right after his engineering degree. He brings vast knowledge and experience to the field and heads the company at PCTE's Head Office in Perth. He is supported by a team of experts in Perth, Sydney, Melbourne, and Brisbane. Reuben is also a member of the Concrete Institute of Australia.

Apart from sales and hire of testing equipment, PCTE can arrange training courses for your staff, provide after sales support via phone or email and are always ready to advise on the best systems for your application.

www.pcte.com.au

Promag Technologies

PROMAG Technologies is a leading TAIWAN manufacturer of AI Defects Recognition Software, MPI equipment, FPI and Clean System, and UV LED lights. Over the past 20 years, PROMAG has had a long history of manufacturing and supplying the NDT industry with reliable and high-quality products and services. With a wealth of MT/PT/Clean/UV/AI knowledge, we also provide ODM/OEM services and strive to be client-focused at all times, working with our partners and clients to find the right solution for your NDT needs.

www.pmtndt.com

Revo Group

Revo Group is a leading provider of niche asset inspection equipment and services in Oceania, SE Asia and around the world. Our highly experienced team provide forensic, expert witness, asset management, design, training and inspection services, software and technology.

At Revo Group, we are specialists asset inspectors that offer a variety of services to electrical utilities, mines, councils, oil & gas producers, private land owners, and other asset owners. Leveraging our quality people, modern concepts, the right technology, and reliable assessments to provide solutions for design, planning, asset management, emergency response, and visual & NDT inspections.

www.revogroupau.com

RPC Technologies

RPC is a global leader in the design, engineering and manufacturing of glass reinforced composite (GRP) solutions, and special fabrications. Proudly Australian, RPC has a distinguished 40-year heritage – dating back to the Transfield Construction Group – delivering world-class engineering solutions to the transport, renewables, defence, infrastructure, water and wastewater, mining, and architecture sectors.

From design and construct, to through-life support, RPC takes pride in building successful long-term relationships with its stakeholders and clients.

The RPC family consists of 500+ engineers and skilled staff employed throughout Australia in NSW, Victoria and South Australia, and in South East Asia.

www.rpctechnologies.com

Russell Fraser Sales Pty Ltd

Russell Fraser Sales (RFS) is Australia's trusted non-destructive testing (NDT) equipment supplier and has been serving Australia's NDT industry since 1993. Russell and his team of 10 staff are dedicated to customer service and regularly provide their customers with opportunities to see and play with new NDT technologies. Some of you will remember the days of the RFS Roadshow pulling into town, not to mention RFS' steady presence at industry exhibitions and the in-house product demonstrations that take place on a weekly basis in the RFS showroom. RFS has again established their position as Australia's most trusted NDT equipment supplier by staying ahead of the changing needs of industry with their fresh approach to NDT equipment product reviews on YouTube. RFS unboxing videos can be found on the "Russell Fraser Sales Pty Ltd" YouTube channel. Be sure to subscribe to their channel. The recent addition of LiveChat to the RFS website also offers greater flexibility in communication, allowing visitors to the site to raise questions and comments via chat.

Russell Fraser Sales supplies NDT equipment including Ultraviolet lights, Ultrasonic Flaw Detectors, Ultrasonic Thickness Gauges, Portable Hardness Testers, magnetic particle inspection, Thermal Imaging for condition monitoring and much more. RFS has all your inspection and testing needs covered.

www.rfsales.com.au

Scanbuddy Limited

Our NDT products are made with the highest quality components, CNC machined and assembled in-house. Nearly all spare components are kept in stock, giving service and repair very quick turnaround times. Streamlined productivity and in-house manufacturing of many components ensure that we can deliver a high quality product at very competitive price.

www.scanbuddy.com

Sentinel

Sentinel Pty Ltd was founded in 2000 and is a privately-owned, Australian-based environmental services company that specializes in the design, implementation and operation of remote environmental monitoring systems. The company is currently working on active projects in a number of countries, including Australia, Chile, Tanzania, Philippines, Fiji, Papua New Guinea, Zambia and Mali.

We have extensive experience deploying and managing environmental monitoring systems and programs for organizations across the world. All Sentinel field staff have hydrographic certification from the Australian Hydrographers Association and we understand:

- Best-practice monitoring
- Security requirements for monitoring equipment in remote locations
- Environmental monitoring hardware - latest technology and sensors
- Data transfer systems - satellite, radio telemetry and cellular
- Teaming with local people for installation projects, such as weir construction
- Field processes, safety and remote field-work contexts
- Data management, quality control and environmental reporting

Sentinel's sister company, Seveno Pty Ltd, is the developer of the "Seveno DataSight" environmental data management software. The companies share headquarters and staff in Fyshwick, ACT, Australia.

www.sentinelpl.com.au

Smartchem

SmartChem Industries is your trusted partner for the Smartcheck Magnetic Particle & Dye Penetrant consumables and associated equipment. SmartChem prides itself on service, both technical and in the delivery of products.

SmartChem is Australian owned and proudly manufactures in Australia with Australian resources (where available). Smartcheck products in particular the aerosols have been tailored to perform in Australian conditions. All of our aerosols are filled in Australia by Australian aerosol fillers.

SmartChem has invested in the necessary test equipment and procedures to ensure that the Smartcheck consumables, tested locally are compliant to the current ISO specifications.

The Smartcheck MPI range are batch tested to ISO-9934.2. Our Certificates of Conformances (CoC) are compliant to the new ISO Standard, including the requirement to detail batch test results. CoC are emailed with our dispatch advice where requested.

Smartchem is always looking to expand its Global Distribution Network, should you be interested in becoming a Distributor of the Smartcheck consumables, we would be happy to discuss any opportunities, please contact us on the details below.

Quality products and service at a reasonable price, that's the SmartChem difference

www.smartchem.com.au

Talcyon Pty Ltd

We provide hardware & software solution, primary to processing industry, but not limited to the NDT sector.

Headquartered in Singapore, we believe in doing business with integrity and continuous innovation towards making inspections simpler and smarter.

www.ndt.talcyon.com

Total Asset Solutions

Established in Melbourne in 2019, our goal is to offer our clients a 'total asset health' monitoring package.

We are proud to offer a professional service, specialising in Thermal imaging, ROV/UAV inspections, non-destructive testing & condition monitoring, to enhance preventative maintenance schedules.

By utilising Thermal imaging and Drone (UAV) inspections, you will enhance your predictive and preventative maintenance schedules and reduce risks to assets and personnel.

Using the latest technology, we provide inspection services in harder to reach places, inspect dangerous locations and cover larger areas quickly, safely, economically and professionally.

www.totalassetsolutions.com.au

Speakers

Keynote Speakers

Paul Holloway
President of Holloway NDT
& Engineering Inc.
Ontario, Canada

Ian Baillie
Chief of Operations,
Rolls-Royce
UK

Jennifer Evans
Chief Executive Officer of the
National Association of Testing
Authorities
Australia

Paul Grosser
President, APCNDT2023
Level 3 NDT
Australia

Christine Scala
Director, Christine Scala
Management Pty. Ltd.
Australia

APCNDT2023 Program

*as of 18 January 2023

Tuesday 28 February 2023					
0800-0900	Registration Open				
0900-1030	**Opening Ceremony Addresses**				
Room	Eureka Rooms Combined				
1030-1100	**Morning Tea**				
1100-1120	**Alex Wilson Memorial Lecture**				
Room	Eureka Rooms Combined				
	Christine Scala - Christine Scala Management				
1120-1200	**Keynote Address - NDT 4.0 Why Accreditation Matters**				
Room	Eureka Rooms Combined				
	Jennifer Evans - NATA				
1200 - 1230	**Opening Ceremony Addresses**				
Room	Eureka Rooms Combined				
1230-1330	Lunch				
1330-1500	**Concurrent Session 1**				
	Concurrent 1A	**Concurrent 1B**	**Concurrent 1C**	**Meeting 1**	**Meeting 2**
Theme	**Ultrasonics**	**Surface Methods**	**Pressure Equipment**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2

1330-1400	**Inspection of Contact Point Corrosion on Seamless Piping Using PA-CATTM** Paul Holloway	**AI Robot Defect Recognition Application in Magnetic Particle Inspection** Jochi Hsia	TBA	Board/AEC	TG1
1400-1430	**Non-contact Ultrasonic Guided Wave Detection of Rail Defects** Ching-Chung Yin	**Work Safety in Magnetic Particle and Penetrant Testing** Kersten Alward	**NDT Solutions for a Refinery's Common Damage Mechanisms** Dennis Chai	Board/AEC	TG1
1430-1500	**Porous Metal Backing Development for High Temperature Ultrasonic Transducers (HTUST)** Guy Feuillard	**UV - Light in NDT: Quo vadis** Thomas Schratt	TBA	Board/AEC	TG1
1500-1530	**Afternoon Tea**				
1530-1700	**Concurrent Session 2**				
	Concurrent 2A	**Concurrent 2B**	**Concurrent 2C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**Ultrasonics**	**Other Methods**	**Panel Session**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
1530-1600	**Nonlinear Guided Wave Structural Health Monitoring for Riveted Lap Joints** Ching-Chung Yin	**Roughness Measurement Based on Analysis of Speckle Image** Ju-Yi Lee	**Panel Session - Quality / ISO17025**	Board/AEC	TG2
1600-1630	**Automated Assessment of Metallic Additive Manufacturing Workpieces by Ultrasound image Texture and Machine Learning Classifier** Shyh-hau Wang	**Influence of Tube Size in Fusion DEMO on Non-Destructive Inspection** Mizuki Kako		Board/AEC	TG2
1630-1700	**Simulation Assisted Deep Learning for Automated Defect Detection and Characterization for Dynamic Rotary Parts Using TFM Imaging** Sudharsan Periyasubbaiya Lakshmana Perumal	**Material Parameter Extraction Study of Polyurethane Composites Using THz-TDS** Sachinlal Aroliveetil		Board/AEC	TG2
1700-1830	**Welcome reception/cocktail drinks**				
Wednesday 1 March 2023					
0800-0900	**Registration Open**				
0900-1030	**Concurrent Session 3**				
	Concurrent 3A	**Concurrent 3B**	**Concurrent 3C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**Ultrasonics**	**Eddy Current**	**Thermography**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
0900-0930	**KEYNOTE: Aerospace In-service NDT Emergencies & Crisis Management** Iain Baillie	**Eddy Current Corrosion Detection on Concrete Power Poles** Joseph Bailey	TBA	ICNDT AGM	TBA
0930-1000	**TBA**	**Eddy Current Inspection for Defects of Long CFRP with Unidirectional Fiber** Jin Inoue	**Asset Condition Monitoring; Utilising UAV Thermographic Inspection** Peter Milligan	ICNDT AGM	TBA

1000-1030	**A Study on the In-Service Cracks Detectability of Boiler Header Stub Welds Using Phased Array Ultrasonic Testing** Ikkeun Park	**Recent Developments in ACFM Sensor Technology for Generic Filet Welds, High Temperature and Galvanized Structure Inspections** Charles Tremblay	**Measurement of Surface Spectral Absorptance for Investigation of Efficient Heating Light Wavelength in Active Thermography Inspection** Masashi Ishikawa	ICNDT AGM	TBA
1030-1100	**Morning Tea**				
1100-1230	**Concurrent Session 4**				
	Concurrent 4A	**Concurrent 4B**	**Concurrent 4C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**Ultrasonics**	**Eddy Current**	**Other Methods**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
1100-1130	**Experimental Study of FDTR in Pulse-Echo Ultrasonic Testing** Petros Abraha	**High-Definition Array Capability Addition to RFT for Ferromagnetic Tubing Analysis** Dean Mason	**NDT of Composite Repairs** Irene Pettigrew	ICNDT AGM	TBA
1130-1200	**Detection and Measurement of Pitting Corrosion using Short Range Guided Wave Scanning** Patricia Salas Gomez	**Influence of Steel Crystalline Structure on Magnetic Response Measured by Eddy Current Testing** Kenji Sakai	**External Inspection of Subsea Pipelines and Risers using Acoustic Resonance Technology (ART)** Stephan Freychet	TG3/WG4 Comms	TBA
1200-1230	**The Guided Wave Propagation Characteristics on Periodic Structures** Jaesun Lee	**The Complex Holiday Detection of Dielectric Coatings for Industrial Infrastructure** Vladimir Syasko	**Measuring Absolute Third-order Acoustic Nonlinearity Parameter using Pulse-echo method** Kyung-Young Jhang	TG3/WG4 Comms	TBA
1230-1330	**Lunch**				
1330-1500	**Concurrent Session 5**				
	Concurrent 5A	**Concurrent 5B**	**Concurrent 5C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**Various**	**Quality**	**Commercial Presentations**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
1330-1400	**Pulsed Eddy Currents: A Review of the Latest Developments in Advanced Data Analysis** Charles Tremblay	**A Review of Effectiveness on Quality Management System for Calibration Activity (ISO 9001:2015, ISO/IEC 17025:2017 and Conventional Method)** Muhammad Aslam	**Cutting Edge PT & MT Systems** CGM CIGIEMME S.p.A.	GA1	TBA
1400-1430	**Research on The In-Plane Vibration Measurement Technology by Holographic Shearography** Chien-Yu Yen	**Human Factors - An Aerospace Concept for the NDT Industry** Shane Norman	**Switch to Non-Toxic Chemistry with MR Chemie** 3AK Chemie Pvt Ltd	GA1	TBA
1430-1500	TBA	**Human Factors - Error Management & Human Performance** Shane Norman		GA1	TBA
1500-1530	**Afternoon Tea**				
1530-1700	**Concurrent Session 6**				
	Concurrent 6A	**Concurrent 6B**	**Concurrent 6C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**Other Methods**	**Quality**	**Panel Session**		**Commercial**
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2

1530-1600	**Transient Wave Analysis of a Plate Partially Immersed in Fluid and Impact Force Identification** Chan-Yi Liao	**Generative Culture in NDT Industry is Essential for the Survival of Community and Meeting New Challenges** Sujit Chakravarty	**Panel Session - NDT & Certification**	GA1	**Sherwin Products and Their unique Place in the Global Market** Callington
1600-1630	**An Innovative Helical Piezoelectric Sensor for Multi-Dimensional Load Detections and Classifications** Po Ting Lin	**International Issues – Troubles with ISO and their Application** Chris Howson		GA1	TBA
1630-1700	**Application of FBG and DIC in the Measurement and Detection of Defects in Composite Materials** Chien-ching Ma	**NDT Inspections of In-Service Assets** Glen Jameson		GA1	TBA
1800-2200	**Conference Dinner**				
Thursday 2 March 2023					
0800-0900	**Registration Open**				
0900-1030	**Concurrent Session 7**				
	Concurrent 7A	**Concurrent 7B**	**Concurrent 7C**	**Meeting Room 1**	Meeting Room 2
Theme	**Ultrasonics**	**Various**	**Other Methods**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
0900-0930	**KEYNOTE: The Challenges of Measuring Weld Flaws with Ultrasound** Paul Holloway	**Evaluation of the X-ray CT's Defect Detectability in Self-Piercing Rivet** Papangkorn Jessadaravornwong	**Characteristic Study of Capacitance Based Sensor for pH Monitoring of Viscous Fluids** Rajan Hareshbhai Chaudhary	TG4	TG5
0930-1000	**Gauging of Thin-walled Tubes/ Pipes using Water-immersible Ultrasonic Pipe Inspection System** Pavan Kumar Nandyala	**CUI Inspection Program using Neutron Backscatter Screening Combined with Real-time Radiography Confirmation Techniques** N Hendra Jatmika	**NDT Technique Applicability on PFP** Irene Pettigrew	TG4	TG5
1000-1030	**A Study on Ultrasonic Propagation Characteristics with Respect to the Thickness of the Thermal Insulation Paint Coating** Yeongil Choi	**Human Factor Effects on Nondestructive Inspection of Aerospace Structures** Muzibur Khan	**SHM of Wire-Breakage in Prestressed Concrete Bridges by Acoustic Emission Technique** Manuel Lohr	TG4	TG5
1030-1100	**Morning Tea**				
1100-1230	**Concurrent Session 8**				
	Concurrent 8A	**Concurrent 8B**	**Concurrent 8C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**NDT 4.0**	**Radiography**	**Commercial Presentations**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
1100-1130	**Robot Innovations of Man-Machine Collaborative Inspections** Po Ting Lin	**3D Surface Scanning Based Thickness Compensation in Digital Radiography of Welds** Tatsuhiko Kawakami	**Live Demonstration of DolphiCam2 for Composite and Corrosion Inspections Using Conventional Ultrasonics** PTCE	TG7	TG6

1130-1200	**Benefiting from NDE 4.0: Possibilities and Challenges** Krishnan Balasubramaniam	**Digital Profile Radiography – Practical Uses and Limitations** Phillip Perrot	**TBA** Arise Global	TG7	TG6
1200-1230	**Open File Format for NDE 4.0** Nick Eleftheriou	**Deploying Machine Learning for Radiography** Topias Tyystjärvi		TG7	TG6
1230-1330	**Lunch**				
1330-1500	**Concurrent Session 9**				
	Concurrent 9A	**Concurrent 9B**	**Concurrent 9C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**Pressure Equipment**	**Other Methods**	**TBA**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
1330-1400	**HTHA in a Lower Process Preheater** Roger Costanzi	**Giving Wings to Asset Integrity to Facilitate Internal Inspection of RFCC Reactor-Regenerator Cyclones with Drones** Prashanth Markonda Patnaikuni & Hama Alnaqbi	**TBA** ALS Global	GA2	TBA
1400-1430	**Reliable, Cost-Effective NDT Inspection Tool for RO Pressure Vessels** Glen Jameson	**Acoustic Emission (AE) Inspection – Expanding Horizons** Puneet Peeyush	**Hydra Form V2** Evident Scientific	GA2	TBA
1430-1500	**Ethics of Pressure Equipment fabrication – A Consideration of Dilemmas** Jamie Hislop	**Determining Safe Working Load of Mooring Bollards by Means of NDT** Herman Quakkelsteijn		GA2	TBA
1500-1530	**Afternoon Tea**				
1530-1700	**Concurrent Session 10**				
	Concurrent 10A	**Concurrent 10B**	**Concurrent 10C**	Meeting Room 1	Meeting Room 2
Theme	**Pressure Equipment**	**Other Methods**	Panel Session		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
1530-1600	**24/7 Large Area Corrosion Monitoring** Patricia Salas Gomez	**Nondestructive Material Characterization and Defect Detection for Additive Manufactured Parts** Che-Hua Yang	**Panel Session - NDT 4.0**	GA2	TBA
1600-1630	**Using APRIS for Inspection of Twisted Tube Heat Exchangers** Vignesh Sivanandam	**Development of a Frequency Difference Moiré System for Wafer Warpage Measurement** Hung-Lin Hsieh		GA2	TBA
1630-1700	**Assessment of Pressure Equipment with Limited Data - Case Study** Neil Young	**Engineering and Advanced Inspection Supporting Asset Integrity Management** Charles Perrie		GA2	TBA
Friday 3 March 2023					
0800-0900	**Registration Open**				
0900-1030	**Concurrent Session 11**				

	Concurrent 11A	Concurrent 11B	Concurrent 11C	Meeting Room 1	Meeting Room 2
Theme	**Ultrasonics**	**Other Methods**	TBA		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
0900-0930	**KEYNOTE: Ultrasonic Inspection of Bolts, Pins and Shafts** Paul Grosser	**Health Monitoring of In-service Waterworks Pipeline by Early Detection of Impact Damages** Dong-Jin Yoon	**Weldsight Software** Evident Scientific	TG3/WG4	AUS PTA
0930-1000	**Improved Imaging of Small Defects and Grainy Material Using Phase Coherence Imaging, a Novel TFM Approach** Prasanth Geddam	**Data- Driven Simulation- Assisted -Physics Learned AI (DPAI) for Simulating Heat Diffusion in Voronoi - Based Polycrystalline Materials** Nishi Rajesh Bhemani	**AI Robot Defect Recognition System Application and Solution in Magnetic Particle Inspection** PROMAG Technologies Development Limited	TG3/WG4	AUS PTA
1000-1030	**Ultrasonic Pulse-Echo Systems Using Full Decoding of Truncated Ranges** Petros Abraha	**Practical NDE and QC Applications of Time Domain Terahertz Technology** Joe Buckley		TG3/WG4	AUS PTA
1030-1100	**Morning Tea**				
1100-1230	**Concurrent Session 12**				
	Concurrent 12A	**Concurrent 11B**	**Concurrent 12C**	**Meeting Room 1**	**Meeting Room 2**
Theme	**Radiography**	**Other Methods**	**Panel Session**		
Room	Eureka Room 1	Eureka Room 2	Eureka Room 3	Hospitality 6	Courtyard 2
1100-1130	**Digital Detector Arrays in Field Radiography: Types, Parameters and Usage Explained** Steven Wissels	**Laser Shearography NDT: Technological advantages and applications in the Aerospace Industry** Liam Crosbie	**Panel Session - Pressure Equipment**	TG3/WG4	AUS PTA
1130-1200	**Using Radiotracer in Live Plant for Detection of Leak Inside Process System without Taking Costly Shutdown.** Sujit Chakravarty	**Internal Crack Estimation by Outer Surface Strain Measurement Using Ultra-Sensitive Strain Sensor** Seung-Kyun Kang		TG3/WG4	AUS PTA
1200-1230	**Timber Condition Assessment Using Backscatter X-Rays** Anthony Lima	**Acoustic Model and Evaluation of Porous Material Using Kelvin Structure** Nohyu Kim		TG3/WG4	AUS PTA
1230-1330	**Lunch**				
1330-1430	**Conference Closing Ceremony**				
Room	**Eureka Rooms Combined**				

The AINDT thanks the Conference Organising Committee:

Paul Grosser (APCNDT2023 Chair), Level 3 NDT

Peter Milligan, AINDT CEO

Nick Eleftheriou, Evident Scientific

Neil Young, Asset Reliability Inspections

Richard Stocker, EnerMech

Catherine Fleay, Management Risk

Irene Pettigrew (Chair, Paper Review Committee), EnerMech

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Ian Hogarth, QLDNDT

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Colm Kinsella, Asset Reliability Inspections

Assessment of Pressure Equipment with Limited Data – Case Study

Assessing pressure equipment with low documentation is challenging for inspectors.

Figure 1. Photo (vessel procured from scrap dealer)

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Assessing pressure equipment with low documentation is challenging for inspectors. This case study presents a successful example of inspection in such a case, which may assist other inspectors who are presented with this challenge. In this case a 37,000 litre LPG pressure vessel built in 1965, was sourced from a metal scrap dealer (Figure 1), blasted, painted and installed on site (Figure 2) for storage of LPG with no documentation, other than the original data plate.

At the time of intended energisation, a query was raised by the client regarding the vessel's State Legislation compliance; a process requiring registration of the vessel design by any State or Territory in Australia. For the intended installation State the vessel also required "item registration" with the State Regulator.

No documentation was evident whatsoever for the vessel and Asset Reliability Inspections was engaged to reverse engineer the vessel, perform design verification and non-destructive testing in order to satisfy the necessary compliance requirements and ensure the vessel could be used with confidence for safe operation.

Figure 2. Photo (vessel installed and ready for use, with no documentation)

Whilst Australian Standard 'AS3920 Pressure Vessels – Conformity Assessment' provides guidance on what is required for low document pressure vessels, the process on how to gather this information can vary, as well as the risk profile for both the inspector and asset owner. It should be noted that this case study is not an exhaustive "how to" guide, as different vessels, owners, and competent persons will require differing levels of inputs to mitigate the risk.

GUIDELINES FOR ADDITIONAL DOCUMENTATION

Type of documentation	Hazard level (To AS 4343)*				
	A	B	C	D	E
MDR and conformance certificate	Y	Y	Y	Y	Y
Instructions and limitations, such as purchase specifications, operational assumptions, specific design requirements such as nozzle loads, environmental loads, foundation loads	Y	Y	Y	Y	Y
Design verification certificate	Y	Y	Y	Y	—
Calculations and design report	Y	Y	Y	—	—
Material certificates	Y	Y	Y	—	—
NDE reports	Y	Y	Y	Y	—
Welding procedures and qualifications	Y	Y	Y	Y	—
Welder identification and qualifications	Y	Y	Y	—	—
General assembly drawings	Y	Y	Y	Y	—
Detail drawings	Y	Y	Y	—	—
Lifting and transport drawings	Y	Y	Y	—	—

* Y = Documentation is recommended.

Table 1. AS1210 Guidelines for Additional Documentation

Figure 3. Photo (original data plate)

Intended Process

Pressure vessels are required to be signed off as safe for use by a Competent Person. However, there are numerous supporting documents and processes that are considered in the decision-making process to determine if a pressure vessel is safe for operation. The level of documentation and input required, to ensure a vessel is compliant, both increase with the hazards and risks associated with the pressure vessel operating parameters, with the main consideration factors being pressure, volume and vessel contents. Australia has a simplified risk matrix for categorising pressure vessels into hazard level groups, A,B,C,D and E with A being the highest hazard level and E being the lowest. As a general example a 50L air compressor from a local hardware store will typically be a Hazard Level D, whilst a commercial 200L air compressor will typically be a Hazard Level C and as the volume/pressure increases or the contents change from non-harmful to harmful or flammable, the hazard level will increase further. More information on these levels can be found in Australian Standard 'AS4343 - Pressure equipment—Hazard levels'.

Suggested documentation required for confirming compliance can be found in numerous Australian Standards such as AS1210, AS3788 and AS3920 which align with the guidance similar to a number of overseas and international standards.

Australian standard 'AS1210 – Pressure Vessels', stipulates that a Manufacturer Data Report (MDR) is required for pressure equipment manufactured in accordance with the standard and that the MDR and other additional documentation shall be transferred at a sale. The standard provides a suggested list of additional items, which is outlined in the extract above (Table 1), essentially demonstrating that the higher the risk of the vessel, the more evidence is required to satisfy safe use.

The high-level process for inspection and registration of pressure equipment is for a Competent Person to:

- Review supplied documentation and/or arrange testing
- Ensure a Design Approval Number is available for any pressure vessel with a Hazard Level A, B,C or D
- Undertake inspection of the item
- If acceptable, issue a report/compliance statement
- Item register the pressure equipment if applicable in the jurisdiction of operation

In this case study, there was no paperwork, and the vessel was manufactured overseas in 1965. Therefore there was no ability of sourcing the paperwork from the manufacturer who are typically only required to keep records for a period of 7years.

Limited Data Pressure Equipment

Pressure vessels with limited or no documentation are present throughout Australia. These vessels create significant issues for asset owners wanting to comply with updated legislation and of course, for owners who want to ensure low document pressure vessels are safe to operate. There are numerous reasons for not having documentation, but it is often associated with a sale of the asset or parent site, or a site closure and the items later being sold individually.

Australian Standard 'AS3920 Pressure Vessels – Conformity Assessment' describes the process on what to do in the case of limited data and essentially advises to gather the same information as what is required for a new build, shown previously.

AS3920 Clause 2.6 advises that the following is needed for pressure equipment with limited data:

- Inspection by competent person
- Satisfy that the build materials are suitable
- Undertake calculations to ensure the design is suitable (requiring the original drawings or a reverse engineering of the vessel)
- Undertake the required non-destructive testing
- Creation of a MDR including the above results

CASE STUDY
37,000litre LPG Vessel

It is important to note that there was no reason to doubt the integrity of the pressure vessel and it was advised that the vessel had been in safe operation for approximately 15 years in Australia prior to being decommissioned. The original data plate was still fitted showing the place and date of manufacture and the vessel properties (Figure 3).

Before conducting NDT, creating as-built drawings, and undertaking design verification calculations, a visual inspection both internally and externally was undertaken in accordance with 'AS3788 – Pressure equipment—In-service inspection' to determine the initial vessel condition. The outcome determined that although there was some minor degradation, the vessel was suitable to pursue further low document assessment and testing.

The design standard utilised was likely to be the 1956 edition of ASME Section 8, due to the time allowed to transition and implement new standards.

The stampings in the top left corner translate to

- ASME Section 8 Design
- W – Arc or gas welded (as opposed to riveted "R", brazed "B", forged "F")
- XR – Full radiography
- HT – Heat treated

Further evidence of full radiography was seen, with weld numbers, datums and diagnostic lengths hard stamped on the shell, thus, providing high confidence that radiography had in fact been performed, reducing the need to re-undertake 100% volumetric testing.

Material

The material was tested using optical emissions spectrometry (OES) to determine material chemistry and a portable Leeb Hardness testing unit for mechanical properties. The results were reviewed in parallel by a Metallurgist briefed on the decade of manufacture. The results were compared to steel that was introduced in the 1960's (and still current) and the OES results reported the material to be ASTM A516 Grade 60 series. This is unlikely to be what was "actually" used, but does give confidence that what was used is likely to be suitable (there is a direct relationship between hardness and strength).

Noting that the vessel had an initial hydrostatic test, has > 15 years Australian service history, is over 55 years old, and was required to pass a new hydrostatic test – the material could be considered suitable for use.

Design

As-built drawings were subsequently made to perform design verification calculations. Whilst it is acceptable to verify a design to its original design standard, with over sixty years passing it was both impractical to request a Design Verification Engineer to review against a 1956 standard and also considered best practice to review against the current standard, as many safety improvements and recommendations have occurred over the years.

As such 'AS1210 -2010 Pressure Vessels' was used as the verification standard. The vessel built in 1965 met the design standards of AS1210-2010. A design verification application was submitted and a Design Approval Number was issued, which would allow the vessel to be item registered and energised if the remaining steps were successful.

The design of a pressure vessel is arguably the most important aspect, because if the design is wrong then the vessel has a significantly higher chance of failing in-service. Australia's system of having a third-party design verification process is unique to Australia and provides an additional control to ensure pressure equipment safety.

NDT/Conformity Volumetric Testing

Noting the vessel had evidence of previous radiographic volumetric testing from manufacture and the shell thickness confirmed at 18mm, the risks associated with confined space radiography was considered, and a decision to not undertake radiography was made. It was not practicable to undertake radiography while there was no clear benefit.

Ultrasonic testing was performed on all Tees for a length of 300mm in all directions. No defects were evident to AS4037 Class 1 acceptance criteria.

Noting that no defects were found, with evidence of prior 100% volumetric testing, it was determined that further "compliance" volumetric testing was not required.

Internal Testing

Internal vessel inspections are often the hardest and frequencies are much lesser than external inspection due to this reason. It was important to ensure the vessel internals were suitable for continued use both due to the vessel's age and noting that future inspections will continue to be limited. Fluorescent magnetic particle testing was carried out on all internal welds with no significant discontinuities evident.

External Testing

As the vessel had been recently painted for installation, the use of eddy current to inspect the welds, without affecting the coating, was undertaken. All nozzles and 100% of Tee joins were inspected with 20% of longitudinal welds were also inspected due to risk of hoop stress. No cracking was evident.

Corrosion Testing

Even though LPG is considered a non-corrosive content, there was no assurances that the vessel, when stored, was stored under a preservation plan. Therefore, robotic corrosion scanning was undertaken with a single 300mm wide scan, vertically on the head and both circumferentially on the and longitudinally on the shell. No corrosion or significant reduction was evident.

Hydrostatic Testing

Hydrostatic testing was the last quality requirement conducted, as the design, material, inspection, and assurances that no in-service cracking was evident were required to be undertaken before the vessel could be energised in any capacity. A hydrostatic test was successfully undertaken at 1.5x the design pressure, being a test pressure of 2.655MPa for 30mins fulfilling the final requirement to confirm the vessel design and negate any outstanding concerns relating to potential brittle fracture.

Outcome

The pressure vessel materials, design, and current condition were shown to be safe for use. An MDR compiling all results was produced and a commissioning inspection was undertaken on site to satisfy item registration.

Discussion / Lessons Learned

The risk appetite for a process like this will vary from owner, inspection company and the inspector. A significant consideration was given to the advised 15 years of satisfactory service in Australia. The physical properties of the vessel including the type of pressure vessel, the size and design greatly reduced the likelihood that a change of service has occurred over its lifetime, which was an important consideration. The highest probability of a change of service since 1965 (if at all) would have been propane to LPG, which would not have adversely affected the integrity of the vessel.

The 1968 ASME code introduced additional content with regards to toughness considerations for steel used in construction of pressure vessels to help address brittle fracture. Current design rules would not require heat treatment for the design and service of the pressure vessel in this case study, as in current times more appropriate materials would be utilised which do not require heat treatment. While there may have been some concern over the materials chosen for this vessel, given the age of manufacture, the fact that this vessel was heat treated (likely due to the service use) helped satisfy brittle fracture concerns, along with a new hydrostatic test. There is less risk to undertake this low document assessment of an ASME vessel designed and built-in accordance with the 1968 ASME standard (or higher) due to an improved code considering steel toughness in more detail.

It was also noted that there was no National Board number on this vessel, which is a central registration system in the United States of America. If a National Board number was evident a request could have been made to the National Board, who would hold the drawings as part of the original application, making the process of design verification significantly easier, faster and therefore cost effective.

This situation/case study was not a rerating or degradation assessment, the requirement was to only confirm safety for continued use within original design parameters and no compromising degradation. Re-rating is a different process, that ideally should use original edition allowable stress/strength values and joint efficiencies. This approach is prescribed in codes such as the American Petroleum Institute code API510 which specifically states you cannot use a more favourable design edition's reduced safety factors i.e., the original design consideration should be maintained.

Conclusion

Assessment of pressure vessels with low documentation can be completed provided that a methodical process is undertaken and documented. This case study provides a working example of a successful process which proved more cost effective that a new build or purchase of a vessel.

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- **Assets** Info, manuals, photos, location, cost, automated events – calibration, inventory, Rego renewals
- **Specifications** – Materials database, Test Standards, procedures, Master-reference data library, configure result table.
- **DMS** – Storing documents for staff or for public (website) to eliminate servers.
- **CRM** – Automated customer survey, analytics, & several automation. Customisable Lead management & Quotes (your T&C).
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SafeRad™ South East Asia has been operating in Australia since 2009, delivering a full range of (NDT) Non Destructive Testing services.

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SafeRad™ are a NATA Accredited company and offer a full range of NATA Accredited NDT services: Radiography, Ultrasonic Inspection, Phased Array Ultrasonic Testing (PAUT), Magnetic Particle Inspection, Dye Penetrant Inspection, Hardness Testing, Post Weld Heat Treatment, Positive Material Identification, Laser Induced Breakdown Spectroscopy, Ferrite Testing, Visual Camera Inspection

SafeRad™ are the only company in the world with a purpose built Multi Functional Radiography system that offers both Close Proximity and Conventional Radiography (One System All Methods).

SafeRad™ are the world leaders in Close Proximity Radiography where no one has to be evacuated for what is normally a hazardous operation.

SafeRad™ Radiography is the ultimate solution to the conflict between evacuations for Radiography and the requirement to carry out simultaneous operations (SIMOPS) to meet schedules.

Benefits include but are not limited to: increased safety, no need for staff to be evacuated during operations, no impact on work schedules or productivity, assists in expediting work programmes, massive cost savings to client. This means no disruption to any work programs by compromising safety, quality or production.

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