

INDUSTRIAL

EYE

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

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VIBRATION ANALYSIS ■ LUBRICATION ANALYSIS ■ THERMOGRAPHY ■ ACOUSTIC EMISSION

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 AINDT

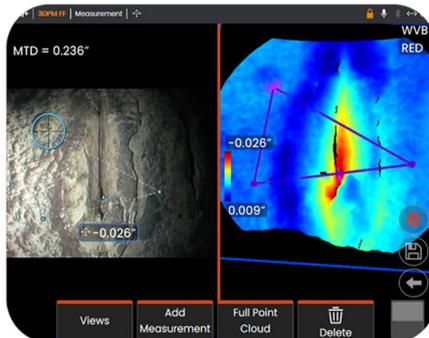




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President's Message



Joshua Morris

Greetings, and welcome to the latest instalment of Industrial Eye.

I am honored to serve as the Federal President of the Australian Institute for Non-destructive Testing once again. I extend my heartfelt gratitude to our outgoing interim President, Richard Stocker, and departing Board members Justin Cavanagh, Nick Eleftheriou

and Damian Clark for their valuable contributions to our institute.

Our Federal Council, comprising nominees from the Branch Councils plays a pivotal role in our organisation. Every institute member has the opportunity to contribute and nominate to our Branch Councils to help shape the fabric of our collective voice. I encourage all interested individuals to engage with their state Branch, as they continuously seek new members dedicated to advancing our industry.

Our current Federal Council is comprised of the following representatives.

New South Wales Branch

Darren Quinn
Neil Burleigh
Stuart Smart

South Australia Branch

Craig Taylor
Andrew Morris
Karl Saul
Tyson Jenke

Victorian Branch

Pranay Wadyalkar
Paul Trigg
Mark Welland

Queensland Branch

Ian Hogarth
Damian Clarke
Roger Hardy

Western Australian Branch

Colm Kinsella
Paul Lavander
Derek Bruns

As many of you are aware, significant transformations have swept through our Board of Directors and federal office in recent months. We welcome Stuart Norman as our new Chief Executive Officer and extend our warmest wishes for success from the membership.

The newly elected Board is embarking on a comprehensive review of our institute's processes, including a thorough examination of our constitution and procedures. Our aim is to exceed expectations and elevate the NDT industry in Australia to new heights.

We eagerly anticipate your interactions with our new CEO as he visits state Branches in the coming months, fostering closer ties with our diverse membership base.

This current era of change echoes my previous tenure as Federal President in 2011, when I succeeded Martin Lloyd Diviny. We navigated significant shifts as we transitioned from an external secretariat to a dedicated federal office with full-time staff, laying the groundwork for transformative growth. Now, we face similar opportunities and challenges, poised to build upon our past successes.

Following the recent Extraordinary General Meeting, the ANIDT Board of Directors unanimously appointed office bearers have commenced work with Angelo Zaccari serving as Vice-President, alongside a dedicated team that includes Ian Hogarth as Immediate Past President again, Glen Haberl as treasurer and Sam Hallifax working tirelessly as secretary.

We're grateful for the diligent efforts of our newly appointed CEO, Board Members and Federal Councilors whose commitment drives our shared vision forward.

Our institute's strength lies in our dedication to serving members and upholding the integrity of our certification processes. Volunteers form the lifeblood of our organisation, and I urge each of you to actively participate and contribute to our collective success.

The recent motion for an independent review of our governance structure, particularly our constitution and quality and procedure manual, underscores our commitment to transparency and accountability. Work on this initiative is already underway, with proposed changes to be presented at the 2024 Annual General Meeting.

In closing, let us remember our core mission: to provide world-class certification and services that support the professional development of our members. Together, we will continue to advance the science and practice of non-destructive testing and condition monitoring, ensuring a strong and brighter future for our industry.

Warm regards,
Joshua Morris, President
Australian Institute for Non-destructive Testing



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Vice President: Mr Angelo Zaccari
Treasurer: Mr Glen Haberl
Secretariat Liaison: Mr Samuel Hallifax
CEO: Mr Stuart Norman

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Treasurer Mr Paul Ashby
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President Mr Paul Trigg
Vice President Mr Amir Ehssan Katouzi
Treasurer Mr Samad Asghary
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 Perth WA 6000



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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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CEO Message

Speaking at the SportNXT conference held in Melbourne in March, Australian Sports Commission Chief Executive and sporting legend Kieren Perkins spoke about the role volunteerism plays in Australian sport. Having read what Kieren said, it made me think about how the non-destructive testing and condition monitoring industries are supported by their volunteers.



Stuart Norman

Prior to my appointment at the AINDT, I have had the opportunity to represent five other industries, working with their peak bodies. I have to say—I have been amazed at the strength of volunteerism with our institute. The level and number of volunteers is exceptional. I want to thank all of you who willing give of your time to further the interests of our industries.

It is a credit to everyone involved, from the Board of Directors and the state branch office bearers, through to the certification boards and standard committees. It is my aim to ensure that we acknowledge and thank all our volunteers. We do not take any of you for granted.

A key point of Kieren Perkins' contribution during the conference panel discussion was that federated models of administration are killing off volunteers' involvement at a grassroots level. He stated, "the federated model for sport guarantees obstruction and oblivion". This comment applies to industry bodies as well.

The priority of sporting bodies such as the AFL and NRL is the success of their competition, not their code. Yet, in the public eye, these bodies are considered to be responsible for their entire code. This same model can be seen in many industries. Some peak bodies have built their size and strength by focusing on the commercial nature of their organisation—often to the detriment of the industry they are meant to represent.

Since starting with the AINDT I have been contemplating the pros and cons of our current governance and operational structure. No organisation is perfect, but I have come to the conclusion that it is much better for us to have a model that promotes industry participation at all levels. The alternative is to centralise everything in the Federal Office, which would lead to what Perkins put as being oblivious to the needs of our industry.

Outside of my professional roles, I have been a committee member of my local cricket club (Go the Yarras!) and held the role of President. Managing an organisation of volunteers is not always easy. In many

ways, it can be more difficult. Unfortunately, there are times when a volunteer needs to be removed for the greater good of the organisation. It's not easy or nice, but sometimes it needs to be done.

When Perkins spoke about the sport industry workforce, he advised of the need to "improve the operational maturity of sport". This thought equally applies to industry bodies. Often the loudest voice is heard and listened to when, in fact, acting on this opinion would only harm the organisation. As my grandma use to say "Adults have adult conversations". I'm pleased to say that in my few months in the role, while there have been some difficult adult conversations, I believe these will lead to a stronger institute in the future.

Perkins understands the importance of volunteers and said that "there are over one billion people working and operating sport on a daily basis". While the AINDT is no where near the size of community sport in Australia, it reminds me that without the active participation of volunteers our institute would not function. For every sporting champion our country produces there are hundreds of people who have paved the way for them to achieve at the highest level.

As we look to the future it is my belief that our high level of volunteerism is our strength. While not everyone will always agree, it is much better than the alternative — an unengaged apathetic membership. In recent months I have met so many members who want the institute to be stable and strong. With your help I hope that we will be just that.

Thank you again to all those who willing give of their time in a variety of positions. If you're not involved in the institute, I recommend you get involved with your local branch.

Best Regards
Stuart Norman
 CEO
 Australian Institute for Non-destructive Testing

AINDT NDT Certification Board Update

The AINDT NDT Certification Board plays a key role in the success of the Institute. Not only does the Board approve certification applications in a timely manner, it also develops exams and addresses many technical matters.

It is imperative that the Board administers the certification scheme with independence and impartiality, complying with all provisions outlined in ISO 17024 Conformity assessment. This international standard outlines a comprehensive framework designed to ensure the objectivity and fairness of the certification process for individuals.

By rigorously following ISO 17024, the Board upholds a certification scheme that is both transparent and credible, maintaining a consistent benchmark for the evaluation of professional competencies. Therefore, it is critical for the integrity and reputation of the certification, and ultimately for the trust of stakeholders and the market at large, that the Board operates effectively and ethically.

With this in mind the AINDT Federal Council and Board of Directors met in March to discuss how the AINDT can ensure that the Certification Board operates effectively. While we are accredited by JAS-ANZ and need to comply with their requirements, we also have obligations as a member of the ICNDT that we need to adhere to.

The Federal Council has selected four members to undertake a review of the Board and its operations. The review will focus on the governance of the Certification Board and will present its findings to the Federal Council, along with some recommendations. The Federal Council will consider these findings and recommendations before making any decisions.

Appointment of New Board Members

Following the Federal Council's decision to conduct a review, the NDT Certification Board met and nominated

Barry Cooper to act as Chair, with Mark Welland to act as Vice-Chair. Chris Howson and Andrew Kennedy have also joined the Board, and will initially assist with certification applications.

The members of the Certification Board have done an outstanding job in processing certification in a timely manner. Until recently, certifications were approved in an average of nine days. While in March we have not had the same prompt processing of applications, moving forward we will endeavour to ensure that applications are approved in the stated 21 days.

Update to ISO 9712:2021

The AINDT has submitted an application to JAS-ANZ to update from the 2014 version of ISO 9712 to the 2021 version. The AINDT is working with JAS-ANZ on this application, and trust that we will be able to issue certifications in line the latest standard in the near future.

AINDT Certification Team Members

Over the past 18 months many of you would have worked with Hanain Rajab who held the role of NDT Certification Officer. Hanain has chosen to move on, and we'd like to thank her for her service over this time. This role has now been filled and we'd like to welcome Tayla King to the AINDT.

The AINDT is also looking to fill the role of Certification Services Manager. The role will work with the Certification Board and assist with accreditation and certification matters. Further information on the role can be provided by contacting the Federal Office.

100

WAYS YOUR INSTITUTE IS WORKING FOR YOU

#41

Encourages participation within the Branch and the Federal Council to further industry.



AINDT Condition Monitoring Certification Board Update

Mechanical Thermography Certification

Over the last couple of months, the Condition Monitoring Certification Board has been busy working on examination papers. Development of an examination paper for mechanical thermography certification is underway, and should be completed soon. Once complete, Category 2 Thermography Mechanical Certification will then be made available as soon as possible.

The creation of examination papers is a meticulous process, requiring many hours of focused effort to ensure the highest standards. Once implemented, we actively maintain the quality of examinations through regular reviews and systematic enhancements, refining them continuously based on feedback and evolving industry benchmarks.

Changes to the 10 Year Re-Certification Process

Changes to the 10-year re-certification process have been implemented, making it more seamless for professionals actively contributing to the field.

Where a candidate has continued to work in the field, and can demonstrate this continuous work, re-sitting the examination will no longer be necessary.

To take advantage of this update, applicants are required to substantiate their continuous professional engagement with relevant supporting evidence and documentation, demonstrating no significant gaps in their practice. However, for those who prefer a more traditional route, the option to complete the examination remains available.

In line with these adjustments, we will be revising the certification guidelines and supplementary materials accordingly. If you have any issues or questions or need further clarification, our team at the federal office is ready to help.

Regards
Shawn Moore
 Chair
 AINDT Condition Monitoring Certification Board



AINDT Federal Councillors, Certification Board Members and Convenors of Committees of Federal Council 2023 – 2024

According to the AINDT constitution, the governance structure is designed to reflect our diverse membership.

Each branch must nominate a proportional number of councillors to the Federal Council based on its membership figures: branches with 20–100 members will nominate two representatives, those with 101–200 members will nominate three, and any branch with over 200 members will be represented by four councillors. This ensures equitable representation and allows for a broad range of perspectives.

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 and the Certification Board. The Executive Committee is comprised 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.

Following the recent Extraordinary General Meeting the newly appointed AINDT Board of Directors met where office bearers were elected. AINDT is pleased to state that all positions were unanimously adopted.

FEDERAL COUNCILLORS

Board of Directors

President: Joshua Morris
Immediate Past President: Ian Hogarth
Vice President: Angelo Zaccari
Treasurer: Glen Haberl
Secretariat: Samuel Hallifax

New South Wales Branch

Neil Burleigh
Darren Quinn
Stuart Smart

Victorian Branch

Paul Trigg
Pranay Wadyalkar
Miro Katouzi

South Australia Branch

Tyson Jenke
Andrew Morris
Karl Saul
Craig Taylor

Victorian Branch

Paul Trigg
Pranay Wadyalkar
Mark Welland

Queensland Branch

Damian Clarke
Roger Hardy
Ian Hogarth

Western Australian Branch

Derek Bruns
Colm Kinsella
Paul Lavander

NDT CERTIFICATION BOARD

Chairman: Barry Cooper
Honorary Secretary: Victor Mierzwa
Vice Chairman: Mark Welland
Member: Angelo Zaccari
Training Provider: Ahmed Jahanzaib
Welding Representative: Bruce Ham
NANDTB Representative: Rodd Smith
Member: Chris Howson
Member: Andrew Kennedy
Non-Voting Member: Stuart Norman

CM CERTIFICATION BOARD

Chairman: Shawn Moore
Honorary Secretary: Dana Lake
Vice Chairman: Paul Rand
IRT Application/Exam Panel Chairman: Erik Thorup
Member: Salah Attia
Member: Daniel Campbell
Member: Sarel Klopper
Member: Peter Howman
Member: Guy Salathiel

Member List

April 2024

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

Through the work of our state branches and federal office, AINDT is committed to fostering a community of professionals and organisations dedicated to the fields of non-destructive testing, engineering, and materials and quality testing.

We offer a tiered membership structure, inviting businesses to enhance their professional standing and industry influence by becoming a Company, Corporate, or Sustaining member. Our memberships unlock a suite of benefits, including marketing opportunities, heightened support, streamlined staff certification management, and much more.

AINDT would like to thank the companies below for their valued support.

SUSTAINING MEMBERS

ATTAR
D R May Inspections
EnerMech
SRG Industrial Pty Ltd
Intertek

SUPPORTING MEMBERS

Chevron

CORPORATE MEMBERS

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

COMPANY MEMBERS

NSW

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

QLD

AXS Pty Ltd (Mackay)

Equipment Direct International Pty Ltd
Industrial Mining Inspection Solutions
International Tube Testing Pty Ltd
Metal Testing Pty Ltd
M-Test Mackay Pty Ltd
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VIC / TAS

ABEN Technical Services
ATCL
Defence Science and Technology Organisation (DSTO - Fishermans Bend)
Gippsland NDT Services Pty Ltd
LMATS Pty Ltd (Williamstown)
NATA
OMS Software Pty Ltd
QENOS
Shantou Institute of Ultrasonic Instruments Co Ltd
Shimadzu Scientific Instruments(Oceania) Pty Ltd

Stocks and Partners Ltd

SA / NT

ASC Pty Ltd
Kuzer Technical
Red Earth NDT Pty Ltd

WA

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

NSW Branch Update

AINDT Industry Night: Igniting Innovation

Experience the future of industry at the upcoming AINDT Industry Night: Igniting Innovation. Hosted by AINDT's New South Wales branch, this event will be held on Tuesday 14 May, from 4.30pm. It promises to be an evening of inspiration and exploration in the heart of Newcastle's technological hub.

Held in the Quinspek Technical Laboratory, owned by Darren Quinn, at the Thales Maritime Precinct in Carrington, Newcastle, this industry night will be a melting pot of visionaries, professionals, and enthusiasts alike.

The event will be a pre-cursor to the highly anticipated national AINDT national conference in October 2025, making it an essential stepping stone for those passionate about the advancement of the Australian NDT industry.

Attendees can expect an immersive experience delving into the latest innovations, technologies and trends that are reshaping our industry landscape. Network with key players, exchange ideas, and gain insights from thought leaders who are at the forefront of innovation.

This event isn't just about what's happening now; it's about shaping what's to come. Be part of the conversation that defines the future of industry.

Register now for the AINDT Industry Night: Igniting Innovation and be prepared to ignite your passion for progress.

Event Details

Date	Tuesday 14 May 2024
Time	Starting at 4:30pm
Venue	Thales Maritime Precinct (Newcastle) Quinspek Technical Laboratory 50 Fitzroy Street Carrington NSW 2294

Register aindt.com.au/Events/

INDUSTRY NIGHT

IGNITING INNOVATION



 Tuesday 14 May

 4:30pm

 Thales Maritime Precinct (Newcastle)

REGISTER NOW





Queensland Branch Update

Queensland Branch Continues to Shine with Recent Technical Session

The AINDT Queensland branch has maintained its momentum with a series of enriching events, underscoring our commitment to the professional growth and networking of our members.

Our community's spirit and dedication were showcased through these events, further solidifying our position as a cornerstone for NDT excellence in the region.

A Focus on Advanced NDT Technologies

A standout event in our recent calendar was the technical session by Evident: Omniscan X3 TFMP/CI and HydroFORM/RexoFORM, which took place on 26 February. This event brought our members up to speed with the latest in NDT technologies, providing a deep dive into the functionalities, applications, and advantages of these state-of-the-art tools.

Led by Nick Eleftheriou (Product Manager and Applications Specialist NDT, Evident Industrial) and Sean Fogarty (Senior Sales Specialist – Industrial Inspection, Evident Industrial), the session offered practical insights and demonstrations of these advanced testing methods.

The engagement and feedback from our members highlighted the success of the session, reflecting the value that these types of events bring to our community.

We wish to express our sincere thanks to all attendees for their active participation and to the speakers for sharing their invaluable expertise. The Queensland branch is also proud to have contributed to the event's warm and welcoming atmosphere by offering a variety of light refreshments and beverages, fostering an environment conducive to learning and networking.

2024 Calendar of Events

As we move forward, the Queensland branch is excited about the calendar of events planned for the remainder of the year. We are committed to delivering more sessions that accommodate the diverse interests and professional development needs of our members.



Your involvement and feedback are crucial to our success and the continuous improvement of our events. We encourage all members to participate actively and share their ideas for future sessions or workshops they would like to see.

Stay tuned for announcements on upcoming events, and let's continue to grow and excel together in the field of NDT.

South Australia and NT Branch Update

On Monday 25 March, the South Australia and Northern Territory branch held its second council meeting of the year at the fabulous British Hotel. The meeting was well attended, both in-person and online via Teams.

With the vast distances from the bottom end of South Australia to the top end of the Northern Territory, we have found the online format a real boost to meeting attendance. We look forward to more of our Northern Territory members signing into the meetings in the future.

Planning for the Annual General Meeting

The meeting was vibrant with the main discussion centered on planning for our Annual General Meeting (AGM). This event is a calendar highlight and a fantastic opportunity for the industry to get together, catch-up and enjoy a welcome respite mid-year. At the moment, we are planning to hold the AGM in July and are hoping to confirm the date and venue at our next meeting.

'Materials with Matt'

We also discussed another event, dubbed Materials with Matt. This be an enriching evening session designed to broaden your professional knowledge while also accruing CPD points.

Members will have the opportunity to dive into fresh topics, engage in thought-provoking discussions, and network with peers. Stay tuned for the finalisation of dates and venues—you'll want to clear your calendar as this promises to be a great evening.

Next Meeting

Our next meeting is scheduled for Monday 29 April at the British Hotel, with kick-off at 6pm. All are welcome and encouraged to attend.

Regards
Simon Wilding
 SA/NT AINDT Branch President

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Victoria and Tasmania Branch Update

Technical Night: Practical Ultrasonic Corrosion Detection

The Victoria and Tasmania branch recently hosted a technical night focused on practical ultrasonic corrosion detection. The event took place at the Golden Gate Hotel in South Melbourne on Tuesday 27 February.

Attendees were treated to a presentation by industry expert Glen Haberl from AICIS. The event delved into various corrosion detection methodologies, highlighting their effectiveness, advantages, and limitations.

The presentation explored different corrosion detection techniques, including conventional ultrasonics, PAUT Dual linear array, HydroFORM, and RollerFORM. Each method was thoroughly examined, offering attendees a comprehensive understanding of their functionalities, intricacies, and applicability.

Throughout the presentation, Glen provided a comparative analysis of the techniques and the pros and cons of each method. Factors such as accuracy, probability of detection, ease of implementation, and cost-effectiveness were discussed, providing attendees with valuable insights into selecting the most suitable approach for their needs.

One of the highlights of the event was the interactive session, during which attendees were given the opportunity to test their skills on a range of equipment. This hands-on experience allowed participants to gain practical knowledge and enhance their understanding of ultrasonic corrosion detection.

By the end of the evening, attendees gained a deeper appreciation for ultrasonic corrosion detection, and practical insights into various techniques, and learned how to make informed decisions when selecting the most appropriate method for corrosion assessment in the field.

Thanks to Glen Haberl from AICIS and Paul Trigg from Evident Scientific for their ongoing support of AINDT members' continuous learning, and professional development within the NDT industry.



A range of NDT equipment was on-hand for attendees to try.



Presentation by industry expert Glen Haberl from AICIS.



Attendees enjoy Glen Haberl's presentation.

Western Australia Branch Update

AOG Energy 2024

AOG Energy 2024 was held at the Perth Convention and Exhibition Centre from 13 to 15 March. AOG Energy is held annually in Australia's energy hub: Perth. For over 40 years, AOG Energy has brought the entire oil, gas and energy supply chain together as a platform for discovering innovation, capabilities and opportunities, supported by major operators, government and industry.

Energised for the Future

The theme for this year's event was Energised for the Future. With a renewed focus on Australia's energy transition, AOG Energy 2024 offered expert thought-leadership, insights into Australian developed technologies and unrivalled networking functions to drive energy innovation.

It was fantastic to see the exhibition presence grow again in size and scale following a great event in 2023. There was strong attendance from local Western Australia representatives, as well as national and international companies and professionals, with lots of interest at all exhibition stands.

The AINDT and AICIP stand was well attended with many positive discussions shared, and some fantastic AINDT-branded giveaways snapped up throughout the event. The stand was hosted by the AINDT Western Australia branch contingent including Josh Morris, Josh Wilkinson, Derek Burns, Richard Stocker, Paul Lavender, Mike Needham, Nathan Lenane, Nic Chortis, David Carter and Colm Kinsella.

Our new CEO, Stuart Norman, also made the trip over from Melbourne to work with the team. It was fantastic to see him rub shoulders with our current and prospective members, along with the local Western Australia branch team. We hope to see Stuart again at our AGM later in the year.

As well as the exhibition, there were opportunities to attend several talks and discussions, including networking opportunities like the opening party, a diversity and inclusion breakfast, and the Subsea Energy Australia welcome drinks.

Knowledge Forum

The AINDT facilitated the excellent AOG Energy Knowledge Forum, which aims to educate, inspire and inform through technical and educational conference sessions.

Bringing together specialised industry sectors to discuss the latest techniques and technology, the Knowledge Forum provided a platform to share insights that enable the industry to overcome both current and future challenges, and reflected the current trends and challenges impacting the wider oil energy industry.

This year, the Knowledge Forum was hosted by Richard Stocker (Regional Director Asia and Pacific, Strategy and



Left to Right: Stuart Norman, Richard Stocker, Paul Lavender and Nathan Lenane.



Richard Stocker (far right) chats to delegates.

Growth, EnerMech). The three presentations delivered were very well attended and received and consisted of:

- Breaking Boundaries: Underwater Robotics and Advanced NDT by Stephan Freychet (Senior Project Manager, TSC Subsea)
- Systematic process for tracking NDT/CM results through to repair or replacement by Nathan Lenane (Specialist NDT, Asset Health, Rio Tinto)
- Acoustic Emission Ensures Ammonia Tank Safety by Dr Gary Martin (Chairman and Technical Director, ATTAR)

AOG Energy 2024 was a highly successful event, with positive contributions and interactions for AINDT and its member companies. We are hopeful that AOG Energy 2025 will once again increase in size and that the AINDT Knowledge Forum will return.

Standards News

Over the last few months, we have received a number of queries regarding development and revision of Australian and ISO Standards related to non-destructive testing.

Given these queries, we would like to update members on the Standards Australia requirements and mandates, including the role and responsibility of the MT007 Committee Non-Destructive Testing of Metals and Materials.

World Trade Agreements

Australia's Federal Government is a signatory to the World Trade Organisation Agreement on Technical Barriers to Trade (WTO TBT). The WTO TBT requires members use international standards as a basis for their technical regulations, where they can. WTO TBT also requires that members use international standards as a basis for national standard development wherever appropriate.

Standards Australia is required to mandate the WTO TBT and ensure that we mutually recognise other countries and systems that are also a signatory.

A flow on effect of this is that Standards Australia requires that all their Committees follow this mandates, including MT007.

Review of Aged Standards

Australian Standards that are ten years old are reviewed and voted on by the MT007 Committee. The Committee has the ability to provide three potential outcomes. These are revise, reinstate or withdrawal a Standard or set of Standards.

As part of the review process, MT007 is required to determine if an ISO Standard can fulfill the requirements and replace the ten-year-old Australian Standard in question. If it is determined that the ISO Standard cannot replace the Australian Standard for any reason, then MT007 is required to determine what areas of the ISO Standard may need to be modified. The ISO Standard is then adopted as a Modified Version.

If MT007 decides to revise an existing Australian Standard, the process becomes complex. Submissions from MT007 are required to prove that the Australian Standard is still a valid document, rather than the ISO Standard. In many cases, the submission for revision is deliberated on internally by Standards Australia. These deliberations often result in only allowing MT007 to reinstate the Australian Standard, or modify the ISO Standard so that it can be used by industry.

A Seat on ISO Standard Committees

As I have indicated in previous editions of the Industrial Eye, the adoption of ISO Standards provides Australia with a seat at the ISO Standard Committee table related to that NDT method. Australia currently has members on the following ISO Committees: NDT Certification, Acoustic Emission and Thermography.

Since taking on ISO Standards for Radiography, Penetrant and Ultrasonic (thickness), we are now in the position to have members on these ISO Standard Committees.

The MT007 Committee has heard from many members that would like Australian Standards to be revised and become the main choice within Australia. However, with the Federal Government signing World Trade Agreements, Standards Australia has no choice but to ensure all Committees, including MT007, work to the mandated requirements of these agreements.

There is little news on ISO and Australian Standards meetings, publications and voting. As such, these will be included in the next edition of Industrial Eye.

Please contact me if you have any questions. I will reply at the first opportunity.

Regards
Angelo Zaccari
 MT007 Standards Chairperson
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Member Profile: Sarel Klopper

With a career spanning over 28 years, Sarel Klopper is an expert in reliability engineering, specifically in the realms of condition monitoring and electrical engineering.



Sarel Klopper

Sarel started his career at Eskom as a Reliability Engineer, where he was responsible for the reliability and availability of 618 MW generator exciters and electrical motors at Lethabo Power Station in South Africa.

Sarel then moved into a Senior Reliability Engineering Consultant role with Komatsu Mining Corporation, where he oversaw the reliability of electrical motors used in both underground and surface mining operations. Sarel then moved into a similar role at Alstom Power, taking on technical and engineering responsibility for Alstom-GE generators in their sub-Saharan African power generation fleet, including in South Africa, Zimbabwe, Botswana and Mauritius.

In 2015, Sarel immigrated to Australia and joined SRG Global as a Condition Monitoring Engineering. Deployed at critical industrial sites such as Alcoa and BHP, he applied his expertise in vibration analysis, thermography, and lubricant analysis to optimise plant operations and ensure high reliability and safety standards. From 2022 to 2024, Sarel moved to Altrad Services where, as a Senior Reliability Engineer, he designed and implemented reliability centered condition monitoring programs.

Currently serving as an Online Condition Monitoring Specialist at SRG Global, Sarel hold a Masters Degree in Electrical Engineering, is a Level 3 Vibration Analyst and Thermographer, and a Level 2 Machinery Lubricant Analyst.

Where do you work? Describe your job.

I work at SRG Global in the field of online condition monitoring.

Can you share your journey into the NDT industry? What motivated you to take on a career in NDT?

Following university, I started working as Electrical Engineer, but the role quickly developed into that of Asset Reliability Engineer.

As a young engineer I found myself having to make maintenance and design improvement decisions based on data from condition monitoring reports. I realised that I did not fully understand the data presented to me in these reports. That lead me to enrol for courses in vibration analysis and thermography, which started my journey in condition monitoring.

Who or what has influenced you most professionally?

My Dad, who encouraged me to be inquisitive from a young age and laid the foundation for my interest in science and engineering. My Dad used to give me small electrical motors to play with since I was around six years old. We spent hours in the garage designing and building all kinds of small electrical projects. Electrical motor projects were always my favourite, and that love remained.

I still use principles from these early interactions with my Dad in my professional life today.

What has been the most interesting project you've worked on and why?

I was the designated Electrical Project Engineer for the upgrade of the electrostatic precipitation system at a power station to a switched integrated rectifier system. The scope of the project covered electrical, instrumentation and process theory and application. The outcome was a reduced energy cost and a significant increase in precipitator efficiency and therefore resulting in a significant reduction in particulate emissions.

What advice would you give to someone just starting their career in the NDT industry?

Be inquisitive, always ask why, never give up, and read.

What has been your greatest professional achievement?

By applying principles from ISO 17359 Condition monitoring and diagnostics of machines, I changed the inspection regime on the generator exciters I was responsible for at a power station.

This resulted in the detection of an inherent material defect on the rotor coil retaining rings on six generator exciter units, which has gone unnoticed for years.

This fault posed a significant risk of catastrophic failure at a huge financial and production loss and posed an unacceptable risk of injury and death.

I had the opportunity to recommend my findings and suggested inspection regime for implementation throughout the business via the technical steering committee.

How has being a member of AINDT benefited you professionally or personally?

One of the values of my employer, SRG Global, is that we are smarter together. Being a member of AINDT allows me to get to know and engage with a network of specialists in the non-destructive testing and condition monitoring fields, to be stronger, together.

Rapid Fire

What is your favourite:

- Food: Avocado
- Song: I Can See Clearly Now by Johnny Nash
- Sport: Motorcycle Enduro Racing

What is your pet peeve?

Ignorance

What is your top tip for NDT excellence?

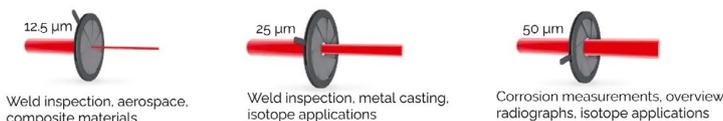
Always ask why

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SYSTEMS FOR EVERY CR APPLICATION DEVELOPED FOR THE HIGHEST QUALITY DEMANDS
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Thermography in Action

Thermoelastic Stress Analysis Using Thermography.

BY KHEANG KHAUV
DIRECTOR, 1MILLIKELVIN AND RECIPIENT OF THE AUSPTA MAL
CAMPBELL EXCELLENCE IN THERMOGRAPHY AWARD

1MILLIKELVIN has developed the world's first fully-integrated, microbolometer based thermoelastic stress imaging system. This system is not only extremely sensitive, but also user friendly, compact, easily deployable and capable of generating precise stress maps.

What is Stress Imaging?

More commonly known as Thermoelastic Stress Analysis (TSA), stress imaging is an imaging technique (camera system) that shows, in semi real-time, the stress on an object that is under load. The technique has a long history of use in aerospace testing.

Advanced Stress Imaging, Simplified

The concept of visualising stress is not a new one. In fact, it traces its roots back to linear thermoelastic theory, which was developed over a century ago. However, the actual implementation of this idea was far from straightforward. To visualise stress, a sensor would have to detect temperature variations as small as a few millikelvin (thousandths of a degree Celsius), but such a sensor did not exist.

Through research, development, and rigorous testing, 1MILLIKELVIN's team of experts succeeded in creating this breakthrough. What sets their approach apart is their focus on user-friendliness, durability, compactness, and affordability.

Unlike other systems, which utilised expensive, science-grade sensors, 1MILLIKELVIN built their camera around less sensitive, uncooled microbolometer sensors. Surprisingly, this unconventional approach not only resulted in a more elegant stress imaging camera, it produced results that exceeded their expectations, outperforming systems that used science-grade sensors.

1MILLIKELVIN succeeded in achieving a remarkable thermal resolution of less than 1 millikelvin. So, when it came time to name the company, the choice was obvious: 1MILLIKELVIN.

A World First

The LTS-640V by 1MILLIKELVIN is the world's first



The LTS-640V by 1MILLIKELVIN.



The world's first dedicated dual channel Stress Imaging camera system.

dedicated dual channel stress imaging camera system. By combining advanced uncooled thermal detector and CMOS imaging technologies, this innovative product offers advanced stress imaging capabilities without the complexity.

With an ultimate stress sensitivity of <math><1\text{MPa}</math>, the LTS-640V has ample precision for the most demanding of applications. Getting started is a matter of 'plug and play'.

The visual sensor along with the visual-stress fusion function allows for easy identification and location of critical stress regions.

Applications

The LTS-640V boasts the fidelity of a high-end research and development instrument with the ruggedness, versatility and ease-of-use of an industrial tool.

Applications include:

- Validation of structural FEA (Finite Element Analysis)
- Identification of areas of structural weakness
- Structural health monitoring
- Detection, monitoring and characterisation of fatigue cracks
- Non-Destructive Inspection (NDI)
- Research and teaching in structural mechanics

Industries

By offering advanced stress imaging capabilities, 1MILLIKELVIN drives better design and engineering outcomes, from constructing smarter and safer structures to more efficient product development and manufacturing.

Industries include:

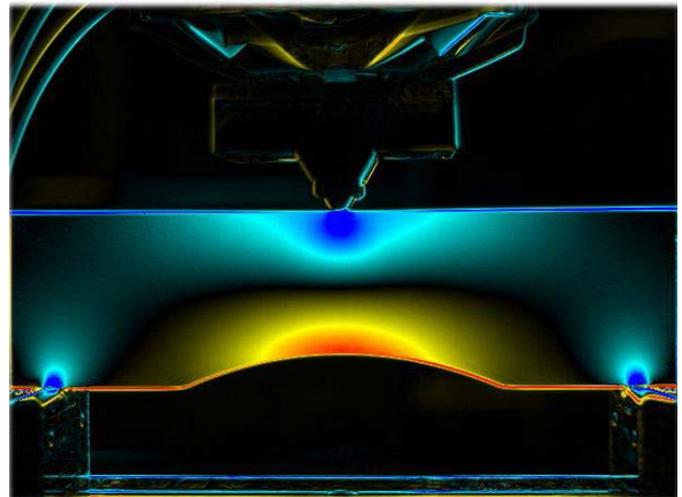
- Aerospace and defence
- Materials testing
- Research and development
- Advanced manufacturing
- Automotive
- Civil engineering
- Renewables

MiTE Suite

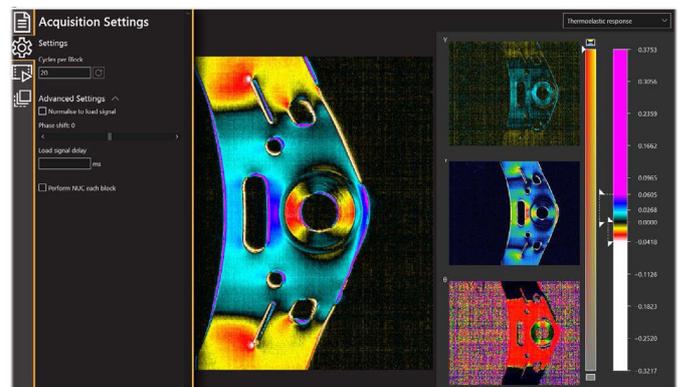
The powerful MiTE Suite software package comes with all 1MILLIKELVIN stress imaging systems. It offers a comprehensive set of tools for advanced stress imaging and analysis.

The MiTE Suite delivers a range of features, including:

- Full complex-valued thermoelastic response
- Real-time display for visual and infrared
- Semi real-time display (user selectable frame rate) for stress and stress-visual fusion
- Real-time stress monitoring for damage detection and trend analysis
- Plotting functions



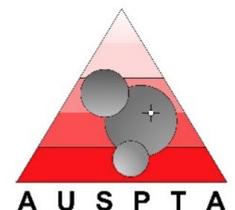
The LTS-640V boasts the fidelity of a high-end R&D instrument with the ruggedness, versatility and ease-of-use of an industrial tool.



The MiTE Suite software package interface.

- Point and ROI metrics
- Stress and strain calibrations

For further information, visit: <https://1millikelvin.com>



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Tethered Robotic Solution for Internal Riser and Pipeline Inspection

bp approached TSC Subsea with a unique challenge: to conduct an internal inspection of an unused riser located on one of their North Sea offshore platforms.

This particular 365mm diameter duplex riser had been installed initially as a spare and had never been put into operation. Due to an upcoming development project, bp aimed to commission the riser for service. However, before proceeding, they needed definitive assurance regarding its suitability.

bp sought a comprehensive, circumferential 360-degree scan of the riser. TSC Subsea provided the solution – a robotic system that could both travel longitudinally along the riser and had the ability to precisely stop and stabilise itself, in order to conduct the detailed assessment required.

Project Highlights

- Robotic pipe crawler capable of navigating vertical pipe sections with multiple bends.
- Multi-technology: ACFM for surface-breaking cracks in recessed welds and SPA for volumetric weld inspection and corrosion mapping.
- Blind trials both technologies detected and sized all defects within bp's engineering tolerances.
- The successful inspection allowed bp to proceed with their development project and recommission the riser.

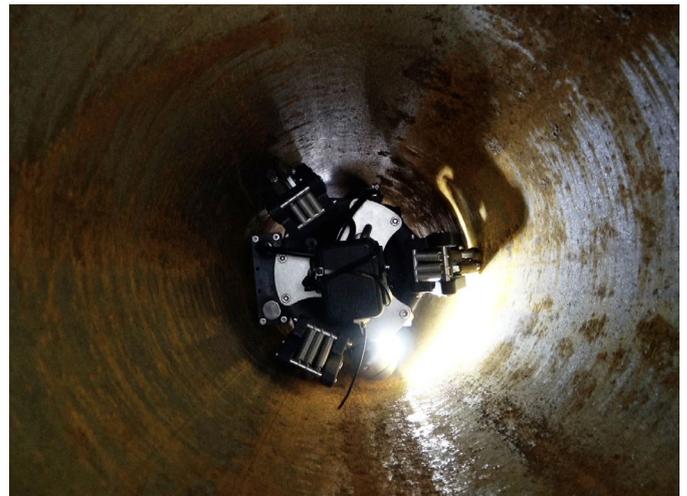
The Challenge

Typical pipeline and riser inspections are conducted externally, which wasn't possible due to the duplex pipe's complex features, including a wall thickness of 48.8mm, multiple intricate bends, the location, and surrounding obstacles.

The 110m long pipe riser included recessed welds every 10m and featured three 90-degree bends. Additionally, it was filled with anti-corrosion fluid and maintained at elevated temperatures with only a single entry and exit point.

Given the intricacy and critical importance of the task, it was decided that a factory acceptance test (FAT) would be necessary to validate the inspection technology and delivery system.

TSC Subsea leveraged its expert engineering team, application specialists, and various toolbox of non-destructive testing technologies, including robotic scanners, to tackle the task.



TRITON internal pipe crawler in action.



TRITON entering the offshore riser.

The Solution

Considering the complexity of the inspection and potential damage mechanisms, the advanced NDT technologies were the clear choice. The selected methods were Alternating Current Field Measurement (ACFM) for detecting surface-breaking

cracks in recessed welds, and Subsea Phased Array (SPA) for volumetric weld inspection and corrosion detection and mapping in areas of interest.

The major engineering challenge was designing and developing the delivery vehicle, which had to navigate the vertical pipe sections with multiple bends and stop precisely at areas of interest. When in position, the vehicle needed to rotate 360-degrees while maintaining constant pressure on the inspection probe.

TSC Subsea engineers devised a design comprising a pipe crawler that could adapt to varying pipe diameters and negotiate bends regardless of orientation. The custom-built robotic scanner accommodated the ACFM or SPA probes and was capable of 360-degree rotation. Ancillary equipment comprised of technology bottles housing the ACFM or SPA circuitry and a custom umbilical management system.

To validate the system's navigation capabilities under real-world conditions, a replica of the riser was created at TSC Subsea UK. bp also provided a duplex test sample with various hidden defects and notches with various depths to assess NDT inspection technologies and technician proficiency.

The FAT commenced with testing the detection capabilities of the technologies within the sample, starting with ACFM followed by SPA. Both technologies successfully detected and sized all defects within bp's engineering tolerances.

Next, the mock-up riser's navigation was tested. The first run was performed with a dry pipe, providing a clear view of the system's performance in navigating sections, bends, and executing 360-degree rotations. For the second run, the pipe was flooded to simulate on-site conditions. Despite reduced visibility, high-quality cameras allowed precise navigation.

Following a thorough FAT, all parties were satisfied with the results and ready to proceed with the site inspection campaign.

The Result

TSC Subsea deployed a team of four experts consisting of robotic engineers and NDT specialists to the offshore platform to initiate the inspection. ACFM was the initial technology used, inspecting all 13 welds internally at the root area, covering the top toe, root, and bottom toe. No defects were detected above the inspection reporting threshold.

The SPA inspection employed both a water wedge and a perspex wedge to determine which testing method would yield the best ultrasonic responses. Ultimately, the water wedge data outperformed the perspex wedge,



Life-size mock-up of the riser for a FAT.



Navigation testing of the pipe crawler.



Internal PAUT and ACFM inspection of the riser.

as the latter lacked geometric reflectors. Consequently, the data from the water wedge was chosen and subjected to analysis for the SPA inspection, resulting



TRITON exiting the offshore riser.



Access point to the 110m offshore riser.

in the detection of no defects beyond the inspection reporting threshold.

The inspection was a success, allowing bp to proceed with their development project and re-commission the riser. TSC Subsea's tethered solution and expertise was fundamental to enabling bp's to put the riser back into service and deliver their the development project, as planned.

“I would like to express our profound appreciation for the collaboration with bp on this uniquely challenging project. With our tethered internal pipe inspection solution, bp recommissioned the riser and proceeded with its development project. This project was a testament to our commitment to embracing challenges and pushing the boundaries of what is achievable in subsea inspections. We look forward to future collaborations and further opportunities to demonstrate our expertise and innovation,” said Frank Luikinga (Senior Project Manager, TSC Subsea).

About TSC Subsea

TSC Subsea specialises in exclusive-technology-enabled, remotely deployed subsea inspections to assess the structural integrity of offshore assets. They help clients minimise costs and risks to the environment and personnel with their exclusive NDT solutions for complex geometries and hazardous situations.

The robust design of TSC Subsea's tooling allows for inspection on various subsea assets with minimal on-site tool modifications, eliminating the need for multiple equipment pieces on site. Their advanced engineering solutions, custom designs, and mock-up testing services address inspection needs related to subsea flexible risers, pipelines, FPSOs and offshore platforms.

For more information, visit: tscsubsea.com

Utilising Acoustic Emission for Ensuring Ammonia Tank Safety

This paper examines the application of acoustic emission testing (AET) technology in ensuring the safety of ammonia storage tanks.

DR GARY MARTIN MIEAUST
 CPENG CMATP
 ATTAR

Ammonia, a vital component in various industrial processes, demands rigorous safety measures due to its hazardous nature. Traditional inspection methods possess limitations in effectively detecting early signs of degradation in tank integrity.

Acoustic emission emerges as a promising solution, offering real-time monitoring capabilities for detecting structural anomalies. This paper elucidates the principles of AE technology, its implementation in ammonia tank safety, and the benefits it offers in enhancing operational safety and reliability.

Introduction

Ammonia plays a pivotal role in numerous industrial sectors, including agriculture where it is used in the production of fertiliser, refrigeration for storage of produce, and chemical manufacturing. However, its widespread application comes with inherent risks, particularly associated with storage and handling.

Ensuring the integrity of ammonia storage tanks is imperative to prevent catastrophic incidents that could

result in environmental damage and jeopardise human safety. Ammonia tank failures have been a regular occurrence over the past few decades. With failures occurring in pressure vessels and atmospheric tanks. Many of these have been reviewed by Pattabathula [1].

Conventional inspection methods, while essential, may fall short in detecting subtle structural degradation that could lead to leaks or ruptures. Examining all of these very large vessels by conventional NDT techniques requires access to the wall. While this may be possible during the construction phase it is generally not possible on in-service tanks without emptying the tank and removing the insulation.

ATTAR has monitored three in-service atmospheric ammonia tanks in recent times, either while filling and as part of a Risk Based Inspection (RBI) program, or continuously over a longer period of time. Both methods allowed for early warning signs of potential failures.

Ammonia Vessel Failures

Ammonia vessel failures have been a regular occurrence [1]. Some failures that have occurred over the last five decades are listed in Table 1. A more comprehensive study is available in Pattabathula's paper [1].

Year	Operator	Capacity	Vessel	City	Country	Deaths	Injured
1973		50 tonne	Bullet	Potchefstroom	South Africa	18	65
1989	Azotas	10,000 tonne	30m Dia 20m high Tank	Jonova	Lithuania	7	57
1992	Sonacos SA		Bullet	Dakar	Senegal	129	1150
1999	Coromandel Fertiliser	5000tonne	Tank	Chennai	India		
2005	Yara		Tank	Rostock	Germany	1	1
2016	CUFL DAP 1	500 tonne	Tank	Chittagong	Bangladesh		52
2019	NCIC		Sphere	Cairo	Egypt	10	5
2023	Three Rivers FS		Bullet	Manchester	USA		6

Table 1. Summary of ammonia storage vessels and associated deaths and injuries.



Figure 1. DAP 1 500 tonne tank after failure [2].

Atmospheric Ammonia Tank Construction

There are two common types of atmospheric tanks used to store liquid ammonia at -33°C [3]. They are:

1. Single wall tanks, which are tanks with one steel bottom and wall designed to contain the full liquid level of ammonia.
2. Double wall tanks, which are tanks with double steel bottom and wall, each designed to contain the full liquid level of ammonia.

The type of material used in their construction is low temperature certified carbon manganese, silicon, steel, impact tested at or near -40°C , e.g. ASTM A537 Class I [4] or alternatively ASTM A516 Grade 70 [5]. Suitable steels are listed in API 620, Appendix R [6]

Typical dimensions are:

- Inner tank 49m diameter, 29m high
- Outer tank 51m diameter, 30m high

The annulus is typically filled with pearlite for insulation. From the outside they look as shown in Figure 2 [7].



Figure 2. Typical double walled atmospheric ammonia storage tank [7].

Causes of Ammonia Tank Failures

There are a number of factors that can contribute to ammonia tank failures.

Fabrication issues, such as welding defects. Although inspected using a variety of NDT methods, each with its own limitations, any missed defects may lead to leaks, Stress Corrosion Cracking (SCC), or in-service fatigue cracking.

In-service issues, such as human error exhibited by using incorrect filling techniques leading to over-pressurisation, faulty equipment or impact damage also have the potential to cause failure, as does SCC and fatigue crack growth.

Of these, the fabrication issues and SCC are the most problematic [7]. The initial fill or hydrostatic test is when the effect of fabrication defects may be felt. SCC can occur in-service, but the probability is low. It is more likely to be problematic on recommissioning of a tank [7].

Tank Inspection

The standard quality control or inspection method for tank welds less than 60mm thick was radiography. On high integrity installations such as large ammonia tanks, all welds must be fully X-rayed. However, radiography (RT) is a slow process during which dangerous radiation is produced. There are no other personnel permitted in the exclusion zone, and some defects in some orientations (such as sidewall defects) may not be found.

Alternative ultrasonic (UT) techniques such as time of flight diffraction scanning have been used with success on large tanks [8].

Magnetic particle (MT) has been used in conjunction with RT and UT for surface breaking defects such as weld toe cracks or HAZ cracks.

AET has been recommended for hydrostatic proof testing and first fill by Ammonia Know How [9], a UK based industry group. This requires installation of wave guides attached to the inner tank and possibly passing through the outer wall during construction. AE sensors are mounted on the waveguides prior to the initial fill. This also means they are available for subsequent in-service assessments of structural integrity.

In-service inspection intervals vary significantly around the world. However, in more recent years, RBI has been promoted in (for example), Guidance for Inspection of Atmospheric, Refrigerated Ammonia Storage Tanks from Fertilizers Europe [7]. API 653[10] provides guidance. RBI allows operators to assess a wide range of local conditions and set inspection intervals based on them.

However, these may be over-ridden by local legislation or standard requirements.

Intermittent or continuous AE monitoring may be used as part of a RBI program.

Principles of Acoustic Emission

Acoustic emission is a non-destructive testing technique that detects transient stress waves generated by discontinuities within materials. These waves propagate through the material and can be detected by sensors placed on the surface.

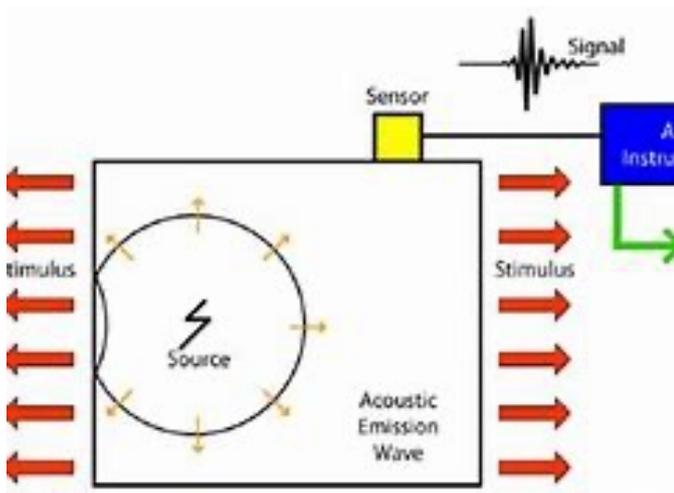


Figure 3. Schematic version of generation, transmission and detection of AE.

A discontinuity is a distinct break in physical continuity of a material, such as a non-metallic inclusion or crack. These act as a stress concentrators or stress raisers and if large enough, can cause premature failure of a structure. The smallest discontinuity is a dislocation but when enough dislocations move under the applied stress, they emit a stress wave in the material, i.e. an acoustic emission.

In steel, dislocations move in large quantities during elastic and plastic deformation. The high stresses at a discontinuity such as a crack tip result in an elastic-plastic zone ahead of the crack, and large scale dislocation movements, producing acoustic emission.

Test Procedure

Test procedures are based on ASTM E 1930 Standard Practice for Examination of Liquid-Filled Atmospheric and Low-Pressure Metal Storage Tanks Using Acoustic Emission [11].

For new tanks, AE monitoring is carried out during hydrostatic proof testing, as specified by governing codes, Standards, or other regulations relevant to the particular tank. This requires that the tank is filled to the maximum design level and a superimposed hydrostatic and/or pneumatic pressure is applied above the liquid

level as required by governing Code, test methods or other regulations.

For a new tank that does not require hydrostatic testing, AE monitoring is carried out as it is filled to the maximum design level and a superimposed hydrostatic or pneumatic pressure, or both, is applied to achieve maximum design pressure. If design pressure is not available, the maximum operating pressure is applied.

In-service tanks with operating and superimposed pressure <15 millibars [0.22 psig] are required to be filled to their maximum operating level plus 5%.

Acoustic emission monitoring is conducted over the range of 75% to 100% of AE test pressure

The fill procedure for an in-service tank is shown in Figure 4 from ASTM 1930[7]. The tank is filled at a rate so as to minimise background noise from the fill process to permit continuous monitoring. However, if background noise from the fill process cannot be eliminated the load holds become most important.

The AE sensors, typically piezoelectric transducers with a resonant frequency of 150kHz are used to convert mechanical energy from any generated stress waves into electrical signals. They are mounted on wave guides that may be welded on to the inner tank surface or held in place by spring loaded mechanisms. Advanced signal processing techniques are employed to analyse recorded acoustic emissions, Figure 5, distinguishing between background noise and significant emission events. As sensors are placed all around the tank, generally at 6 metre intervals as shown in Figure 6, triangulation algorithms may be used to locate the origin of AE events on the tank's surface.

During the test AE may be detected from dislocation motion during plastic deformation of material, active cracks, crack surface rubbing, active corrosion and spalling of corrosion products, and leak noise. Background noise may also be detected from wind or rain, structure internals or processes, filling or ice [12].

Typical test data from an ammonia tank is shown in Figure 5. The test sensor set up and located AE is shown in Figure 6.

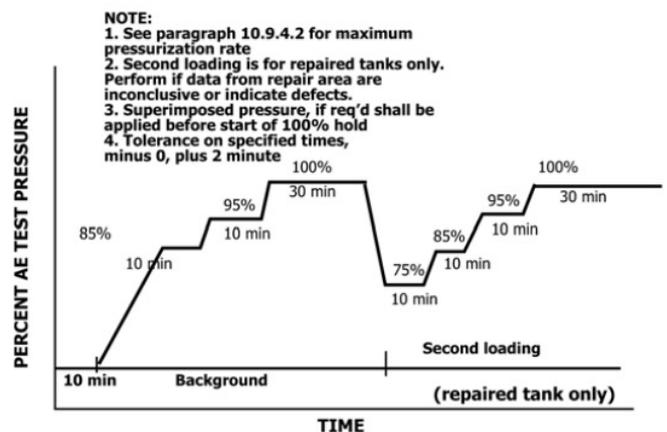


Figure 4. Fill procedure for in-service storage tank [11].

Rejection criteria are based on ZIP (Zone Intensity Profiling) so that signal strength or activity shall not increase with load. To achieve this the signal amplitude and number of events per channel are monitored, with an Evaluation Threshold of 50dB (see Figure 7 for an example).

Data analysis usually involves filtering to remove periods of high activity due to weather events, low energy activity (consistent with background noise), application of a mechanical noise filter for removal of low amplitude activity and rubbing noise.

Activity intensity analysis provides a measure of the structural signification of the activity and rates it from N (Negligible), then A through to E, where A is least intense, and E is highly intense. The intensity is reflected as channel activity, rather than intensity of each located event, which essentially provides classifications for the zone around each channel. The classification also reflects activity with increasing intensity, where hits recorded later in the test are compared against those earlier, and if the intensity of those later hits is higher, the classification moves upwards.

Any AE indications located must be precisely located and measured using other NDT techniques for evaluation.

Reasons for Using AE

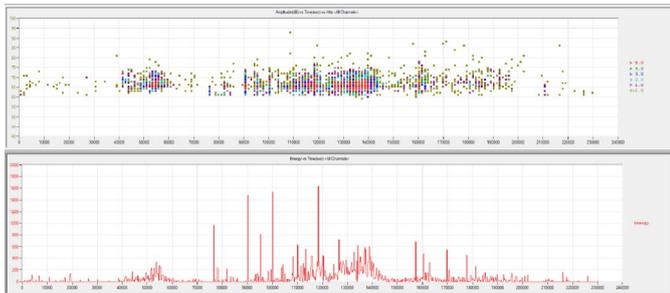


Figure 5. Typical test record from tank monitoring.

In the context of ammonia storage tanks, AE technology offers several advantages over traditional inspection methods:

- 1. Early Detection of Structural Anomalies:** AE can detect microscopic cracks, corrosion, and other defects at their nascent stages, allowing for timely intervention before they escalate into major issues.

- 2. Real-time Monitoring:** Tanks with permanently installed sensors may be subject to continuous AE monitoring that provides a comprehensive understanding of the tank's structural health, enabling proactive maintenance and minimising downtime.
- 3. Remote Sensing:** AE systems can be configured for remote monitoring, facilitating monitoring of tanks located in remote or hazardous environments without direct human intervention.
- 4. Cost Efficiency:** By reducing the frequency of manual inspections and preventing unexpected downtime, AE technology offers long-term cost savings.

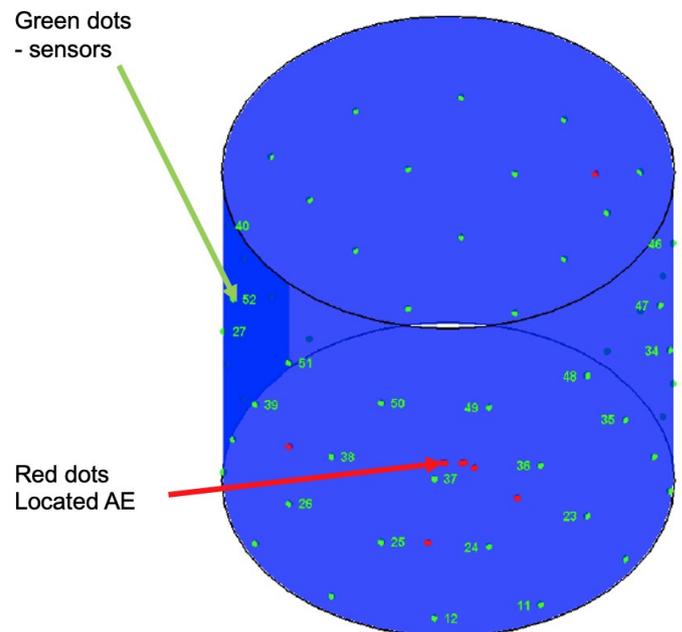


Figure 6. Showing sensor location and AE location on 3D tank layout.

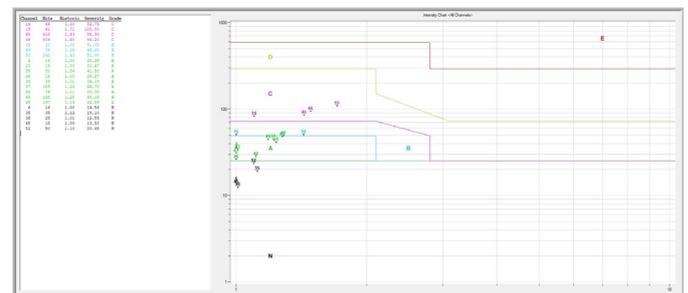


Figure 7. Channel plotting of intensity and severity into classifications.

Conclusion

Acoustic emission technology presents a paradigm shift in ensuring the safety and reliability of ammonia storage tanks. By providing early warning signs of structural degradation, AE enables proactive maintenance, minimising the risk of catastrophic failures.

The successful implementation of AE at facilities around Australia underscores its potential to revolutionise industrial safety practices. Continued research and development efforts are necessary to address remaining challenges and maximise the benefits of AE technology in safeguarding critical infrastructure.

References

- [1] Pattabathula, V., presented at 2009 FAI Seminar, Safety in the Global Ammonia Industry, Hyderabad during 3–5 December, 2009 N₂H₄ Plant Failures | PDF | Ammonia | Explosion (scribd.com)
- [2] Safeteng, Catastrophic Failure of 500 ton Atmospheric Refrigerated Anhydrous Ammonia Tank (2016), www.safteng.net
- [3] EFMA, Recommendations for the Safe and Reliable Inspection of Atmospheric, Refrigerated Ammonia Storage Tanks. European Fertilizer Manufacturers' Association, Brussels, Belgium, 2002.
- [4] ASTM A537/A537M–20 Standard Specification for Pressure Vessel Plates, Heat-Treated, Carbon-Manganese-Silicon Steel. ASTM, Conshohocken, PA, USA, 2020
- [5] ASTM A516/A516M–10(2015) Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower-Temperature Service. ASTM, Conshohocken, PA, USA, 2015
- [6] API Standard 620: Design and Construction of Large Welded Low Pressure Storage Tanks, American Petroleum Institute, Washington, DC, USA, 2014.
- [7] Guidance for Inspection of Atmospheric, Refrigerated Ammonia Storage Tanks, Fertilizers Europe, Brussels, Belgium, 2014
- [8] McGowan, P.A., Advanced safety features of an ammonia tank. *Int J Press Vess Piping*, 77, 13, Nov 2000, 783–789
- [9] Pattabathula V et al., Ammonia Storage Tanks, www.Ammoniaknowhow.com
- [10] API Standard 653 Tank Inspection, Repair, Alteration, and Reconstruction, American Petroleum Institute, Washington, DC, USA, 2014.
- [11] ASTM E1930–97 Standard Test Method for Examination of Liquid Filled Atmospheric and Low Pressure Metal Storage Tanks Using Acoustic Emission, ASTM, Conshohocken, PA, USA, 2021
- [12] Peacock, M.J., Improving the Noise Discrimination for an Ammonia Tank AE Test, 30th European Conference on Acoustic Emission Testing and 7th International Conference on Acoustic Emission, Uni Granada, 12–15 September 2012.

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Encourages participation within the Branch and the Federal Council to further industry.



NDT World Event Calendar

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

27 to 31 May 2024 | Incheon Korea

Hosted by the Korean Society for Non-destructive Testing under the auspice of ICNDT, the 20th World Conference on Non-Destructive Testing Conference is being held in Incheon, South Korea, from 27 to 31 May 2024.

The Conference is set to offer a dynamic, highly informative technical program, as well as opportunities for the exchange of ideas and innovation from all around the world. Plus, the program features a range of social events and short courses on topics like Structural Health Monitoring Using Statistical Pattern Recognition; and Welcome to the World of Digital Transformation, NDE 4.0 and Artificial Intelligence.

With over 200 companies on display, the Exhibition will be one of the largest gatherings of NDT companies and professionals seen in recent times.

Built upon the advanced infrastructure of Incheon International Airport, the venue Songdo Convensia is a centre of trade and transportation. Within an hour's distance from Seoul by public transportation, delegates will have the opportunity to experience a mixture of diverse cultures and world-class urban life.

For further information, visit: 20thwcndt.com



11th European Workshop on Structural Health Monitoring (EWSHM)

10 to 13 June 2024 | Potsdam, Germany

The European Workshop on Structural Health Monitoring (EWSHM) is a leading conference that provides a platform for professionals to exchange knowledge and advancements in the field of Structural Health Monitoring (SHM) and related disciplines. The workshop aims to showcase the latest achievements in SHM, demonstrate cutting-edge SHM technologies, and foster the development and implementation of future SHM initiatives.

EWSHM 2024 will gather experts from various fields, including fundamental research, numerical simulation, structural monitoring in industries, engineering ideas and technologies, prognostics, and structures' life cycle health management.

In addition to the technical sessions, EWSHM 2024 will feature a dedicated space for demonstrations, showcasing real-world applications of SHM technologies. This interactive component aims to provide attendees with hands-on experiences and a better understanding of the challenges and potential solutions in implementing SHM.

EWSHM has a rich history, established in 2000 and running biennially in different cities across Europe. While traditionally referred to as a workshop, the event has evolved into a conference-like format.

For further information, visit: ewshm2024.com



NDT in Canada Conference 2024

11 to 13 June | Ottawa, Canada

The Canadian Institute for Non-destructive Evaluation (CINDE) will host the NDT in Canada 2024 Conference at the Brookstreet Hotel in Ottawa, Ontario from 11 to 13 June. The theme for this conference is Making Every Connection Count. The conference brings a number of opportunities to discuss: Where is NDT going? How do we get there? What tools and techniques will pave the way for the future of inspection? The conference also features plenty of social events and networking opportunities, including a pre-conference mix n mingle, a golf day, and banquet and awards dinner. Expect to find the answers to these (and other) questions at NDT in Canada 2024.

For further information, visit: www.cinde.ca/conference

7th Malaysia International NDT Conference and Exhibition (MINDTCE)

20 to 21 August 2024 | Petaling Jaya, Malaysia

The 7th Malaysia International NDT Conference and Exhibition is a journey to next-generation NDT Solutions. It will be held from 20 to 21 August, at the Grand Lagoon Ballroom, Sunway Resort Hotel. Explore the latest advancements from leading providers, distributors, and researchers. Learn from world-renowned speakers who present impactful discoveries and applications. Connect with peers, forge collaborations, and discover new opportunities. Share your ideas, challenge the status quo, and contribute to shaping the future of this dynamic field. Contribute to the future of NDT by sharing ideas and contributing to the testing and inspection revolution.

For further information, visit: mindtce.com.my

36th EWGAE 2024

18 to 20 September 2024 | Potsdam, Germany

The EWGAE conference is a prestigious international forum for researchers, engineers, and practitioners who are interested in the field of acoustic emission. The conference aims to provide an opportunity for participants to exchange ideas and share the latest advances in the field of acoustic emission, including theoretical and experimental investigations, instrumentation, data analysis, and applications. The conference will feature keynote lectures from renowned experts in the field, as well as technical sessions, poster presentations, and panel discussions. Plus, it includes social events that will provide opportunities for networking and building new collaborations.

For further information, visit: ewgae2024.com

The 3rd World Congress on Condition Monitoring

15 to 18 October 2024 | Beijing, China

The primary objective of the World Congress on Condition Monitoring (WCCM) is to exchange worldwide research and application achievements on condition monitoring and related areas, with particular emphasis on scientific and technical development, industrial applications and cooperation worldwide. The Congress is aimed at providing a worldwide platform to scientists and practitioners in both academia and industry. Sessions will focus on: signal detection and processing; CM and NDT instrumentation and methods; diagnosis, assessment and prediction; CM of core components, systems and facilities; and advanced CM technology.

For further information, visit: www.intiscm.org

ASNT 2024

21 to 24 October 2024 | Las Vegas, USA

ASNT's annual conference invites professionals from across the industry to actively participate, connect and collaborate. The theme of Engage reflects ASNT's commitment to fostering meaningful interactions, sharing knowledge, and pushing the boundaries of non-destructive testing. In the vibrant setting of Las Vegas, attendees can expect over 100 technical sessions, 100 exhibitors and 2,220 delegates. From innovative technologies to insightful discussions, ASNT 2024 promises an experience where individuals can come together, exchange ideas, and contribute to the advancement of non-destructive testing practices.

For further information, visit: asnt.eventsair.com/asnt-2024

NDE 2024

12 to 14 December | Chennai, India

The 34th Annual Conference and Exhibition on Non Destructive Evaluation will be hosted by the Indian Society for Non-destructive Testing (ISNT) in Chennai in December. With over 50 keynote talks, 40 technical sessions and over 120 exhibitors, it is shaping up to be an engaging event. It is set to attract over 2,000 delegates. Chennai is one of India's largest and most vibrant cities, known for its rich cultural heritage, historical landmarks, and thriving economy. The city is a major economic hub in India, with a diverse economy that includes industries such as automobile manufacturing, information technology, healthcare, and the film industry, contributing significantly to India growth.

For further information, visit: isnt.in



ARI

ARI delivers professional services in pressure equipment inspection, weld inspection, and non-destructive testing. Their

team of experienced professionals are committed to providing high-quality, reliable inspection services to ensure the safety and compliance of client assets. ARI uses state-of-the-art equipment and adhere to industry standards and regulations to deliver accurate, actionable results. View their Capability Brochure.

ARI's goal is to help clients reduce downtime and improve the reliability of their assets while maintaining the highest safety standards.

ARI has a proven track record of supporting planned shutdown services, new construction projects, and delivering routine in-service inspections of the highest quality. When your operations cannot stop, their team will execute 24 hours a day, 7 days a week to meet your inspection needs.

With offices in Bunbury, Perth, and Adelaide, ARI is available to partner with asset owners and operators to ensure safety and efficiency.

For further information:
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 Phone: 08 9725 7550
 Website: ari.com.au



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Chemetall wants to contribute to a world that

provides a viable future with enhanced quality of life for everyone. They do so by creating chemistry for their customers and society and by making the best use of available resources. Sustainability is at the core of what they do, a driver for growth, as well as an element of their risk management.

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Chemetall offers a comprehensive portfolio of Ardrex products for magnetic and penetrant non-destructive testing (NDT) on materials used in oil and gas, energy, aerospace and general industries.

Their full portfolio of penetrants, cleaners, and developers are for use on metallic and non-metallic surfaces requiring visible and/or UV inspections. Our products conform to the challenging requirements of numerous international manufacturing quality standards.

Chemetall's manufacturing facility in Melbourne is certified to ISO 9001 and ISO 14001 and is supported by distribution networks throughout Australia including JG Thomas in Perth.

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For further information:
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Simplifi NII is a leading provider of Rohmann GmbH eddy current equipment and calibration services, catering to industries such as

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What sets Simplifi NII apart is not just their top-notch equipment but also their comprehensive calibration

services. Their experienced technicians and state-of-the-art tools ensure that your Eddy Current equipment operates at peak performance, delivering reliable and consistent results.

For businesses looking to enhance their NDT capabilities, Simplifi NII is a trusted partner offering advanced technology and expertise. Contact Simplifi NII today to explore their range of eddy current equipment and calibration solutions, and take your NDT operations to the next level.

For further information:
 Website: simplifi-nii.com.au/elotest-m6



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- NDT, inspection, metallurgy, mechanical and chemical testing data capture modules
- Single click, automatic report generation, secured signing and emailing
- Document share point management

- Certification and induction management which flags approval to prevent NCR
- Assets program which blocks non-calibrated assets in the test data capture program
- CRM (Business Relationship Management) and quotation module
- Timesheet and payroll module
- Accounting book-keeping PO, invoices, bills pay, P&L and productivity reports
- Debt collection module to get paid promptly
- Data security to prevent parted staff accessing your company data

The all-in-one OMS is available at ZERO upfront cost (implementation, customisation, training) with subscription fees for the cost of approximately one per day. No lock-in contract, zero exit fees but continuous ongoing support, additional features development by 33 developers and subject matter experts, at ZERO extra cost to users.

For further information:

Email: systems@omssoftware.com.au

Phone: 0432 686 768

Website: omssoftware.com.au

SafeRad

SafeRad™

SafeRad™ South East Asia has been operating in Australia since 2009, delivering a full range of

non-destructive testing (NDT) services. Their head office is based in Kwinana, Western Australia.

SafeRad™ is a NATA accredited company and offers a full range of NATA accredited NDT services, including:

- 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™ is 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.

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- Increased safety
- No need for staff to be evacuated during operations
- No impact on work schedules or productivity
- Assists in expediting work programs
- Massive cost savings to client

This means no disruption to any work programs by compromising safety, quality or production.

For further information contact Scott Buttery (Operations Director):

Email: sbuttery@saferad.com.au

Phone: (08) 9439 6499

Website: saferad.com.au



Integrated Condition Monitoring Training Solutions

ICM Training

Solutions delivers world class ISO 18436 accredited training and certification in condition monitoring and predictive maintenance, in practical everyday language.

ICM's training and certification programs are internationally recognised and meet the highest standards as recognised through the ISO 18436, European PCN and Australian Training and Qualification schemes.

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- TCAT Infrared Thermography
- VCAT Vibration Analysis
- UCAT Ultrasound

Best Practice Awareness Training:

- Condition Monitoring Technologies
- Hydrocarbon Management and Analysis
- Fixed Plant and Heavy Mobile Equipment
- Predictive/Proactive Maintenance

ICM trainers have vast industry experience as subject matter experts across industry sectors including mining, oil and gas, utilities and defence.

In addition to ISO 18436 accredited training, ICM offers a broad range of best practice awareness courses that have direct economic and HSE relevance. ICM courses reveal the how and why to greatly improve on reliability, operational integrity, safety, cost and risk through making informed decisions and proactively addressing the root causes of failure mechanisms in both fixed plant and heavy mobile equipment.

Accessing a broad range of knowledge and industry training and consulting experience, ICM offers a rare degree of insight and flexibility around your condition monitoring training requirements and operational needs.

For further information:

Email: training@icmt.com.au

Phone: 0419 993 233

Website: icmt.com.au



Smartchem Industries

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requirements, with over 100 years' combined experience in the manufacture and distribution of magnetic particle and dye penetrant consumables.

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The Smartcheck MPI range is batch tested to ISO-9934.2. Its Certificates of Conformance (CoC) are compliant to the new ISO Standard, including the requirement to detail batch test results. CoC are emailed with dispatch advice where requested. All CoC and SDS are available on their website; a useful reference tool for an audit or where a copy is required in the field.

The Smartcheck dye penetrant range has been third party type tested to ISO 3452.2 by MPA Hanover in Germany, including Smartcheck Dye Pen Fluoro—a level 3 water washable/solvent removable fluorescent dye penetrant.

SmartChem supplies direct and has a comprehensive network of resellers. Heatleys Safety and Industrial heatleys.com.au are their exclusive distributor in Western Australia, while Accurate Instruments www.accurate.kiwi cover both the North and South islands in New Zealand. For distributors on the east coast of Australia, contact Smartchem direct.

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For further information:

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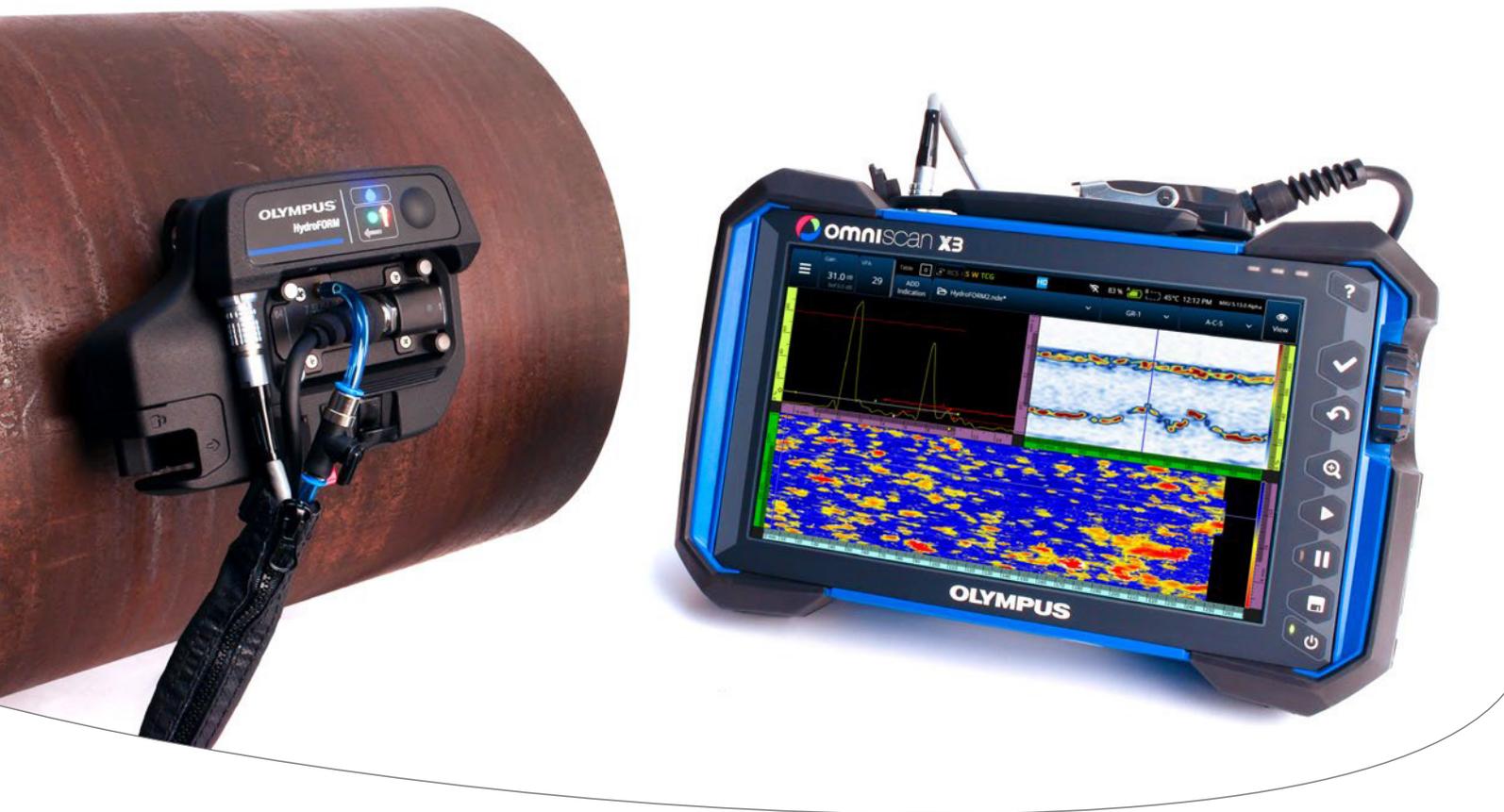


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