AUSTRALASIAN INSTITUTE OF MARINE SURVEYORS

Shipshape

March 2026

WORLD'S LARGEST BATTERY-ELECTRIC SHIP POWERS UP IN TASMANIA

AUSTRALASIAN INSTITUTE
OF MARINE SURVEYORS

Shipshape

Front Cover: Incat Tasmania has activated the largest battery-electric propulsion system ever installed on a ship – with 250 tonnes of batteries in a 130-metre vessel capable of carrying 2,100 passengers and more than 220 vehicles. Turn to page 12 for details. **Back Cover:** A large mixed fleet of commercial, recreational and historical vessels in Sydney's Rozelle Bay (foreground), where marine businesses face an uncertain future due to a NSW Government zoning decision. (See article on page 60.)

A.I. has arrived. (Page 5.)

Battery-powered ship. (Page 12.)

Refloating Island Trader. *(Page 15.)*

Extinguishing agents. (Page 56.)

Sydney uncertainty. (Page 60.)

Don't panic! (Page 62.)

DRIVING INDUSTRY CHANGE:
Collaboration within and across borders

40
Years of Operation

2026 AIMS Conference

Fremantle Sailing Club,
Thursday 7 & Friday 8 May 2026

Artificial intelligence – science fiction turning into reality

SCIENCE fiction has always intrigued and amazed the world with its vision of a utopian future, free of war, disease and suffering, as well as the darker side of machines enslaving humanity.

From Jules Verne to Fritz Lang, from *20,000 Leagues Under the Sea* to *Star Trek* and *The Jetsons*, science fiction has part-excited and part-terrified us, and made us wonder what the future has in store. Artificial Intelligence, or AI, is one area of science fiction that is now becoming a distinct reality.

AI and its possibilities are fast being enmeshed into our everyday lives at an exponential rate.

What AI can do for us as a society and as individuals seems to be only limited by our imagination. If science fiction is any indicator of what the future will bring, AI has the potential to fundamentally change the way we live and work, depending on who chooses its direction and application.

For those of us in the marine surveying work, we would look at AI and ask the most basic of questions: "Well, how does it help me?" If we take AI's most basic of functions, that of accessing knowledge, it can greatly assist a marine surveyor to navigate the plethora of legislation and regulations that we are required to interpret and ensure compliance with.

Marine surveyors work across a range of sub-disciplines: cargo-handling; damage assessment and investigation; statutory surveys ... the list goes on. Being able to consistently stay abreast of the regulations covering each area, including changes to these regulations, and the cost of such vigilance (both in terms of cost of resources and time), can put an enormous pressure on business owners, particularly single and small operators.

Having access to a secure and trusted platform can greatly increase the productivity of operating in the marine surveying space but also improve the outcome for our clients by reducing the cost of any mistakes made during the course of our endeavours.

AI offers enormous potential to improve the quality of the service that surveyors provide to their client. As with all advances in technology, there will be challenges that will alter how work is undertaken and which will have a positive or negative impact on each individual business.

How we as surveyors and, importantly, business operators engage with this change will determine

whether AI is a success and improves our profitability or a major threat to how we operate as professionals.

The Australian Maritime Safety Authority (AMSA) has been undertaking a review of its Domestic Commercial Vessel (DCV) Surveyor Accreditation Scheme over the past eight months with the Industry Reference Group (IRG). The DCV Surveyor scheme has been in place since 2015, when AMSA assumed the role of National Regulator for all DCVs in Australia.

The IRG consisted of AMSA representatives and DCV surveyors. The review is a whole-of-scheme review covering survey categories, accreditation tiers, accreditation categories, surveyor qualifications and expertise, issuance of certificates of survey, training of new surveyors, WHS requirements, plan approvals oversight, professional organisations, and CPD and professional indemnity and quality assurance.

This broad-ranging review will see a significant upgrade of the current SAGM Part 1 document as well as part of SAGM Part 2.

Members who operate in the DCV space are encouraged to engage in the review process when a consultation paper is released, later in the year, putting forward a raft of changes for consideration.

Eric McIlwain
Chair of the AIMS Board

Looking forward to a busy 2026

THE next 12 months will be busy, with a key focus on delivering our biennial conference.

1. AIMS Strategic Plan

The Board met in early January to review work against the key pillars of the AIMS Strategic Plan 2026-2031. It is well worth sharing the Forward to the plan.

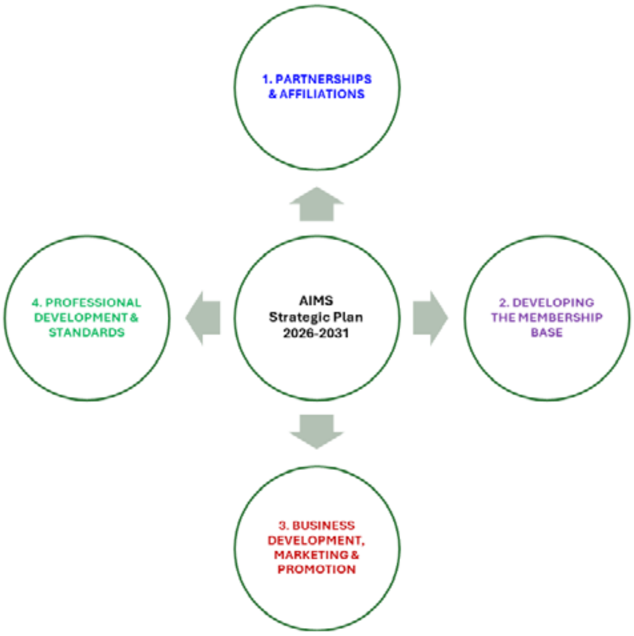
This Strategic Plan coincides with a significant milestone for the Institute. It is a plan that has been developed to shape how our Institute grows and evolves over the next five years, focussed on meeting and delivering on its strategic aims whilst delivering operational stability to our members. Whilst the plan provides the Board with a detailed framework, we as a governance group are also conscious that we need to remain both strategically and operationally flexible, able to identify and meet new opportunities and challenges, and be agile in how we approach them.

The development and publishing of this Strategic Plan is testament to the significant evolution and enhancements to the Institute's capabilities in both the operational management and governance arenas. Whilst many would assume that many of these capability enhancements are due to the deep technical expertise that exists within the Board, Management Team and wider surveyor community (all of which is true), we fully believe our members' passion for the industry is a crucial success factor.

This passion manifests itself in many ways, such as the time invested to support the management team and the time commitment invested by what is a volunteer Board. Australasian Institute of Marine Surveyors (AIMS) is very simply an organisation which is run by the members for the members to promote, enhance and support our place within the maritime domain.

The Board represents you and your industry, and therefore this is your Strategic Plan. Each and every member of the Institute is therefore a stakeholder, and engagement with both the Management Team and Board is essential if the Institute is to continue delivering positive outcomes and success for its members. We look forward to your feedback and support as we implement this plan over the coming years.

You can access the full plan here: https://aimsurveyors.com.au/wp-content/uploads/2026/02/AIMS-Strategic-Plan_2026-to-2031_v2.pdf



2. Conference Update

Our final conference program and supporting information can be found here: https://aimsurveyors.com.au/conference2026/

Conference Program: https://aimsurveyors.com.au/wp-content/uploads/2026/03/Conference-Program.pdf

Speakers List: https://aimsurveyors.com.au/wp-content/uploads/2026/03/Speakers-List-5.pdf

Partners Program: https://aimsurveyors.com.au/wp-content/uploads/2026/03/AIMS_Fremantle_Perth_Partners_Guide_Final.pdf

Accommodation Options: https://aimsurveyors.com.au/wp-content/uploads/2025/12/Conference-Accommodation-Options_Update.pdf

Sponsorship: https://aimsurveyors.com.au/wp-content/uploads/2025/12/1_AIMS-Conference-Sponsor.pdf

3. Building industry presence through social media and strategic alliances

AIMS was established in 1986 and is the largest industry body for marine surveyors in the Southern Hemisphere. The organisation represents professional marine surveyors across all sectors of the industry and strives to ensure that consumers and stakeholders are properly informed on marine survey standards and ethics: essentially, building an industry presence requires multiple considerations.

3.1. Industry context

Marine surveyors typically work across three sub-sectors: (1) Shipping marine surveying; (2) Domestic commercial vessel (DCV) marine surveying; and (3) Recreational marine surveying.

Shipping surveyors inspect and survey, acting as an expert witness or examining ocean-going vessels to oversee cargo loading and unloading operations. They also assess damage or inspect and record the condition of the vessel or onboard cargo, machinery or equipment.

DCV marine surveyors are accredited by the Australian Maritime Safety Authority (AMSA) and Maritime New Zealand, for example, to undertake statutory surveys on DCV in accordance with national law and regulations.

Recreational marine surveyors undertake surveys of recreational vessels on behalf of an owner, insurer, insurance surveys or potential purchaser with the purpose of assessing their condition and / or value.

The breadth and depth of work undertaken by marine surveyors includes:

Ocean Going Vessels

- Cargo
- Loading and discharge
- Draught and trimming
- Classification
- Insurers and P&I Clubs
- Condition and on / off hire

Specialist Survey

- Compass adjusting
- DPS surveys
- Off-shore rigs and support vessels
- Electrical
- Maritime lawyers
- Dive surveyors

Government

- Class societies
- ISPS
- Port / State control
- Flag State
- Grain

Domestic Commercial Vessels

- Tugs, barges and cargo vessels up to 35 metres
- Fishing vessels
- Passenger vessels

Recreation Vessels

- Pre-purchase and damage surveys
- Recreational vessel general surveys

High levels of competition across these sectors in Australia remain a concern for marine surveyors, reflecting the level of activity involving the sale and purchasing of leisure vessels, commercial vessel surveys as required by AMSA, and shipping activity across Australasia requiring the knowledge and skills of shipping surveyors.

3.2. Social media

A key consideration in selecting an appropriate social media platform is this: does the audience you wish to influence, promote to or represent interact with social media platforms? A secondary, but no less important, consideration is: how do you intend to integrate posts across social media platform? You will also need to consider how you integrate social media platforms and your organisation's website. Finally – and, again, no less importantly – what resources will you need to allocate to manage your social media channels?

AIMS has been developing its LinkedIn, Facebook, and YouTube presence to achieve multiple purposes, including:

- promoting the marine surveying profession;
- promoting continuing professional development workshop / webinars of the organisation;
- promoting professional development courses;
- sharing key organisational events; and
- the promotion of alliances.

In addition to our social media infrastructure, posts (when relevant) are linked to the AIMS website to drive marine surveyors and the public to our content. Our activity on social media posts is geared to promote the profession, provide information to marine surveyors who engage with these platforms and advertise the benefits of marine surveyors being part of a professional association. We have found that sharing our industry newsletter, *Shipshape*, has helped promote the vast range of work undertaken by marine surveyors on a local, regional and international level.

3.3. Alliances

It has become increasingly important for AIMS to build alliances with organisations in the maritime industry. We are not the first to do so but we have taken our time to consider the interests of members, the profession more broadly and our partner organisations.

The first of these alliances was developed with Austbrokers Countrywide. The aim of working together remains the building of a marine insurance pool that benefits members and, more broadly, non-member surveyors by lowering insurance costs as the pool of marine surveyors grows. In addition to cross-promotion, the team at Austbrokers deliver workshops and support AIMS by providing funds that help deliver our biennial conferences. This alliance was the start of building future alliances with organisations in the maritime sector.

AIMS has also partnered with the Boating Industry Association (BIA) and the BIA of Victoria and BIA of Western Australia. The focus here is vessel safety and the promotion of recreational marine surveyors to the Australian recreational vessel community. These alliances have led to workshops and the promotion of marine surveying at boat shows.

The most recent was established with the Women's International Shipping and Trading Association (WISTA) Australia. The focus of the alliance is to foster the promotion of gender diversity, industry talent development and professional excellence.

3.4. Government agencies

We also group our work relating to alliances with the ongoing engagement with government agencies: AMSA; the Department of Agriculture, Fisheries & Forestry (DAFF); and Maritime New Zealand.

Providing industry feedback to AMSA is ongoing and critical work for AIMS, particularly with the current Marine Surveyor Accreditation Framework Review. Our links with Maritime New Zealand continue to strengthen through our New Zealand-based Vice-Chair Greg Marsden.

Our work with DAFF has led to the introduction of the Accredited Grain Surveyor Assurance (AGSA) Scheme. The AGSA Scheme was introduced in 2023 to implement a regulated approach to the qualifications and experience required to perform fitness-to-load surveys.

On 1 July 2023, the Export Control (Plants and Plant Products) Rules 2021 (Plant Rules) were amended to provide greater assurance to the shipping industry and Australia's grain exporters that bulk vessels comply with agricultural export legislation.

3.5. Learnings

Building an industry presence is no small feat; it requires a concerted, collaborative effort. AIMS highlights that, through strategic social media engagement and successful alliances, we can advocate for and promote the vital role of marine surveyors.

The benefits have been significant for both AIMS and our partners, and our ongoing initiatives guarantee continued progress and collaboration within the maritime industry. As we move forward, the collaborative approach will be essential in shaping a resilient and recognised marine surveying community

4. AIMS Code of Conduct

The AIMS Code of Conduct ("the Code") is a voluntary, self-regulatory sector code of good practice. The Code aims to improve marine survey outcomes and increase stakeholder trust by enhancing the transparency, accountability and effectiveness of the Australasian Institute of Marine Surveyors members. The Code will contribute to the realisation of our self-regulatory approach to the official formal certification of commercial marine surveyors.

The Code also sets standards for practice rather than standards for results. It goes beyond the minimum standards required by government regulation and focuses on good marine surveying practice, including integrity, leadership and competency. Members are required to act in an ethical and professional manner and in doing so promote the AIMS as the professional body it is.

The Board has updated the Code to include Best Practice Principles (BPPs):

BPP 1. Independence and Impartiality

Surveyors must act without favour, influence or conflict of interest. This means making objective assessments regardless of client, broker, insurer or contractor expectations.

- Avoid conflicts of interest at all costs.
- Uphold ethical standards, even under commercial pressure

BPP 2. Integrity

- Maintaining professional conduct and factual reporting.
- Surveyors must uphold the highest ethical

standards, treating all stakeholders with fairness and respect.

- Integrity also extends to honest marketing, transparent pricing and avoiding misrepresentation of qualifications or services.

BPP 3. Continuing Professional Development

- Surveyors should only undertake surveys they are qualified and experienced to perform.
- Competence must be maintained through ongoing professional development.
- This ensures reports remain technically accurate, defensible and aligned with best practice.
- Ensure your knowledge is up to date by undertaking continuing professional development.

BPP 4. Reporting

- Survey reports must be factually correct, clearly written, and structured in a way that provides clients with both clarity and context.
- Observations should be supported by evidence and recommendations should be proportionate to the risk.
- Ensure traceability and compliance with record-keeping standards.

BPP 5. Safety

- Surveyors carry a duty of care to highlight deficiencies that could compromise vessel safety.
- Reports should not only identify faults but also explain their safety implications.
- Surveyors are to undertake their tasks so as not to endanger the lives of individuals or compromise the safety of any vessels they are surveying.

BPP 6. Ensure thorough preparation and planning

- Review vessel documentation, survey history and operational requirement before arrival.
- Coordinate with client and stakeholders to align on scope and timing.
- Anticipate potential issues – whether technical, logistical, or environmental – and plan contingencies.

BPP 7. Survey conduct detailed

- Use structured checklists tailored to vessel type and kind of survey.
- Apply both visual and technical methods.
- Document anomalies with clarity: photos, measurements and contextual notes.
- Always observe high standards when in the marketplace dealing with clients and other surveyors.

The full Code can be found here: https://aimsurveyors.com.au/wp-content/uploads/2026/02/AIMS-Code-of-Conduct_2026.pdf

5. Re-certification Audit

According to the International Organization for Standardization (ISO), ISO 9001 is a globally recognised standard for quality management. It helps organisations of all sizes and sectors to improve their performance, meet customer expectations and demonstrate their commitment to quality. Its requirements define how to establish, implement, maintain and continually improve a quality management system (QMS).

I am very happy to advise that AIMS has undergone its Re-certification Audit and has gained a further three-year certification.

6. Industry Workshops and Webinars

AIMS continues to provide workshop and webinar content for members to engage with continuing professional development (CPD).

Workshop 30: Nick Parkyn, Nick Parkyn Marine Surveying / MarineML – 26 November 2025.

Topic: Appendages

Nicholas (Nick) Parkyn has an extensive background in both the marine and information technology disciplines. Nick's work in the marine industry includes marine surveying, yacht and small craft design and marine software development. He is experienced in composite design and fabrication and has specified synthetic rigging on designs since 1994. He was one of the first to apply Spectra to marine applications. He is the author of the book: *What a marine surveyor needs to know about synthetic (composite) yacht rigging.*

Workshop 1: Jeffrey Blum, Director, Maritime Education & Training Ltd – 2 and 9 February 2026.

Topic: Parts 1 and 2 – Vessel Employment Methods ~ Voyage v Time Charter obligations of charterers and owners / operators.

Jeffrey Blum has been involved in shipping and trading since 1972. The fourth generation of a shipping family, he is a member of the Baltic Exchange since 1976. He has been a shipbroker, charterer, shipowner and operator, Lloyd's underwriter, gasoil futures broker and commodities trader in London and elsewhere.

In 1994, he created Interlink International Trading (UK) Ltd, providing maritime commercial claims consultancy and bespoke corporate training. His clients include oil majors, commodity traders, shipowners, P&I Clubs, shipbrokers, lawyers, governments and international shipping organisations www.intlinkint.com

In 2002, Jeffrey co-founded and remains principal lecturer of Maritime Education & Training Ltd, providing bespoke tuition, including for students taking the annual examinations of the Institute of Chartered Shipbrokers "www.metl.london"

For many years he has contributed articles to trade magazines and books, and is revising the 12th edition of a major shipping textbook. He achieved Fellowship of the Institute of Chartered Shipbrokers by examination in 1979 and has served on the ICS Controlling Council, Membership and UK & Ireland Committees and London & South-East Branch Committee since 1983, including as its Education Officer since 2000, Chairman 2005-2007 and Vice Chairman 2015-2017.

Jeffrey is a Fellow of the Chartered Institute of Arbitrators (since 1997 and Honorary Associate since 1979), has been an arbitrator (sole and tribunal) since 1994 as Supporting Member of LMAA (London Maritime Arbitrators Association), a Council Member of ICSAS (International Commodity and Shipping Arbitration Service) since its creation in 2005, and a panel arbitrator of SCMA (Singapore Chamber of Maritime Arbitration) since 2019.

He has been a member of the Baltic Exchange since 1976, has been appointed as an expert witness in arbitration and litigation cases since 1983, and has served on the Governing Council of BEEP (Baltic Exchange Experts Panel) since 2012, now known as BEWA (Baltic Expert Witness Association) since 2019, including as its Chairman since 2020.

Jeffrey is a Mentor for the Marine Society's Coming Ashore Programme. Since 1984, he has lectured on maritime law and several commercial subjects at universities and colleges, is a frequent presenter at public, academic, governmental and bespoke training seminars worldwide, and is a Visiting Professor at World Maritime and Shanghai Maritime Universities since 2007.

Workshop 3: Dr Eric Perez – 16 February 2026

Topic: Continuing Professional Development

7. Newsletter Contributions

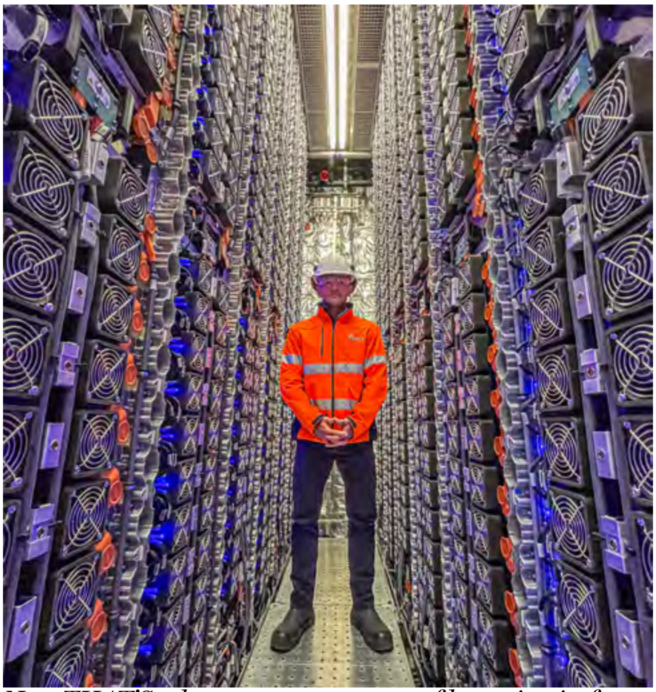
Thank-you to the members who contributed to this edition of the newsletter, and, for members who do contribute, your article can be used as evidence of continuing professional development.

I encourage members to contribute to the newsletter. If you would like to know more, please contact the office.

8. Your Institute

Please contact me on +61 2 6232 6555 or send me an email with feedback, and ideas at gm@aimsurveyors.com.au.

Dr Eric Perez
Chief Executive Officer



Now THAT'S a battery – 250 tonnes of batteries, in fact, powering a new Incat-built ocean-going vehicular ferry. Very impressive. (See the following two pages for details.)

History made as world's largest battery-electric ship powers up

INCAT Tasmania has achieved a world first and defining moment in maritime history – on 14 December 2025, the largest battery-electric ship ever constructed was powered up and successfully completed its first e-motor trial in Hobart, Tasmania.

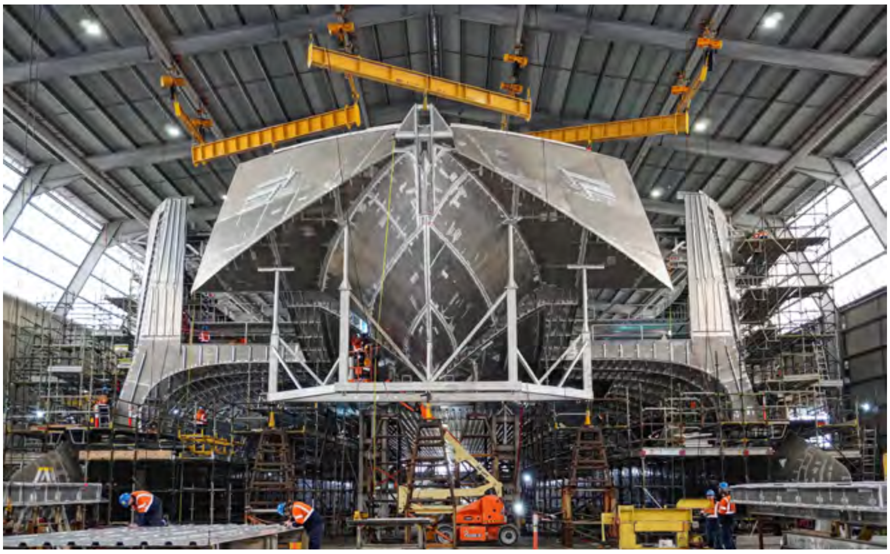
The powering of Hull 096 – the world's largest battery-electric ship and the largest electric vehicle of any type on the planet – marks a watershed moment as the 130-metre vessel, capable of carrying 2,100 passengers and more than 220 vehicles, activated the largest battery-electric propulsion system ever installed on a ship for the very first time.

In front of invited dignitaries, including Australian Trade Minister Don Farrell, Tasmanian Premier Jeremy Rockliff, and Her Excellency Barbara Baker, Governor of Tasmania, Incat Chairman Robert Clifford powered up the water jets and delivered an impressive demonstration of the vessel's propulsion capability.

The achievement is the first time a ship of this size, weight and passenger-vehicle capacity has operated solely on battery power anywhere in the world. Designed and built in Hobart, the vessel represents a major leap forward in advanced manufacturing and confirms Tasmania's position at the forefront of the global transition to sustainable shipbuilding.

Powered by more than 250 tonnes of batteries, the vessel's energy storage system delivers over 40 megawatt-hours of installed capacity: four times larger than any previous maritime battery installation in the world.

The Incat ferry under construction in Hobart ...



... featuring the catamaran design ...

... with wave-piercing hulls.

Incat Chairman Robert Clifford powered up the ferry in December, watched by invited dignitaries.

Mr Clifford said the moment was historic, not only historic for Incat but also for the global maritime industry.

“This is the first time a ship of this size, anywhere in the world, has been trialled under 100 per cent battery-electric propulsion,” he said. “It’s a remarkable achievement by our workforce and a turning point for shipbuilding.

“Tasmania has been at the forefront of international aluminium shipbuilding for decades and today’s milestone shows we are now leading the world in the next era – sustainable, high-performance vessels at scale.”

Mr Clifford said the vessel demonstrates what Australian innovation is capable of delivering.

“We are proving that advanced manufacturing in Australia is not only alive but setting global benchmarks. This ship will stand as a flagship for what’s possible when industry, design and clean-energy technology come together.”

He added that the test was the first in a series of trials for the ground-breaking ferry before it departs for South America in coming months.

The ship achieved further significant milestones in January and February.

In mid-January, the vessel underwent harbour trials in the River Derwent, allowing crews to test propulsion, manoeuvrability, control systems and onboard operational performance in real-world conditions.

“These trials represent the first time a ship of this size and passenger-vehicle capacity has operated solely on battery power anywhere in the world, marking a major step forward for large-scale electric shipping,” Mr Clifford said. “Moving Hull 096 under its own battery-electric power is a world first at this scale and confirms that electric propulsion is viable for large commercial vessels.”

In February, a significant safety milestone was completed, with successful deployment of the vessel’s marine evacuation system (MES), supplied by fellow Tasmanian company Liferaft Systems Australia.

The deployment included three 22-metre inflatable evacuation slides, each connected to a 128-person open reversible liferaft, alongside an additional linked liferaft. Once fully equipped, the world’s largest battery-electric ferry will feature six MES units and 13 linked liferafts, providing total liferaft capacity of 2,432 people.

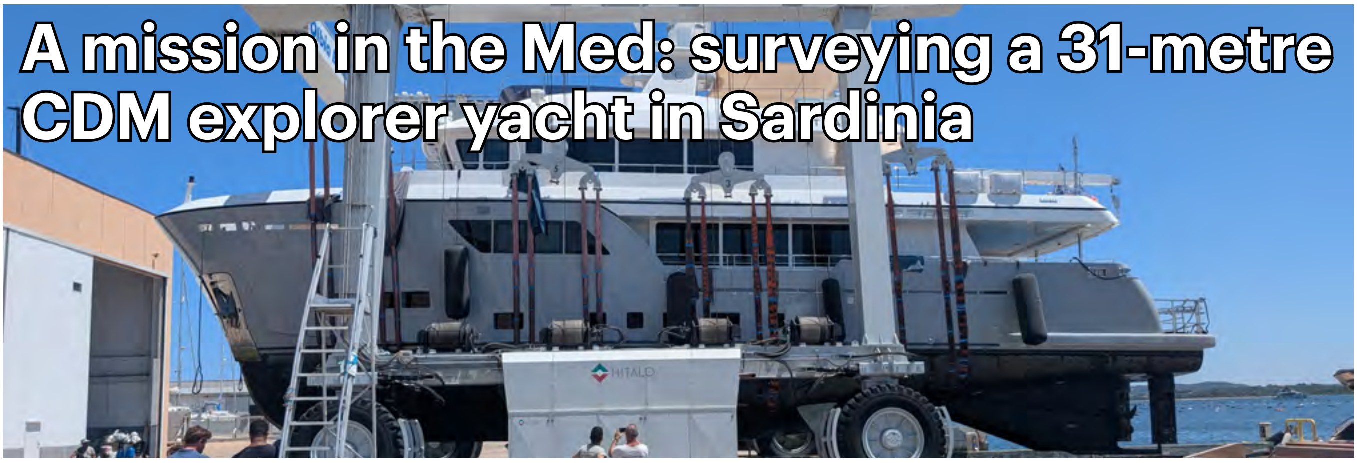
Further information: Incat Tasmania at: https://incat.com.au/history-made-as-worlds-largest-battery-electric-ship-powers-up/

Note: This article is based on media releases issued by Incat Tasmania in December, January and February.

The vessel underwent successful harbour trials in January ...

... and deployment of a passenger evacuation system in February.

A mission in the Med: surveying a 31-metre CDM explorer yacht in Sardinia



IN the superyacht sector, trust is as vital as hull integrity. When an Australian client engaged RTM to conduct a full pre-purchase survey on a 31-metre Cantiere Delle Marche (CDM) explorer yacht in Sardinia, our task was clear: deliver independent, professional due diligence to support a multimillion-dollar acquisition.

Setting the scope

After 32 hours of travel from Brisbane, Renee and I arrived in Olbia, Sardinia, ready to begin. This was not a travel assignment; it was a technical mission involving a 240-tonne steel and aluminium vessel powered by twin Caterpillars.

Before stepping aboard, we reviewed construction specifications, maintenance records, and operational history to establish a structured survey plan tailored to the client's priorities and the vessel's intended operational profile.

By engaging RTM, our clients relied on trusted local expertise rather than unfamiliar fly-in surveyors. This ensures consistency, independence and a clear chain of accountability, which is essential when representing owners in international transactions.

Day One: initial assessment

The American crew provided excellent cooperation as we commenced the onboard inspection. Renee focused on interior presentation, finish quality, and guest-area functionality and services, while I examined structural integrity, propulsion systems, and ancillary equipment.

CDM's reputation for robust engineering was evident but, as every surveyor knows, value lies in the detail. We assessed machinery, propulsion, ancillary systems, electrical distribution and hydraulic systems, verifying that the vessel's systems matched both the documentation and the owner's intended use.

Day Two: out-of-water inspection

The haul-out at Olbia shipyard provided full access to the underwater body. Watching a 240-tonne explorer yacht lifted clear of the water is always impressive – but the real work begins once the hull is safely cradled.

Our inspection covered:

- plating condition and coating performance;
- appendages, shafts, bearings and seals;
- rudder assemblies and steering gear;
- thruster tunnels;
- skin fittings and penetrations; and
- evidence of grounding or impact.

For steel vessels, early detection of corrosion or coating failure is critical. The shipyard's facilities and cooperation allowed us to complete a thorough assessment.

Day Three: sea trials

A six-hour sea trial along Sardinia's coastline allowed us to evaluate the vessel across a full operational profile. We monitored engine performance, vibration levels, steering response, stabiliser behaviour, generator load handling and creature comforts under realistic demand.

At anchor later that evening, we continued testing into the night, validating redundancy, automation and system integration. By midnight, our findings were compiled into a formal report, and reviewed onboard with our client and the owner's representative.

This immediate, transparent communication enabled timely, informed decision-making regarding negotiation and future operational planning.

Day Four: finalisation and departure

After a final review and handover, we began the long journey home. Assignments like this reinforce the importance of independent surveying in global yacht acquisitions.

Beyond the technical work, our role is to provide clarity, ensuring every vessel purchased is safe, compliant, and represents genuine value for the owner.

Rod Twitchin
Rod Twitchin Marine Pty Ltd
AIMS member

MV *Island Trader* refloating report

SHORTLY after 0925 hrs on Monday, 17 October 2011 the MV *Island Trader* went aground on a lee shore inside the lagoon of Lord Howe Island, while unberthing for the return voyage to Port Macquarie. The wind was from the SSW gusting 25 to 30 knots.

The ship's final resting position was 31o31.42' S, 159003.44'E, and the heading 1250T (1120C, T/E 13E). The vessel became firmly aground on calcareous sand and small platforms of Ned's Beach calcarenite beneath the after-body and abaft the wheelhouse.

The ship was refloated at 1812 hrs on Monday, 24 October and berthed "portside to" back alongside the jetty for internal and external inspection by an American Bureau of Shipping (ABS) surveyor and commercial divers respectively.

The vessel's existing Certificate of Class remained valid; however, an outstanding recommendation for inspection by approved ABS divers at the next port of convenience (Port Macquarie) was issued by the Classification Society surveyor. The ship sailed on the tide for Port Macquarie the following evening,

Tuesday, 25 October

The stranding occurred within the New South Wales Marine Park but well clear of any prescribed Sanctuary Zone or coral community. The calcarenite outcrop upon which the ship settled supported some small specimens of live coral (*Aeropora solitaryensis*) and algae and very few, if any, sedentary fish.

It is believed the grounding contributed infinitesimally to any natural weathering process. No noxious contamination to the environment occurred and a precautionary oil boom was rigged to enclose the ship while stranded.

MV Island Trader *stranded on calcareous sand and calcarenite outcrops. Note the oil boom encircling the ship.*

Ship Response

The master and crew immediately put into effect the ship's Operations Manual procedures in line with a commitment to safety, prevention of pollution and quality management. The Grounding Checklist was immediately consulted and the vessel's position verified continually.

Details of an onboard investigation by the master concluded with the release of an Incident Report to the ship's owner, Lord Howe Island Seafreight Pty Ltd.

Further implementation of the Safety Management System, particularly attention to the Shipboard Oil Pollution Emergency Plan (SOPEP), was also instigated.

Shore staff emergency response

The company's shore-side Emergency Response Team (ERT) and directors reacted in accordance with the company's marine management system and worked attentively with the ship's master and crew, and members of the Lord Howe Island Board, NSW Maritime, NSW Police, NSW Department of Environment & Heritage and others to assemble shore management capabilities and deploy oil spill response equipment.

Portside Marine Pacific was contracted as an independent consultant to aid in the implementation of a Marine Refloat Action Flow Plan and report the events and outcome.

Assessment and refloat

On Sunday, 23 October 2011, at 1752 hrs, the ship's drafts were recorded when the actual tide height was 1.813 metres. Computations after consulting the ship's Hydrostatic Tables gave an estimated loss of buoyancy of 28.2 tonnes. Using a co-efficient of 0.8, it was estimated the static friction to be 22.56 tonnes, thus requiring at least this force to heave the ship free of the calcarenite outcrop and calcareous sand.

It was also estimated that the resultant force(s) (using the theorem of "Parallelogram of Forces") that had been applied so far was approximately 7.0 tonnes and thus far less than required. On the other hand, if the calculated force of 22.56 tonnes had been applied without first diminishing loss of buoyancy, then the chance of damage to the vessel could have been significant.

At this time, three directional forces were being applied.

The port anchor had been laid out with approximately two shackles of cable and leading approximately 0930T.

A 56mm polypropylene hawser led approximately 1600T from the starboard bow Panama fairlead on the foc'scle head and had been secured to two anchors. Each of these anchors was on a separate chain leg diverging approximately 450 apart (bottom type: sand).

A third hawser of similar size was rigged leading approximately 2100T from the starboard quarter and made fast to two Danforth type anchors in tandem (bottom type: sand).

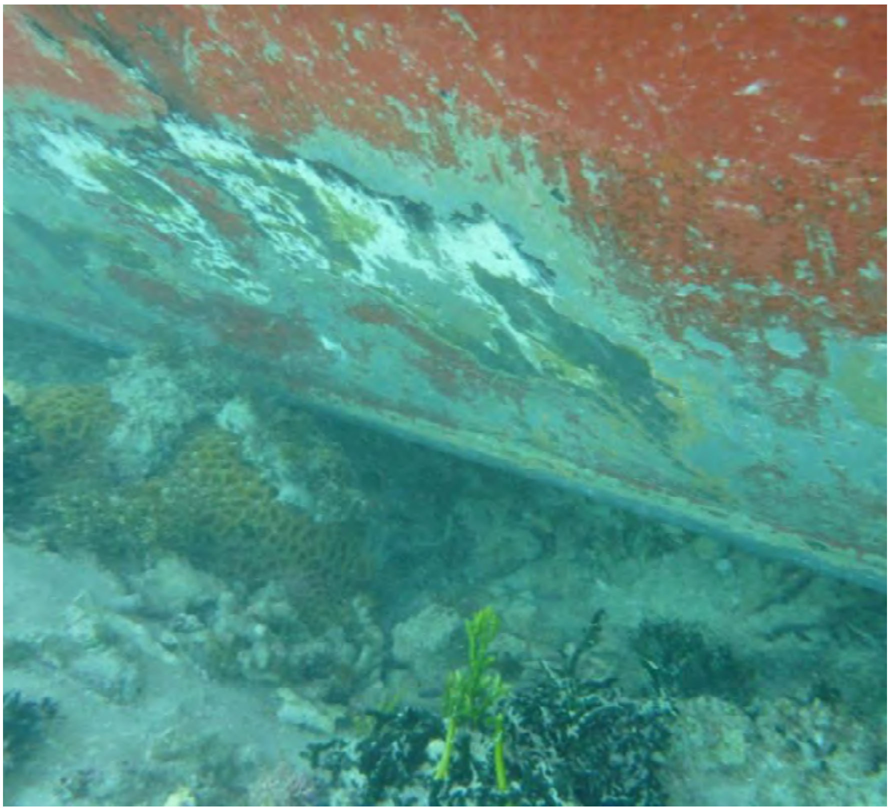
On the following day – Monday, 24 October – during the morning high tide, soundings were recorded around the ship and depths > 2.5 metres were mostly found along the starboard side and ahead of both bows.

Throughout the day, "back cargo" was discharged into a lighter and sent ashore, the ship was de-ballasted of sea water and 10 tonnes of fresh water was transferred to the forepeak tank in order to create a downward moment of force (tonne metres) at the bows.

The heavier starboard anchor (estimated > 1.0 tonne) and approximately two shackles of cable were deployed using the double-ended steel lighter to further lighten (provide rise) the vessel and provide heaving power. This anchor was laid directly ahead, so as to gain the full benefit of the five-tonne winch.

It was now estimated there would be a high probability of refloating the ship provided the height of the incoming

MV Island Trader *heeling to starboard and with port anchor laid out and a polypropylene hawser leading approximately 1600T from the starboard bow. Note also a boat rope rigged down the portside.*



MV Island Trader *chine and topside plate at engine room level.*

tide reached 1.85 metres. The predicted height of the tide was to be 1.690 metres at 1843 hrs. Previous actual tides observed over the past 24 hours had been recorded to be higher than the predicted tide heights (mhl), so it was assumed this would again occur on this high tide.

Subsequent computations showed that there was, in fact, no loss of buoyancy provided the tide reached 1.85 metres. Notwithstanding this, in practice the ship did need to be heaved free.

At approximately 1655 hrs the oil boom was removed from around the ship and at 1712 hrs all slack taken out of the two anchor cables and the two hawsers. The intention was to heave the stern free of the calcarenite platform in a direction of approximately 2100T, being the estimated approximate reciprocal direction of grounding, and at the same time heave the vessel ahead.

At approximately 1750 hrs, the port anchor flukes broke free and this anchor started to "come home" and thus rendered ineffective.

At 1800 hrs, the draft marks were recorded so as to determine the ship's displacement for this particular time.

At 1812 hrs, the ship floated free after heaving on the starboard anchor (five-tonne) and starboard quarter (five-tonne). The master ordered engines, the anchors recovered in their respective hawse pipes, and the hawsers on the starboard bow and starboard quarter were slipped to be recovered by small line vessels positioned on standby for this task.

The ship was subsequently berthed "portside to" alongside the jetty and all tanks, bilges and void spaces immediately sounded.

At high water the next morning, Tuesday 25 October, commercial divers (including the author) inspected the hull plate, sea inlet boxes, skegs, propellers, rudders, zinc anodes, transducer and rudder bearings.

No significant structural damage was deemed to have occurred, apart from some minor shallow indentation and paint loss.

During the day, an ABS surveyor inspected seawater ballast tanks numbers 2P and 2S and 4P and 4S and recorded no notable damage. The existing Certificate of Class remained valid and the ship considered seaworthy to continue trading.

Conclusion

The vessel stranding and subsequent uneventful refloat illustrated unequivocally the company's safety management system is reliable and works. Government agencies, individual islanders and others provided assistance to the ship's owner, master and author in one way or another to achieve the best possible outcome.

The success of the refloating procedure was to first lighten the ship, then transfer fresh water within the ship, apply heaving forces in the correct directions and await sufficient water. No apparent damage appears to have occurred to the ship or the environs of Lord Howe Island; however, it does demonstrate that ongoing vigilance by all parties must continue to be maintained.

Regular drills (floating staff and shore staff) and the need for continuing maintenance of valuable assets – such as the island's steel lighter – are undeniably essential for the preservation of safe shipping to and from Lord Howe Island.

Note: Chief Officer Wayne Oakes kindly provided the photos included in this article.

Capt Peter Kerkenezov BM
AIMS member

A novel approach to correcting a magnetic compass "stuck" on one heading throughout a 360⁰ swing

A WELL-MAINTAINED magnetic compass will, under normal circumstances, align with the Earth's magnetic field being a natural phenomenon (Figure 1), and point to magnetic north.

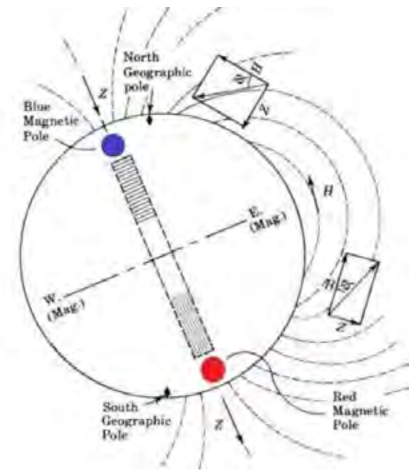


Figure 1*: Earth's magnetic field*

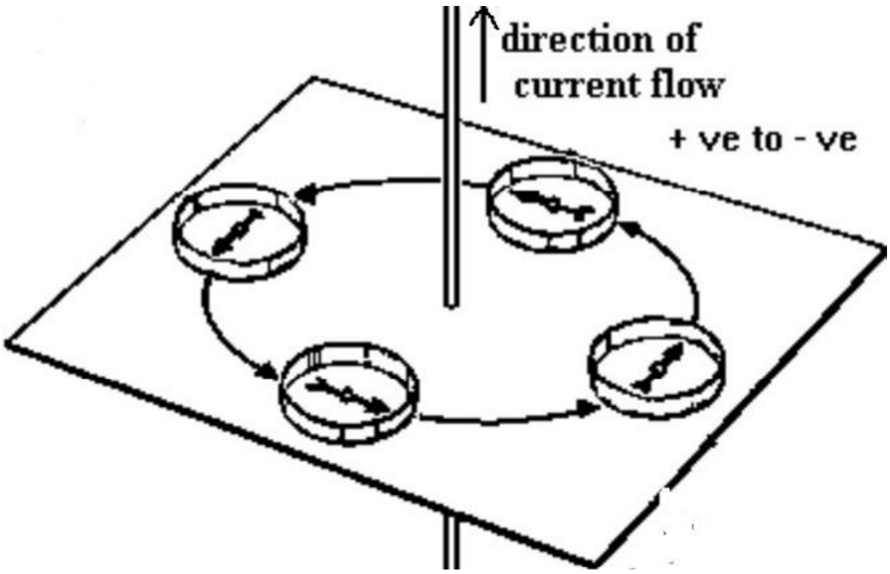


Figure 2: *Current flowing through a wire will create an invisible magnetic field at right angles to the direction of the wire. This is validated by observing the deflection of a compass needle about the wire.*

Total compass error (T/E) is the numerical sum of variation and deviation. Variation is a natural observable value that varies with location. Deviation, on the other hand, is that component caused by magnetised iron (hard or soft) within the ship or an electromagnetic field created by electronic devices close to the compass position.

If a deviation causing magnetic field or electromagnetic field is stronger than the Earth's magnetic field, then the compass needle will align itself to this new field (Figure 2).

On occasion, a vessel's magnetic compass may become "stuck" on any one heading when the vessel is swung through 360^{0}. This is usually due to the compass being affected by an overpowering magnetic field or electromagnetic field within the vessel. This, of course, may create a challenge to resolve, particularly when the cause is due to an electromagnetic field emitted from navigational electronic devices that the ship

Figure 3: *A new-build 15-metre LOA foam-collared aluminium monohull.*

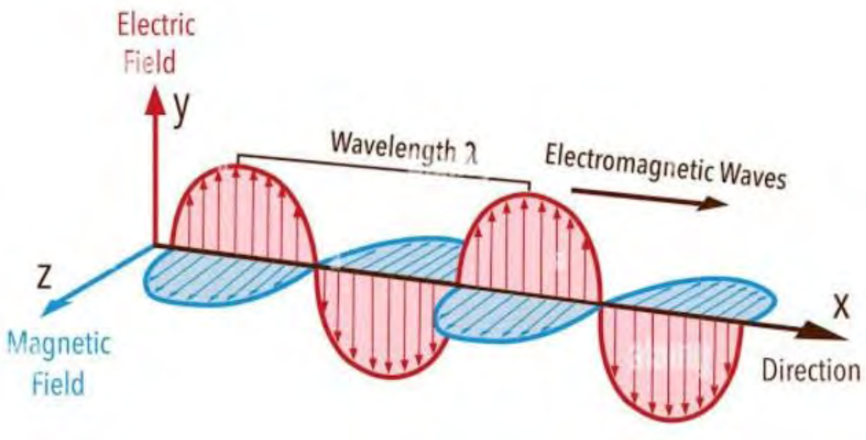


Figure 4: *Electromagnetic waves.*

owner is reluctant to move away from the preferred compass position.

Case study

After embarking a new build (Figure 3), it became evident the magnetic steering compass heading was "stuck" on East when swung through 360⁰.

The vessel was fitted with numerous electronic devices in close proximity to the compass position.

Figure 5: *The magnetic steering compass was removed from a circular hole cut in the console and a pocket ("cage") was fashioned inside the hole using a sheet of aluminium foil and the compass reinstalled.*

The compass was removed from its intended place and found to work and behave as a normal compass. However, the builder was reluctant to move the compass away from the electronic devices deemed to be causing the "locked" compass. It seemed rational to conclude the compass was aligned with a very strong resultant electromagnetic field (Figure 4) directed athwartship, from starboard to portside.

Strategic positioning of powerful rare-earth magnets in the traditional manner had no effect and it was elected to try shielding the compass from the imagined, invisible electromagnetic field using a sheet of aluminium foil to create a quick, impromptu Faraday Cage (Figure 5).

Once completed, the compass was found to function normally and, following analysis, was corrected in the conventional way. The following coefficients were determined:

- Coeff A +0.375
- Coeff B Nil
- Coeff C +1.5
- Coeff D +1.0
- Coeff E +0.75

Conclusion

In light of the aforementioned, it would appear the application of a Faraday Cage to be a useful tool in some instances where a magnetic compass is "stuck" on one heading due to an adverse electromagnetic field at the compass position.

Capt Peter Kerkenezov BM
AIMS member
Mr Heyden Griffin

Crew injuries during maintenance in engine room of *Wisdom Venture* near Sydney, NSW, on 6 May 2025

1. Investigation Summary

1.1. What happened

On 6 May 2025, the oil tanker *Wisdom Venture* was drifting off Sydney, New South Wales, when the engineering team commenced maintenance on the main deck steam valve for the cargo heating system. The valve had been leaking from the bonnet joint gasket.

Following isolation of the system, the team removed the valve bonnet. During this process, residual hot condensate was suddenly released, resulting in burn injuries to three crew members. First aid was administered on board, and the injured personnel were subsequently evacuated to shore for medical treatment.

1.2. What the ATSB found

The Australian Transport Safety Bureau (ATSB) found that, prior to commencing maintenance work on the cargo heating system main deck steam valve, the crew did not allow adequate time for the steam system to cool. In addition, the verification system to ensure that the steam line was fully depressurised was not used.

This was most likely due to the time pressures to reintroduce heating to the main engine fuel system.

The ATSB also found that a drain line in the warm-up bypass line had been permanently modified without formal approval or documentation. This change was not incorporated into a risk assessment and no formal review was conducted.

This undocumented change likely introduced a system vulnerability that undermined the effectiveness of the steam system isolation.

Additionally, the modification was not identified in the chief engineer's handover process, leaving the incoming engineering team unaware of the altered configuration and associated risks.

It was also not identified during routine technical inspections or superintendent riding visits. This resulted in the ship manager's management of change process not being applied.

1.3. What has been done as a result

Following the incident, the ship manager advised that the drain line on *Wisdom Venture* has been returned to its original design configuration. A fleetwide campaign has also been initiated to identify any unauthorised modifications to shipboard piping systems. Where such modifications are identified, internal investigations will be conducted.

To raise awareness of the risks associated with undocumented engineering changes, the incident will be included in pre-joining briefings for senior engineering staff and discussed during crew seminars.

Ship staff will also be reminded that all modifications must be undertaken in consultation with the office and in accordance with the company's management of change process.

Finally, to improve oversight and strengthen management of change procedural compliance, the superintendent's inspection report will be amended to include verification of any shipboard system modifications not reflected in the ship's design drawings. These actions are intended to ensure that future modifications to critical systems are properly assessed, documented, and communicated.

2. The occurrence

On 6 May 2025, the Aframax[1] oil tanker *Wisdom Venture* was drifting off Sydney, New South Wales, while awaiting berthing instructions. The ship had arrived from Geelong, Victoria on 20 April 2025 and, due to prevailing weather conditions, the master kept the main engine on 10 minutes' notice to maintain safe positioning during the drift.

The ship had a cargo of about 14,610 tonnes of marine fuel oil, which required heating. At about 1300 local time[2], the chief engineer led the engineering team to commence planned maintenance on the cargo heating system main deck steam valve (see the section titled "Cargo heating system"), which had been leaking from the bonnet joint gasket. The maintenance task required the cargo heating system to be shut down.

The team, which consisted of the second engineer, a fitter and an oiler, conducted a toolbox meeting and implemented isolation procedures (see the section titled "Safety management system"), including shutting steam supply valves, draining the steam line by opening the drain valve, and confirming zero pressure on the fitted gauge on the steam line before and after the pressure-reducing valve. The team then began removing the valve bonnet with the aid of a chain block.

At approximately 1400, while lifting the bonnet, residual hot condensate was suddenly released, splashing onto nearby team members. The second engineer sustained first-degree and second-degree burns. The fitter and the oiler sustained first-degree burns.

The injured personnel were immediately transferred to the ship's medical room, where first aid was administered, including cold water treatment, antiseptic cream and pain relief medication. The master notified the ship's onshore management and medical advisory service and contacted Sydney vessel traffic services (VTS)[3] to arrange medical evacuation.

At about 1500, the ship proceeded to the Sydney pilot boarding area. The injured personnel were then disembarked to a shore medical launch for hospital treatment at about 1918.

3. Context: *Wisdom Venture*

3.1. Crew

At the time of the incident, *Wisdom Venture* had a crew of 24 personnel, and all were appropriately qualified and endorsed for the positions they held. The master had over 12 years of watchkeeping experience, including six years on oil tankers and about 2.5 years as master. The chief officer had about 8.5 years of oil tanker experience. The second and third officers each had several years of relevant service.

The chief engineer had about 9.5 years of experience on oil tankers, including 2.5 years in the role of chief engineer. The incident occurred during a scheduled crew change, and the chief engineer was in the process of being relieved. The relieving chief engineer had four years of experience as chief engineer. They joined the ship on 17 April 2025 in Geelong to conduct a parallel handover with the outgoing chief engineer.

The second engineer had approximately 7.4 years of experience. The third and fourth engineers each held officer of the watch (engine) certificates of competency. An electro-technical officer (ETO), certified for both oil and chemical tankers, was also on board at the time of the incident.

All officers had completed advanced tanker safety training and demonstrated strong English proficiency. Most had prior experience on similar ships and had completed multiple tenures. The Aframax oil tanker *Wisdom Venture* was owned by Acclaim Shipping Limited, operated by Wah Kwong Ship Management (Hong Kong) and registered in Hong Kong. The ship was classed with Lloyd's Register.

3.2. Environmental conditions and operations while drifting

Between 20 April and 6 May 2025, *Wisdom Venture* drifted off the coast of Sydney, while awaiting berthing instructions.

During these periods, the ship maintained position within designated drifting zones, outside port limits. Environmental conditions were generally calm, with recorded speeds over ground ranging from 0.5 to 5.4 knots. The ship's main engine was routinely placed on 10 minutes' standby notice and was periodically started to reposition or adjust drift trajectory.

Engine control was frequently shifted between the engine room and bridge, with telegraph tests and main engine tests conducted before each use. These operations were logged with precise positional data, indicating careful monitoring and control during drifting phases.

During the drifting period, the engineering team, under the direction of the chief engineer, initiated several maintenance tasks. These included:

- major maintenance on a main engine unit;
- replacement of main engine fuel valves;
- overhauling of diesel generator engine cylinder heads and pistons; and
- rectification of a steam leak from the bonnet flange joint of the cargo heating system main deck steam valve, located in the engine room.

3.3. Steam system purpose and configuration

Wisdom Venture operated a high- and low-pressure steam system (Figure 1) that supported a range of essential onboard functions. The steam was generated through two auxiliary boilers and an exhaust gas boiler (when the main engine was in operation).

The exhaust gas boiler could be connected to either of the auxiliary boilers via a circulating pump, allowing for flexible integration of waste heat recovery. Each auxiliary boiler was fitted with a main steam stop valve at the steam outlet, directing steam from either boiler into the main steam line located in the engine room.

Downstream of these main steams stop valves, the steam line divided into two branches supplying:

- high pressure steam (0–1.6 MPa) for the cargo and ballast pumping plant; and
- low pressure steam (0–0.9 MPa) for the auxiliary systems.
- On the day of the accident, the cargo and ballast pumping system were not in use.

3.4. Auxiliary heating system

The high-pressure steam for the auxiliary systems passed through a pressure-reducing valve. To verify the correct operation of the valve, pressure gauges were fitted both before and after it. This arrangement enabled monitoring of pressure differential and ensured the valve was functioning within its designed parameters. It also allowed the crew to see if there was pressure in the auxiliary system.

Following pressure reduction, the steam line, located in the engine room, branched out to supply heating to various auxiliary systems including:

- marine fuel oil;
- purifiers;
- engine room tanks;
- hot water circulating system; and
- accommodation.

The steam line then continued to the valve for the cargo heating system.

3.5. Fuel oil heating

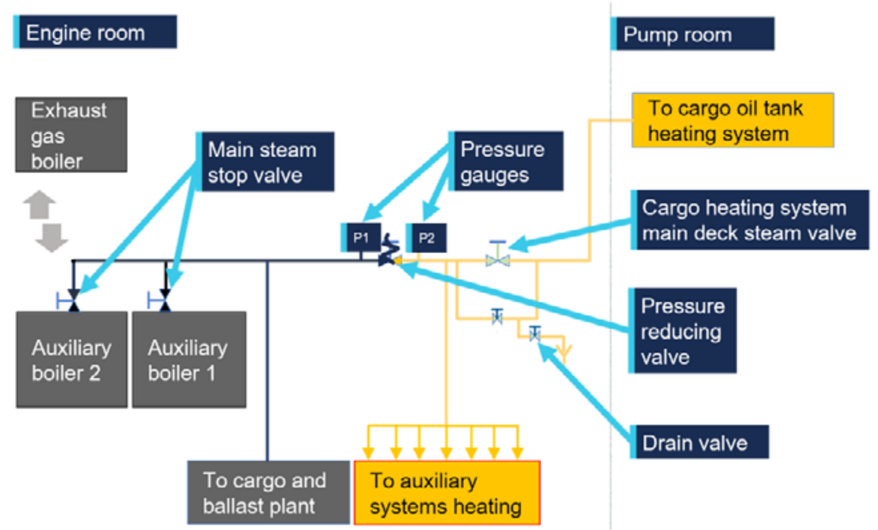
The ship's main engine, generator engines and auxiliary boilers were configured to operate using either marine fuel oil (MFO) or marine gas oil (MGO). MFO required heating to reduce its viscosity and enable effective atomisation and combustion. Without sufficient heating, MFO becomes too viscous for reliable operation.

Where the heating steam was required to be fully shut down for maintenance, the normal practice was to switch the engine fuel supply system to MGO, as it does not require heating and can be used directly. However, transitioning from MFO to MGO necessitated purging the fuel system of residual MFO. This process resulted in the loss of a large quantity of MGO, with implications for fuel efficiency, environmental management and operational planning.

When required for short periods of time, the steam system could be shut down; however, it took a considerable amount of time for the system to cool fully before maintenance could be carried out. Additionally, the heating system could only be safely shut down for a limited window, estimated to be less than 30 minutes, before fuel viscosity would begin to affect engine performance (see the section titled "Process on the day"). This constraint was evident during the shutdown process on 6 May 2025, where fuel temperature alarms were triggered as the heating system remained offline beyond this window.

3.6. Cargo heating system

The cargo heating system was designed to keep viscous liquids like marine fuel oils at the right temperature so they could be pumped easily when the fuel was being offloaded. To do this, the system used low-pressure steam, through a network of pipes in the cargo hold. The cargo fuel was required to be kept within a heat range and was not required to be running continuously.



P1: Pressure gauge before the reducing valve (high pressure side)
P2: Pressure gauge after the reducing valve (low-pressure side)
Black line shows high pressure steam. Yellow line shows low pressure steam. Exhaust gas boiler could be connected to any one of the auxiliary boilers through a water circulating pump.
Source: ATSB

Figure 1: *Simplified diagram representing the steam system.*

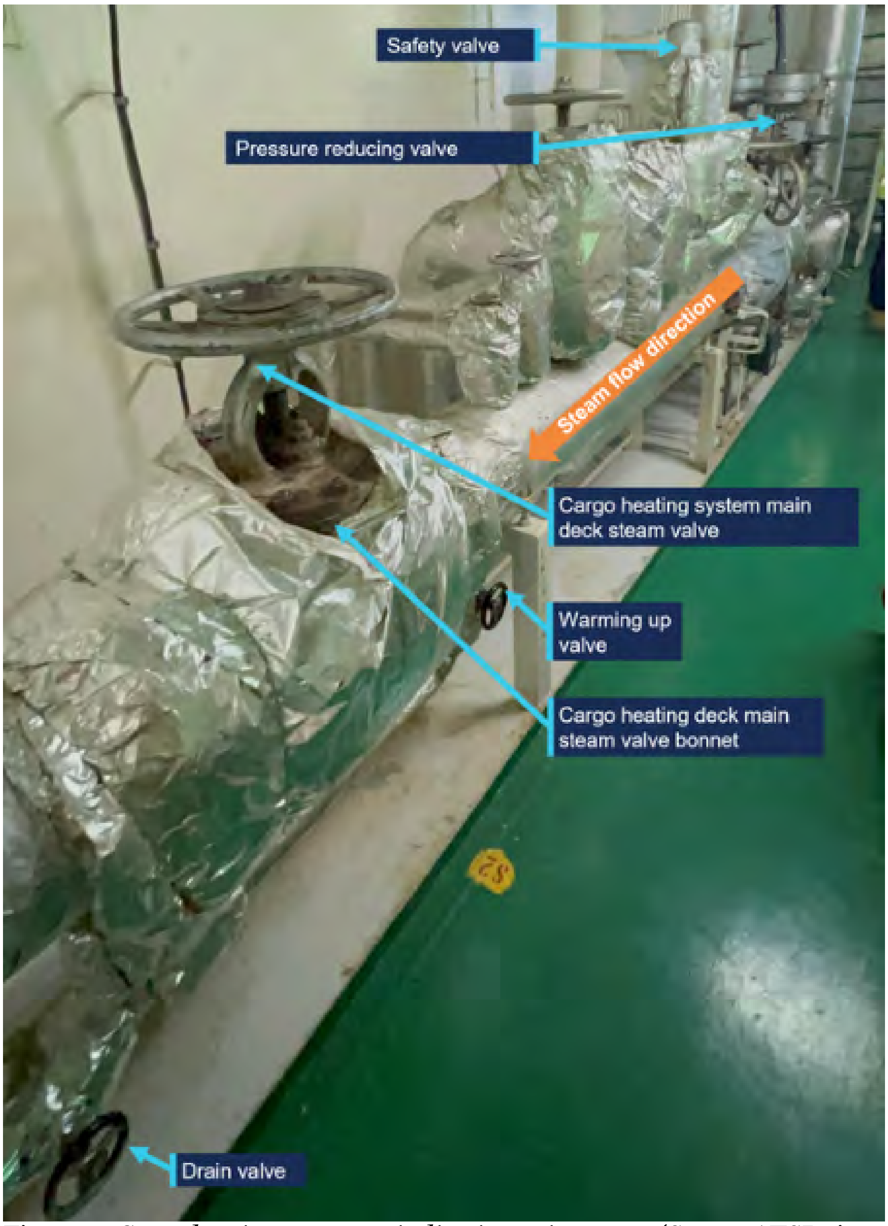


Figure 2: *Cargo heating steam main line in engine room.* (Source ATSB site photograph)

Low pressure steam passed through the main deck steam valve (Figure 1 and Figure 2), the last valve in the steam line in the engine room, which led to the deck and the cargo heating system. This valve was the main steam isolation valve for the cargo heating system. It was closed when cargo heating was not required and played a critical role in making sure the system could be safely shut down for maintenance and isolating the deck heating system during emergencies.

3.7. Cargo heating procedure

Prior to introducing steam for the cargo tank heating system, the main deck steam valve remained closed while preparatory actions were undertaken. To mitigate the risks of thermal shock and water hammer through the cargo heating system, steam was slowly introduced through a warming-up line, a line which bypassed the main deck steam valve.

Until the system was at working temperature, steam would condense, producing boiling water, which drained through drain valves throughout the system. This included a drain line, on the warming-up line, which led to an engine room floor drain hopper. The presence of condensate was verified by visual inspection of the drain at the outlet.

Throughout the heating process, system temperature and pressure were continuously monitored. Once it was established that the system was warmed and condensate was no longer being drained, steam was gradually introduced to the cargo heating system through the main deck steam valve.

Once the valve was fully opened and system stability was confirmed, the warming-up system was isolated, and the drain valve was closed.

3.8. System modification

During the site inspection, the ATSB identified a permanent modification to the drain line from the warming-up line (Figure 3). It was reported that the modification was to save water by redirecting condensate away from the open drain hopper (which led to the engine room bilges) and returning the water to the boiler feedwater system.

The condenser was at approximately the same vertical elevation as the stop valve, with the boss about 0.25 m above the condenser.

The connection was established using a fabricated pipe assembly comprising unions, elbows and a bronze union bonnet globe valve.

3.9. Process on the day

On 5 May 2025, at 1200, in preparation for planned maintenance on the main deck steam valve, the cargo heating was stopped.

On 6 May 2025 at 1200, in accordance with the ship's safety management system (SMS) (see the section titled "Safety Management System"), the master and chief engineer issued the following permits:

Cold work permit: authorised the overhaul activity under controlled conditions, confirming personnel briefing, hazard

Figure 3: *The modification connected the drain line to a spare boss4 on the condenser for the air ejector.* (Source ATSB site photograph)

isolation, and personal protective equipment (PPE) compliance.

Risk assessment: identified potential generic hazards including steam backflow, equipment malfunction and confined space risks, with mitigation measures documented and endorsed.

Isolation permit: outlined the lockout / tagout procedure to prevent unintended release of hazardous energy. Isolation points included:

- ❑auxiliary boiler main steam and warm up valves shut before and after the operation;
- ❑valves before and after pressure regulating in closed position; and
- ❑line drained and kept open.

They were executed by the team, which consisted of the second engineer, a fitter and an oiler.

Despite preparations to isolate the steam system, the shutdown was carried out without switching the fuel systems for the main engine, auxiliary engine, and auxiliary boilers (each of which required heating) to alternative fuel that did not rely on steam heating.

The auxiliary boiler alarm monitoring system reflected the system's abnormal status during the steam isolation and restoration process. The system was shut down at 1347, triggering an alarm. A temporary recovery was observed at 1452, followed by a second abnormal alarm at 1454, with full recovery noted at 1457. These time-stamps indicated the duration of the steam system isolation and restoration, and the periods during which the auxiliary boiler steam system was not operational.

At 1430, fuel oil inlet temperature alarms were triggered for the main engine, indicating that the marine fuel oil temperature had dropped to 105°C. At 1450, similar alarms were triggered for the marine fuel oil system for the diesel generator. These alarms reflected inadequate heating across the fuel systems, which impacted operational readiness. The steam system was turned back on at approximately 1452, restoring the necessary heating and resolving the abnormal conditions.

Prior to the removal of the main deck steam valve bonnet holding nuts, steam pressure was confirmed to be zero on the pressure gauges fitted on the steam line, both before and after the pressure-reducing valve. The crew advised that both pressure gauges were indicating zero before they commenced work.

Post-incident interviews revealed that the modified drain line had not been disconnected for visual inspection, and the warming-up line valve remained closed during the depressurisation process.

3.10. Safety management system

The ship's safety management system (SMS) incorporated a permit to work (PTW) system to manage non-routine and potentially hazardous tasks. The PTW system required formal authorisation prior to commencing work such as hot work, electrical maintenance, enclosed space entry, or operations involving pressurised systems, including steam.

Before issuing a permit, responsible officers were required to complete supporting activities, including system isolation (where required), verified through an isolation certificate.

3.10.1. Isolation procedures

Isolation was required when work involved:

- ❏ breaching pipeline systems or opening pumps;
- ❏ working on electrical or pressurised systems; and
- ❏ conducting maintenance in enclosed spaces or on cargo systems.

The isolation procedures ensured that all energy sources were identified, isolated, and verified to be in a zero-energy state before work commenced. This included mechanical, electrical, hydraulic, pneumatic, thermal and chemical energy.

The process then required that lockout/tagout (LOTO) procedures were used to secure and label isolation points, with clear signage such as "Do not operate – work in progress".

The isolation permit process included:

- ❏ planning and identifying all lockout/tagout points;
- ❏ notifying affected personnel;
- ❏ physically locking and tagging energy sources;
- ❏ verifying isolation through testing; and
- ❏ continuous supervision and documentation.

3.10.2. Risk assessment

The SMS required that risk assessments be conducted by appropriately experienced personnel, with specialist input sought where necessary.

This process was intended to identify and mitigate hazards associated with the task, including risks such as energy release, system pressurisation, or ignition sources.

The company's risk assessment form was the designated tool for documenting this process and supporting safe operational decision-making.

The SMS emphasised the importance of ensuring that all personnel involved in potentially hazardous work were adequately trained and aware of the procedures and risks associated with its tasks.

3.10.3. Chief engineer's handover

The SMS outlined a structured handover process for the chief engineer to ensure continuity and operational safety. As part of this process, a disembarking chief engineer was required to provide the incoming chief engineer with a comprehensive briefing on the status of all machinery and systems under their responsibility, including any modifications or deviations from standard configurations.

The handover was recorded in the handover checklist and verified during joint inspections.

The ATSB could find no records of the identified modification being recorded in the records of previous chief engineers' handover checklists.

3.10.4. Technical visits

The SMS mandated that each ship was inspected by a technical superintendent at least twice per year, with no more than six months between visits.

These inspections were conducted using structured checklists and were intended to assess the operational condition of machinery, safety systems and compliance with maintenance standards.

During the visit, the superintendent:

- ❏ verified the status of the planned maintenance system (PMS);
- ❏ evaluated the readiness of critical systems, such as steam lines;
- ❏ reviewed any modifications or deficiencies;
- ❏ documented observations and discussed them with shipboard management; established timelines for corrective actions; and
- ❏ provided onboard training and conducted appraisals of senior officers.

These visits were required to support alignment with company standards and continuous improvement in technical and safety performance.

The ATSB did not identify any records of the identified modification in the technical visit records.

3.10.5. Management of change procedures

The ship manager had established a management of change (MoC) process to ensure that any modification to shipboard systems, design, procedures or equipment was assessed, authorised and implemented in a controlled manner.

Fleet superintendents were required to conduct scheduled riding visits during which they:

- ❏ evaluated operational performance;
- ❏ reviewed risk management checklists;
- ❏ identified undocumented or emerging risks; and
- ❏ initiated the MoC process where changes were observed or proposed.

Engineering changes, as defined in the health, safety, and environmental (HSE) manual, included any modification to the ship's structure, onboard systems, or control equipment that could affect operational integrity.

Such changes were subject to formal risk assessment and required approval at the appropriate level of authority, depending on the scope and potential impact.

The MoC process mandated the use of a specific form to:

- document the change;
- assess associated risks; and
- define mitigation measures.

Risk assessments were integral to the MoC process and were to be conducted in accordance with company procedures. These assessments involved identifying hazards, estimating the likelihood and consequences of its occurrence and implementing controls to reduce risk to an acceptable level.

Fleet superintendents were expected to provide technical input, particularly in cases involving non-routine repairs or modifications following equipment failure.

The ATSB identified two recorded MoC for the engineering department since the ship's delivery:

- fuel compliance modification, MoC dated 8 January 2019; and
- exhaust gas cleaning system (EGCS) installation during dry dock, MoC dated 22 July 2022.
- No other records of engineering-related changes were available for review.

3.11. Post-incident inspection

Following notification of this incident, the Australian Maritime Safety Authority (AMSA) attended the ship at Gore Bay terminal, Sydney, on 8 May 2025 to conduct an inspection.

AMSA's inspection concluded that isolation procedures had been followed and appropriate personal protective equipment (PPE) was used. However, their investigation also stated that the piping arrangement allowed a section to remain enclosed without a drain, which likely led to vacuum formation and the subsequent release of condensate when the valve was opened.

During the port state control inspection, AMSA identified two deficiencies. The first related to the port-side boiler pressure easing gear, which could not be operated from a safe position.

The second involved crew unfamiliarity with the oily water separator, where the oil content monitor drain valve had been left open during testing. Both deficiencies were required to be rectified prior to the ship's departure.

4. Safety analysis

4.1. Introduction

This safety analysis examines the key factors that contributed to the burn injuries aboard the Aframax oil tanker *Wisdom Venture* during maintenance on the cargo heating system main deck steam valve.

It focuses on procedural lapses, undocumented system modifications and inadequate verification practices that increased the risk of injury to crew members.

4.2. Incomplete isolation check

At the time of the incident, the ship was drifting with the main engine operating on marine fuel oil, which requires continuous heating to maintain viscosity. Most likely due to the amount of fuel required to be purged, the decision was made not to switch the engine fuel to marine gas oil prior to conducting the maintenance activity.

In those circumstances, the heating system could only be shut down for a limited window, estimated to be less than 30 minutes, before fuel viscosity would begin to affect engine performance. This time constraint likely reduced the cooling time the crew allowed prior to removal of the valve bonnet.

The warming-up valve remained closed during depressurisation, and the crew relied solely on pressure gauge readings located before and after the steam pressure-reducing valve to verify if the system had cooled sufficiently. Additionally, not opening the warming-up line removed the opportunity for the pressure to stabilise on either side of the main deck steam valve, prior to commencing the maintenance work.

In addition, engineering crew members did not disconnect the modified steam drain line that had been permanently re-routed to the air ejector condenser. This modification resulted in condensate remaining in the drain line as there was not sufficient pressure to overcome the head of pressure to the connection to the condenser.

In combination, this configuration did not allow for a positive visual confirmation that the line was free of steam or condensate. Consequently, when the valve bonnet was removed, residual hot condensate was released, resulting in significant burn injuries to three crew members.

Although the required cold work permit, isolation permit and risk assessment were completed, the documentation did not identify or address the operational risk associated with the modified drain line configuration.

The absence of a verification step to confirm the line was fully depressurised meant that the isolation process was incomplete, and the potential for residual hot condensate discharge was not adequately mitigated.

4.2.1. Contributing factor

Prior to commencing maintenance work on the main deck steam valve, the crew did not allow adequate time for the steam system to cool. In addition, the verification system to ensure that the steam line was fully depressurised was not used.

This was most likely due to the time pressures to reintroduce heating to the main engine fuel system. This resulted in the release of residual hot condensate when the valve was opened, and injuries to three crew members.

4.3. Undocumented drain line modification

Engineering drawings available on board clearly depicted the original configuration of the drain line, which discharged into an open hopper leading to the engine room bilges. However, during the ATSB's on board inspection, investigators identified that the drain line had been permanently re-routed to discharge into the steam side of the air ejector condenser system.

This modification did not align with the original design intent and was not reflected in any schematics or technical documentation.

Interviews with both the outgoing and incoming chief engineers confirmed that the modification predated their tenures and had not been formally recorded or communicated during handovers. In addition, no references to the change were found in recent handover notes, and no supporting documentation was available to explain the rationale or timing of the modification.

This meant that a permanent modification was implemented without supporting documentation or formal engineering review. Additionally, the modification was not incorporated into any risk assessment or technical records and no evidence was found to indicate that it had been subject to formal inspection or verification. This undocumented change introduced a system vulnerability that compromised the effectiveness of the steam system isolation.

4.3.1. Contributing factor

On board the *Wisdom Venture*, a permanent modification to the steam drain line was implemented without documentation. During the modification process, the change was not incorporated into a risk assessment and no formal review was conducted. This undocumented change likely introduced a system vulnerability that undermined the effectiveness of the steam system isolation. (Safety issue)

4.4. Unidentified engineering change

No documentation was found to indicate approval from the ship's manager, classification society or flag state for the modifications to the cargo heating system drain line. In addition, technical inspection records from the ship manager did not reference the modification, and condition reports rated the steam system as being in "good" condition without noting any deviations.

The absence of observations, or non-conformances, for this change suggests it was not detected during routine technical inspections or superintendent riding visits. This resulted in the Wah Kwong Ship Management (Hong Kong) management of change (MoC) framework, which required that any modification involving system layout changes be subject to formal risk assessment and documentation, not being effectively applied.

This unidentified modification highlights the importance of robust inspection protocols and documentation practices to ensure system integrity and compliance with approved design standards.

4.4.1. Other factor that increased risk

A modification to the cargo heating main steam system drain line was not identified during multiple company superintendent's visits. This resulted in the Wah Kwong Ship Management (Hong Kong) management of change framework, which required that any system modifications be subject to formal risk assessment and documentation, not being effectively applied. (Safety issue)

5. Findings

ATSB investigation report findings focus on safety factors (that is, events and conditions that increase risk). Safety factors include "contributing factors" and "other factors that increased risk" (that is, factors that did not meet the definition of a contributing factor for this occurrence but were still considered important to include in the report for the purpose of increasing awareness and enhancing safety). In addition, "other findings" may be included to provide important information about topics other than safety factors.

Safety issues are highlighted in bold to emphasise their importance. A safety issue is a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operating environment at a specific point in time.

These findings should not be read as apportioning blame or liability to any particular organisation or individual.

From the evidence available, the following findings are made with respect to the crew injuries during maintenance involving oil tanker *Wisdom Venture*, about 60 km east of Sydney, New South Wales on 6 May 2025.

5.1. Contributing factors

Prior to commencing maintenance work on the main deck steam valve, the crew did not allow adequate time for the steam system to cool. In addition, the verification system to ensure that the steam line was fully depressurised was not used. This was most likely due to the time pressures to reintroduce heating to the main engine fuel system. This resulted in the release of residual hot condensate when the valve was opened, and injuries to three crew members.

On board the *Wisdom Venture*, a permanent modification to the steam drain line was implemented without documentation. During the modification process, the change was not incorporated into a risk assessment and no formal review was conducted. This undocumented change likely introduced a system vulnerability that undermined the effectiveness of the steam system isolation. (Safety issue)

A modification to the cargo heating main steam system drain line was not identified during multiple company superintendent's visits. This resulted in the Wah Kwong Ship Management (Hong Kong) management of change framework, which required that any system modifications be subject to formal risk assessment and documentation, not being effectively applied. (Safety issue)

6. Safety issues and actions

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues. The ATSB expects relevant organisations will address all safety issues an investigation identifies.

Depending on the level of risk of a safety issue, the extent of corrective action taken by the relevant organisation(s), or the desirability of directing a broad safety message to the Marine industry, the ATSB may issue a formal safety recommendation or safety advisory notice as part of the final report.

All of the directly involved parties are invited to provide submissions to this draft report. As part of that process, each organisation is asked to communicate what safety actions, if any, they have carried out or are planning to carry out in relation to each safety issue relevant to their organisation.

Descriptions of each safety issue, and any associated safety recommendations, are detailed below. Click the link to read the full safety issue description, including the issue status and any safety action(s) taken.

Safety issues and actions are updated on this website when safety issue owners provide further information concerning the implementation of safety action.

6.1. Undocumented drain line modification

Safety issue number: MO-2025-004-SI-01

Safety issue description: On board the *Wisdom Venture*, a permanent modification to the steam drain line was implemented without documentation.

During the modification process, change was not incorporated into a risk assessment and no formal review was conducted. This undocumented change likely introduced a system vulnerability that undermined the effectiveness of the steam system isolation.

6.2. Unidentified engineering change

Safety issue number: MO-2025-004-SI-02

Safety issue description: A modification to the cargo heating main steam system drain line was not identified during multiple company superintendent's visits. This resulted in the Wah Kwong Ship Management (Hong Kong) management of change framework, which required that any system modifications be subject to formal risk assessment and documentation, not being effectively applied.

7. Glossary

- AMSA: Australian Maritime Safety Authority
- EGCS: Exhaust gas cleaning system
- MFO: Marine fuel oil
- MGO: Marine gas oil
- MoC: Management of change
- MPa: Megapascal
- PMS: Planned maintenance system
- PTW: Permit to work
- SMS: Safety management system
- VTS: Vessel traffic service
- 8. Sources and submissions
- 8.1. Sources of information

The sources of information during the investigation included the:

❑ ship manager and the ship staff of ship Wisdom Venture;
❑ ship manager's safety management system;
❑ shipboard checklists;
❑ alarm logs; and
❑ medical treatment records.

8.2. Submissions

Under section 26 of the Transport Safety Investigation Act 2003, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate.

That section allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the following directly involved parties:

❑ ship manager, master, chief engineer, fitter and oiler;
❑ Australian Marine Safety Authority;
❑ Hong Kong shipping registry; and
❑ Lloyd's register of shipping.

No submissions were received.

9. Purpose of safety investigations

The objective of a safety investigation is to enhance transport safety. This is done through:

- ❏identifying safety issues and facilitating safety action to address those issues; and
- ❏providing information about occurrences and their associated safety factors to facilitate learning within the transport industry.

It is not a function of the ATSB to apportion blame or provide a means for determining liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings.

At all times, the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner. The ATSB does not investigate for the purpose of taking administrative, regulatory or criminal action.

9.1. Terminology

An explanation of terminology used in ATSB investigation reports is available here. This includes terms such as occurrence, contributing factor, other factor that increased risk and safety issue.

10. Publishing information

Released in accordance with section 25 of the Transport Safety Investigation Act 2003.

Published by: Australian Transport Safety Bureau

Report: https://www.atsb.gov.au/sites/default/files/2025-09/Final%20report%20MO-2025-004.pdf

11. References

1. A tanker, usually between 80,000 and 120,000 dead weight tonnes.

2. Local time was Eastern Standard Time (EST), which is Coordinated Universal Time (UTC) +10 hours.

3. The Port Authority of New South Wales operates a 24-hour Vessel Traffic Service (VTS), with call sign "Sydney VTS".

4. A "spare boss" refers to an unused pre-installed or moulded connection point or fitting on a pipe or pressure vessel.

A future in marine surveying

THE following article was published in the AIMS Newsletter in July 2005 by Mike Bozier, former President of AIMS. Thanks to Capt Peter Murday.

Capt Peter Murday's views...

Mike was a foundation member of the AIMS and the first President of the AIMS in 1986. He was President for a total of eight years at various times, the last time being 1998-99. Mike was also a valuable mentor to all future Presidents thereafter.

Although this article is only 20 years old, it shows the great changes the industry has gone through in this relatively short period. The description of a surveyor's lot back in the 1960s makes us wish these days would return. Alas, it is not to be.

In the last three paragraphs, Mike peered into the "cloudy crystal ball" to try to predict where the industry was headed. The final paragraph is interesting, in that the surveys described therein as being done "so little" are these days big business for many of our members.

The marine surveying industry has grown and adapted to meet changing requirements of our export-import businesses and the demands of an ever-growing recreational / DCV area. What will the industry – and the AIMS – look like in 2045?

Mike Bozier article

In considering possible future trends in our profession in Australia, a look at where we have come from seems appropriate.

At the end of the 1960s, there were 10 private, fulltime surveyors working in Sydney, plus two who looked after oils and chemicals and two who only adjusted compasses. Three firms worked for shipping companies and shipping agencies but also worked for some cargo insurers, such as South British Insurance, that no longer exist.

Quite often, if there was a conflict of interest with the surveyors' client, the shipping agency and the insurer would agree to the surveyors representing both of them and splitting the survey fees.

The Sydney Marine Underwriters' Association employed two staff surveyors who also carried out some pre-loading inspections of grain ships. The position in Melbourne was similar, although one company dominated the shipping company work. There was also a Victorian Marine Underwriters' Association.

Marine surveying has evolved continuously. In the 1930s, a marine surveyor travelled into the wharfs by train or bus in the morning, worked his way around the ships in which he was interested, had a leisurely lunch on most days and wrote reports in the afternoon. At the end of the 1960s, the system was similar but cars were essential.

General cargo was still discharged with ship's gear, usually derricks, and stacked in a wharf shed. Damaged cargo was stored in a wharf "deadhouse" for inspection by the consignee's customs agent and the ship's surveyor. In the event of major damage, such as to a piece of machinery, a joint survey would be held at the wharf with the cargo insurer's surveyor and a representative of the consignee.

It was uncommon for a ship's surveyor to carry out a further inspection of damage at a consignee's premises. In August and September, Christmas imports would be flooding in. There could be upwards of a hundred cartons of "Matchbox"-brand models in the deadhouse, with windows cut in the side of each, and part of the contents missing. Each carton had to be opened, the missing items identified and their invoice value shown on a Customs form to claim a rebate of duty.

In 1985, when AIMS was being set up, there were 19 private surveyors in New South Wales, 12 in Victoria, 15 in Queensland, six in South Australia and three in Tasmania. There was also a Marine Surveyors Association in Western Australia, with 10 members. Of these 64 surveyors, 56 became founder-members of AIMS.

Survey work had continued to evolve. The first overseas cellular container ship had arrived in Australia at the end of 1968. By 1985, general cargo ships were uncommon in Australia. Small geared bulk carriers were used for steel cargoes, PCC vessels had appeared, and the export of coal and wheat from Sydney had ceased.

Container shipping companies still packed small consignments in their own containers (LCL cargo) and required damaged cargo surveys prior to delivery to a consignee. The State marine underwriters' associations had gone after the formation of the

Insurance Council of Australia, as had many of the smaller insurance companies.

The work done by surveyors polarised. The majority of surveyors worked for shipping companies and agencies or for cargo insurers but none worked for both. The only exception was in legal actions, where similar expertise might be required by each party. With the increase in litigation, work as an expert witness was becoming more common.

At present, AIMS has 100 active members, working in all States and three members working overseas. Some members have specialised in one type of surveying but the majority still cover a number of different fields. The State capital ports handle the bulk of general cargo import and exports, while the out-ports handle bulk commodities.

With the introduction of IMO recommendations on packing cargo into containers and on the stowage and securing of cargoes in ships' holds, the introduction of ISM code, the increase in container shipping company expertise in the carriage of refrigerated and special cargoes, and the phasing out of LCL consignments due to the proliferation of freight forwarders, the incidence of minor cargo damage requiring a marine surveyor's report has diminished. This is reflected in the fact that a number of the Institute's older, active members in the main ports have chosen not to work fulltime.

So what is the future for a marine surveyor in Australia? AIMS has 23 probationary members, most of whom have completed or are completing the AMC course for Certificate IV in Commercial Marine Surveying. Some of these are working in the recreational craft industry. Others are working in ship construction and maintenance or associated industries, and 10 are engaged in marine surveying.

With the reduction in Australian-registered ships and the migration of Australian seafarers offshore, together with the reduction in the numbers of western European officers, the traditional source of marine surveyors has drastically reduced.

Allied to this is the general shortage of persons with maritime qualifications for competing occupations, such as harbour and Reef pilots, port operations, ship operations, maritime college lecturing and government departments such as DoTaRS. It seems that there will be enough survey work to choose from but the type of work will continue to change. Continuing flexibility and a willingness to continue to learn will be prime requisites for a successful surveyor.

Exports of bulk commodities from Australia will continue to increase for the foreseeable future and the associated marine survey work should also increase – draught surveys, on/off hire, vessel condition inspections and damage surveys. The import and export of bulk oils and chemicals will also probably increase.

Work in the main ports on container cargoes and PCC and RoRo cargoes will probably contract, as a percentage of the volumes carried, for the reasons previously mentioned. The major potential change is with marine insurance surveying.

If the marine sections are absorbed by the general sections of insurance companies and the transport claims are "commoditised" in a manner similar to that which has started for general and household claims, then marine insurance surveyors may have to decide if they wish to remain in their positions.

Most work for themselves, handling the full range of insurance work up to and including the giving of evidence in court actions. Surveyors of this sort will probably change to consultancy work or move out of survey work all together. Previous AIMS members now work for Commonwealth Government bodies, in port operations and in harbour pilotage.

Peering into a cloudy crystal ball, it seems likely that, over the medium term, work in the main ports will polarise further. The international inspection companies will try to expand their customer base by offering national coverage – a one-stop shop approach. This would appeal to the accountants who increasingly are pushing for immediate, bottom-line results with no regard for a long-term outlook.

At the other extreme will be small, local survey companies offering consultancy-type services that include acting as an expert witness. They will be available when a wharf hits a ship, a portainer crane falls over just as a ship is berthing, a heavy lift topples over just as its weight is being taken and other on-off events but it is unlikely that there will be enough of them to represent all interested parties

The hardest thing to understand is why there is so little precautionary survey work, such as pre-loading hold-condition inspections, supervision and certification of the stowage and securing heavy cargo in holds, stowage and securing of heavy and awkward consignments on flatracks and in containers, and the adequate protection of sensitive cargo from moisture damage. The cost of one claim would pay for a large number of preventative surveys.

Mike Bozier
Past President,
AIMS

From engine room to surveyor's desk: my journey in the maritime sector

WHEN Eric from the Australian Institute of Marine Surveyors suggested I write about my journey instead of another technical deep-dive, I thought, "Now that's a great idea!" While I'm usually focused on compliance reports and technical analyses for *Shipshape*, every bit of that expertise stems from an interesting career journey – a story of continuous learning, serious challenges and a commitment to maritime excellence.

I started, quite literally, right in the engine room. After scoring a university gold medal in marine engineering, I spent the next decade working my way up from a trainee to a management-level engineer officer on huge ocean-going LPG tankers, oil tankers and bulk carriers.

Life at sea isn't just a job: it's a high-intensity crash course in reality. You're running a massive, floating factory far from land. Teamwork, quick thinking and resilience aren't things you talk about – they're what you rely on every single hour to keep the vessel safe and the mission compliant.

The management-level engineer officer's crucible

As a management-level engineer officer, I wasn't just fixing machines; I was managing complex operational cycles. I've taken delivery of new ships, which is akin to managing a greenfield commissioning project from scratch. I've overseen multiple dry dockings, which require the meticulous shutdown and restart of the entire vessel's technical plant.

Beyond the technical competency, life onboard taught me true leadership and parallel thinking. You learn resilience from being separated from your family for months, from solving complex mechanical failures in the middle of the Pacific and from staying calm when a severe storm hits. You learn to lead diverse teams, working closely with people from five different nationalities, fostering a shared commitment to safety and efficiency. This intense operational environment was the crucible where my leadership and diagnostic skills were forged.

Pivoting to the shore

The sea life is incredible but, eventually, the industry or life itself pushes you ashore. When travel restrictions (due to COVID-19 travel restrictions) made sailing tricky, I didn't step away – I just changed my angle. I started freelancing as a superintendent, helping overseas ship managers from the ground here in Australia (while the ships they manage were in Australian ports). That naturally got me deeper into the regulatory world, and I picked up experience as a flag state inspector, which was a fantastic crash course in compliance.

That path, of course, led me right to the role I have today: class surveyor and auditor for an IACS society.

The surveyor's perspective

After years of running the show, becoming a class surveyor an auditor flipped my perspective entirely. Instead of managing the system, I now verify it – which is much more interesting than it sounds!

I work for an IACS society and my main mission is making sure ships meet those crucial international standards.

That means everything from detailed surveys of the hull, machinery and equipment to diving deep into a company's safety management system (SMS) and auditing against frameworks like ISM, ISPS and MLC.

Honestly, it's about much more than ticking boxes. Because I've actually lived the journey and been on the receiving end of inspections, I know exactly where the pressure points are and what robust ship operation truly looks like in practice. This hands-on knowledge is key. It allows me to collaborate with ship operators and onboard crew to not just find issues but genuinely guide them towards building operations that are truly resilient and sustainable.

Beyond compliance: the business angle

During my sailing days, a crew member got me hooked on stock investing and, suddenly, my curiosity went way past machinery manuals! To invest smartly, I realised I had to truly understand how businesses work. I ended up diving headfirst into finance, operations, strategy and marketing – all self-taught. It was fascinating to learn how companies grow, compete and stay relevant, looking at industry models and economic trends.

What really connected the dots was my audit work. I kept seeing the same thing: maritime businesses run by technical and operational experts, but they often get stuck when trying to turn that brilliance into clear, scalable and sustainable growth systems.

This observation lit up my next goal. I realised that my combined skill set – the hands-on knowledge from ship, the systematic checks from surveying and the strategic deep-dive from my own studies – is perfectly built to help these maritime ventures.

Let's talk growth

If you're a business owner or operator maritime sector, I'd genuinely love to have a cup of coffee or have a chat over the phone or online with you. (My shout!). I'm keen to understand the unique challenges your business faces and perhaps I can throw in a few good ideas or insights based on my journey. Let's talk growth!

Kalyan Das
ISM-ISPS & Service Supplier Auditor, Marine Surveyor, MLC Inspector at RINA and AIMS member

Fire protection industry permit scheme and penalties under ozone legislation

IN Australia, controls for ozone depleting substances (ODS) and synthetic greenhouse gases (SGG) are achieved under the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* (the Act) and the *Ozone Protection and Synthetic Greenhouse Gas Management Regulations 1995* (the Regulations).

These controls are in place to:

- promote the responsible management of scheduled substances to minimise their impact on the atmosphere;
- provide controls on the manufacture, import, export and use of SGGs under the Framework Convention on Climate Change and the Kyoto Protocol;
- encourage industry to replace ozone depleting substances; and
- ensure Australia meets its international obligations under the Vienna Convention and the Montreal Protocol.

The Act and Regulations control the acquisition, possession, disposal and handling of controlled extinguishing agents for the fire protection industry in Australia.

These controls apply to any ODS or SGG extinguishing agent scheduled under the Act, including but not limited to the following.

Commonly used

- Heptafluoropropane (HFC–227ea)
- Bromochlorodifluoromethane (BCF)
- Bromotrifluoromethane (BTM)
- Hydrochlorofluorocarbon (HCFC Blend A and HCFC Blend C)

Limited use

- Tichlorofluoromethane (CFC-11)
- Trifluromethane (HFC-23)
- Pentafluoroethane (HFC-125)
- Hexafluoropropane (HFC-236fa)
- Cholorotetrafluoroethane (HCFC-124)
- Perfluorobutane (PFC-410)

1. Permit or Authorisation Required – acquisition, possession, disposal or handling

You are required to obtain an appropriate licence, permit or authorisation from the Fire Protection Industry (ODS & SGG) Board if you acquire, possess, dispose or handle any of the extinguishing agents scheduled under the Act. These requirements are also in place for Halon.

Special arrangements may apply to operators of approved destruction facilities and to handling equipment or controlled extinguishing agents in the aviation, marine or Defence Force industries. For more information, contact the Fire Protection Industry (ODS & SGG) Board.

2. Handling a controlled extinguishing agent

Handling a controlled extinguishing agent means doing anything with an extinguishing agent that carries the risk of emission. This includes, but is not limited to:

- decanting the agent;
- installing or maintaining fire protection equipment; and
- decommissioning or disposing of fire protection equipment.

3. Application

Application forms for an appropriate licence, permit or authorisation are available at www.fpib.com.au.

It is important that applicants submit correct and accurate information. Severe penalties may apply if a person submits false or misleading information.

4. Conditions of licences, permits or authorisations

Technicians and companies in the fire protection industry who hold a licence, permit or authorisation are required to meet the conditions of their licence, permit or authorisation. These conditions are in place to prevent avoidable emissions of an extinguishing agent and, where required, ensure appropriate records are kept.

Details of the conditions are included with the licence, permit or authorisation. In addition, the Fire Protection Industry (ODS & SGG) Board encourages technicians to work in accordance with the ODS & SGG Good Practice Guide which complements the Regulations to safeguard the environment. The Good Practice guide is available here.

Penalties of $16,500 may apply if you acquire, possess, dispose or handle any of the scheduled extinguishing agents without the appropriate licence, permit or authorisation. This increases to $19,800 for a body corporate in certain cases. A permit or authorisation may be cancelled

Fire Protection Industry (ODS & SGG) Board

or suspended if a condition is not met.

5. Discharging a controlled extinguishing agent

Discharging a controlled extinguishing agent can have an impact on the atmosphere. For this reason, the Act and Regulation allow for civil penalties for individuals of $99,000 and up to $495,000 for a body corporate for the unlawful discharging of a controlled extinguishing agent into the atmosphere.

The Act and Regulations also allow inspectors to issue infringement notices to individuals or a body corporate if there are reasonable grounds to believe a person has caused an unlawful discharge of a controlled extinguishing agent into the atmosphere. Individuals can be fined up to $3,960 and a body corporate up to $19,800.

It is not an offence to use a controlled extinguishing agent to prevent, control or extinguish a fire or to suppress an explosion.

In some limited circumstances, such as to test or calibrate a fire extinguishing system, the Fire Protection Industry (ODS & SGG) Board may approve the discharge of a controlled extinguishing agent. For more information, please contact the Fire Protection Industry (ODS & SGG) Board.

6. Monitoring licences, permits and authorisations

The Fire Protection Industry (ODS & SGG) Board in conjunction with the Department of Climate Change, Environment, Energy & Water (DCCEEW) undertakes a range of monitoring, intelligence, compliance and enforcement activities.

The purpose of these activities is to ensure that technicians and companies that acquire, possess, dispose or handle controlled extinguishing agents, hold an appropriate licence, permit or authorisation under the Act and Regulations, and the relevant conditions are being met.

Inspectors may arrive unannounced at premises to check compliance with the Act and Regulations and ask to see a licence, permit or authorisation. Where considered necessary, inspectors may also request to see documentation, records or equipment required as a condition of a licence, permit or authorisation.

7. Non-compliance with the Act and Regulations

Non-compliance with the Act or Regulations may result in:

- a criminal prosecution;
- a civil penalty order (where available); and
- infringement notice being issued.

In addition, non-compliance can result in the cancellation of a licence, permit or authorisation if the holder is no longer a fit and proper person, or has contravened a condition of the licence, permit or authorisation.

In some cases, the Minister or another person may also seek an injunction to:

- restrain a person from doing a thing that is a contravention of the Act or Regulations; or
- require a person to act if failure to act is a contravention of the Act or Regulations.

Licence, permit and authorisation-holders found to have not complied with the Act or Regulations will be monitored for ongoing compliance and may be the subject of increased compliance activities by the Department and the Fire Protection Industry (ODS & SGG) Board.

8. Reporting non-compliance

If you have any information about the acquisition, possession, disposal and handling of controlled extinguishing agents in Australia that may not comply with the requirements of the Act or Regulations please contact the Fire Protection Industry (ODS & SGG) Board. Information reported to the Fire Protection Industry (ODS & SGG) Board will be held in the strictest confidence.

Handling extinguishing agent without an extinguishing agent handling licence or a special circumstances exemption	r 302	Penalty for an individual: 50 penalty units ($16,500)
Acquiring, possessing or disposing of bulk extinguishing agent without approval	r 303	Penalty for an individual: 50 penalty units ($16,500) Penalty for a body corporate: up to 60 penalty units (18,780)
Possessing halon without approval	r 304	Penalty for an individual: 50 penalty units ($16,500) Penalty for a body corporate: up to 60 penalty units ($19,800)
Engaging in conduct leading to the discharge of a scheduled substance	s 45B	Penalty for an individual: 300 penalty units ($99,000) Penalty for a body corporate: up to 1,500 penalty units ($495,000) Infringement notice for an individual: up to 12 penalty units ($3,960) Infringement notice for a body corporate: up to 60 penalty units ($19,800)
Making a false or misleading statement or providing a document containing false or misleading information in relation to a licence, permit or authorisation application	s 62	Civil penalty for an individual: up to 120 penalty units ($39,600) Civil penalty for a body corporate: 600 penalty units ($198,000) Criminal penalty: imprisonment for 2 years
Making a false or misleading statement or providing a document containing false or misleading information to an inspector	s 62	Civil penalty for an individual: up to 60 penalty units ($19,800) Civil penalty for a body corporate: 300 penalty units ($99,000) Criminal penalty: imprisonment for 12 months
Intentionally obstructing, hindering or resisting an inspector or a person assisting an inspector	s 63	Civil penalty for an individual: up to 30 penalty units ($9,900) Civil penalty for a body corporate: 150 penalty units ($49,500) Criminal penalty: imprisonment for 6 months
Refusal or failure to answer an inspector's question or produce a document required by an inspector	s 64	Civil penalty for an individual: up to 60 penalty units ($19,800) Civil penalty for a body corporate: 300 penalty units ($99,000) Criminal penalty: imprisonment for 12 months

9. Monitoring licences, permits and authorisations

The Fire Protection Industry (ODS & SGG) Board, in conjunction with the Department of the Environment & Energy (the Department), undertakes a range of monitoring, intelligence, compliance and enforcement activities.

The purpose of these activities is to ensure that technicians and companies that acquire, possess, dispose or handle controlled extinguishing agents hold an appropriate licence, permit or authorisation under the Act and Regulations, and the relevant conditions are being met.

Inspectors may arrive unannounced at premises to check compliance with the Act and Regulations, and ask to see a licence, permit or authorisation. Where considered necessary, inspectors may also request to see documentation, records or equipment required as a condition of a licence, permit or authorisation.

10. Non-compliance with the Act and Regulations

Non-compliance with the Act or Regulations may result in:

- a criminal prosecution;
- a civil penalty order (where available); and
- infringement notice being issued.

In addition, non-compliance can result in the cancellation of a licence, permit or authorisation if the holder is no longer a fit and proper person, or has contravened a condition of the licence, permit or authorisation.

In some cases, the Minister or another person may also seek an injunction to:

- restrain a person from doing a thing that is a contravention of the Act or Regulations; or
- require a person to take action if failure to act is a contravention of the Act or Regulations.

Licence, permit and authorisation-holders found to have not complied with the Act or Regulations will be monitored for ongoing compliance and may be the subject of increased compliance activities by the Department and the Fire Protection Industry (ODS & SGG) Board.

11. Reporting non-compliance

If you have any information about the acquisition, possession, disposal and handling of controlled extinguishing agents in Australia that may not comply with the requirements of the Act or Regulations, please contact the Fire Protection Industry (ODS & SGG) Board. Information reported to the Fire Protection Industry (ODS & SGG) Board will be held in the strictest confidence.

Fire Protection Industry (ODS & SGG) Board

Sexual harassment and power imbalance: a $305,000 Federal Court warning for employers

The following article was published by Jonathan Mamaril, Director at South Geldard Lawyers on 20 November 2025.

SEXUAL harassment remains one of the most serious and preventable risks in Australian workplaces. Recent reforms, increased public awareness and the shift toward a positive duty to eliminate harmful behaviour mean employers are under closer scrutiny than ever.

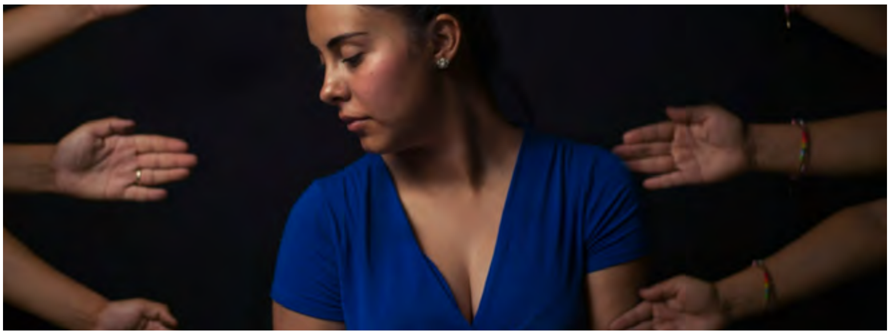
The Federal Court's decision in Magar v Khan [2025] FCA 874 is a powerful reminder of what can happen when poor culture, unchecked behaviour and power imbalances collide. It is also the first judgement to consider the new section 28AA of the *Sex Discrimination Act 1984*, which deals with harassment on the ground of sex.

Section 28AA of the *Sex Discrimination Act 1984* (Cth) defines harassment on the ground of sex as unwelcome, demeaning conduct based on a person's sex that a reasonable person would anticipate would cause offence, humiliation or intimidation. This can include comments, jokes or displaying sexist materials and captures behaviour that is not necessarily sexual in nature but is demeaning due to someone's sex.

For HR and People and Culture leaders, this case contains essential insights about culture, accountability and the rising level of damages awarded by the courts with particular regard to sexual harassment.

1. A case that highlights culture, power and vulnerability

Ms Magar worked as a shift supervisor at a Mad Mex franchise owned and operated by Mr Sonny Khan. She was young, new to Australia, financially dependent on the work and without local family support.



The workplace was male-dominated and the Court accepted evidence of:

- regular crude jokes;
- demeaning comments about women; and
- inappropriate behaviour among a group of male staff.

Justice Bromwich described the culture as one that tolerated "sexist" and "boorish behaviour". According to the Court, this type of environment can normalise disrespect and lay the groundwork for more serious conduct to occur. This context was critical in assessing the allegations.

It also demonstrated the significant power imbalance between Mr Khan, who ran the business, and the young employee who relied on him for income and direction.

2. Testing the new law on harassment based on sex

One of the key issues was the meaning of harassment on the ground of sex under section 28AA. This provision was introduced after the Respect at Work report and was designed to capture demeaning conduct related to a person's sex, even when it is not sexual in nature.

For this claim to succeed, the conduct must have a clear connection to the person making the complaint. Justice Bromwich confirmed that there must be a rational link between the behaviour and the individual who says they were harassed. It cannot be a generalised observation about a problematic culture unless that culture was expressed in a way that relates to the person affected.

In this case, although the workplace culture was plainly inappropriate, the Court found that the broader conduct among staff was not sufficiently connected to Ms Magar herself. The sex-based harassment claim therefore failed.

In practical terms, the culture was offensive and sexist, but the legal test required more than that.

3. Serious sexual harassment proven

The failure of the sex-based harassment claim did not prevent the Court from making very significant findings of unlawful sexual harassment.

The Court accepted that Mr Khan:

- questioned Ms Magar about a hickey and her sexual activity in graphic detail;
- asked intrusive personal questions about her sex life;
- showed her pornographic material;
- showed her sex toys, asked

her to comment on them, and touched her with them;

- encouraged her to go to a massage parlour or hotel with him; and
- asked her to watch pornography with him in private settings.

These events occurred repeatedly over several weeks. Justice Bromwich preferred the evidence of Ms Magar to that of Mr Khan, importantly noting that her continued attendance at work did not undermine her credibility. The Court commented that people often continue working despite harassment because they need their job, especially when vulnerable or financially dependent.

This finding reinforces that HR teams must take a nuanced approach when assessing credibility. An employee's decision to remain at work rarely means the conduct did not happen.

4. Victimisation through legal threats

After Ms Magar made an internal complaint to Mad Mex, Mr Khan became aware that she was the complainant. He then issued formal letters through his lawyers, accusing her of defamation and demanding she withdraw her statements.

The Court found these letters were intended to intimidate her. They discouraged her from pursuing her rights and therefore constituted victimisation under the Sex Discrimination Act.

This aspect of the case is a significant reminder for HR and employer representatives. Any action that could be perceived as punishing an employee for raising concerns can attract liability in its own right.

6. A landmark damages award

Justice Bromwich ordered Mr Khan to pay $305,000, which included:

- $160,000 general damages for sexual harassment;
- $10,000 general damages for victimisation;
- $5,000 aggravated damages due to aspects of the defence;
- $90,000 past economic loss; and
- $40,000 future economic loss.

This is one of the larger awards for sexual harassment in Australia. The Court emphasised that sexual harassment damages are not assessed by simple comparison with earlier cases. Previous decisions provide guidance but do not cap or limit what a court can award.

The judgement reflects community expectations and the trend toward stronger financial consequences for workplace misconduct.

7. Key lessons for HR and People & Culture teams

1. **Culture is not a side issue. It is evidence.**

A workplace that tolerates sexist comments or disrespect can be used as contextual proof of more serious allegations. Culture creates risk and courts are increasingly relying on cultural evidence.

2. **Power imbalance magnifies the seriousness of conduct.**

Young, migrant, casual and visa-dependent workers may have limited ability to push back. Courts will consider these factors.

3. **Policies and training are not enough without enforcement.**

A written policy does little if managers model poor behaviour or allow others to do so.

4. **Threatening a complainant can create a new legal breach.**

Victimisation is unlawful. Heavy-handed responses, warning letters or legal threats can generate additional liability.

5. **Early HR intervention can prevent escalation.**

Proactive training, accessible reporting mechanisms and independent investigations are essential. Where the accused is in a position of authority, external investigators are strongly recommended and those investigations should really be under legal professional privilege.

8. What could HR and P&C teams do now?

Review sexual harassment policies to ensure they reflect the extended legal definitions.

Deliver training that addresses both sexual and sex-based harassment. Training from a law firm who are experts in this area could be a consideration.

Strongly consider independent investigations in sensitive or senior-level allegations and those investigations should really be under legal professional privilege.

Audit workplace culture, especially in male-dominated environments and, if need be, look at potential solutions, most likely starting with management training on sexual harassment.

Ensure reporting pathways are safe and do not require employees to raise complaints directly with the alleged harasser.

Respond to complaints promptly and without any conduct that could be interpreted as retaliation.

These actions support compliance with the positive duty to eliminate harmful conduct and reduce exposure to significant financial and reputational risk.

You can reach out on (07) 4936 9100 or via email to Jonathan Mamaril, Jonathan Mamaril, Director at jmamaril@southgeldard.com.au. All employers receive an obligation-free consultation.

Automating Draft Surveys using Artificial Intelligence

Samuel Frick[1], Rowan Murcott[1], and Aidan D'Souza[1]
[1] OMC International, Melbourne, Australia; s.frick@omcinternational.com

Abstract
In the modern world, ports are ever looking for a competitive edge over their peers. As processes are continuously improved and refined, efficiency and safety gains are often sought. One area of operations that has seen relatively little modernisation is that of draft surveying, which has followed the same basic principles for hundreds of years, involving trained surveyors manually inspecting the draft marks around the hull of a vessel.

An important part of any transfer of cargo to or from a vessel, particularly solid bulk cargoes, a draft survey is the process in which the weight of cargo on a vessel is determined. Once the draft is known, Archimedes' principle can be used to determine displacement of a vessel and, after making appropriate deductions, the weight of cargo. By performing a draft survey both before and after any loading operations the amount of cargo transferred can be calculated. However, performing a draft survey generally requires cargo transfer operations to be paused for a non-trivial amount of time and may place the surveyors in potentially hazardous situations near mooring lines or underneath overhead objects.

The fields of computer vision and machine learning have made significant improvements in the past years, allowing for novel solutions to problems such as this, requiring human observation and judgement. This paper introduces the Optical Draft Intelligence Network (ODIN) technology (patent pending), which uses wharf mounted CCTV and LiDAR devices, powered by artificial intelligence, to monitor vessel draft in real time, throughout the entirety of stay at berth, as well as providing additional information such as drift detection, list, and trim. This technology can be used by surveyors to instantly obtain the draft from any internet enabled device, reducing both cargo transfer delays and potential safety issues.

Keywords: draft survey, draft, list, artificial intelligence, port operations.

1. Introduction

1.1 Draft Surveying

An essential component in many calculations related to a vessel, the draft of a ship is the vertical distance from the waterline to the keel. Under keel clearance (the distance between the keel and the sea floor) and air draft (the distance from the waterline to the highest point on the vessel) are perhaps the most obvious of these, with ports having minimum requirements in place when needed to ensure a vessel can transit safely. However, the main economic use case of vessel draft is in calculating vessel displacement, which when transporting bulk cargoes is often used as a method to determine the amount of product transferred to or from a vessel (United Nations, 1992). An accurate reading of the draft is required as errors may result in significant over or under representation of the amount of product on a vessel.

Traditionally, the draft has always been determined by having a trained surveyor encircle the vessel to read each set of draft marks. Vessels will generally have six sets of draft marks, located at mid ship and at the forward and aft perpendiculars, on both the port and starboard side. If not physically at these locations, corrections are made to the observed values. Depending on the sea state, each reading may take several minutes, with the entire process generally taking around 30 to 60 minutes to complete.

Once the draft marks have been read, there are several steps to calculate the displacement, with the draft firstly being averaged between the port ($draft_p$) and starboard ($draft_s$) side at each location (Equation 1), and then averaged across the ship to minimise errors due to vessel hog or sag (Equation 2), resulting in what is known as the quarter mean draft (Dibble & Mitchell, 2009).

$$draft = \left(draft_p + draft_s\right)/2 \quad (1)$$

$$quarter\ mean\ draft = (draft_f + 6 * draft_m + draft_a)/8 \quad (2)$$

Once the quarter mean draft is known, this can be used to determine the volume of the vessel underwater (V), and by multiplying this by the density (ρ) of the water one can obtain the mass of water displaced (m, Equation 3). Archimedes' principle then equates this displaced water mass with that of the vessel, giving the vessel displacement.

$$m = \rho V \tag{3}$$

In practice, accurately determining the submerged volume of the vessel is not trivial due to the complex shape of the hull and so each vessel comes equipped with a precomputed hydrostatic table that equates the quarter mean draft with a displacement, generally for both sea (~1.025 g/cm^3) and fresh water (1 g/cm^3) densities.

This process to determine the vessel displacement is performed multiple times during cargo transfer operations, at a minimum at both the start and end. By taking the difference of the displacement measured at these two times and making allowances for ballast operations and other transfers to/from the vessel, the amount of cargo transferred can be determined, as shown in Equation 4.

$$m_{cargo} = disp_{end} - disp_{start} - allowances \tag{4}$$

While some automation has been added to this process as computers have been introduced, with spreadsheets or dedicated programs generally used for performing draft corrections and displacement calculations, the main time sink of the surveyor physically reading the draft marks has remained the same for hundreds of years (United Nations, 1992). Unfortunately, this step places the surveyor in potentially hazardous situations, with mooring lines and cranes often near the draft marks, and so cargo transfer operations will be paused during this time to help minimise these risks, but at the trade-off of more time at berth. There is also the variable human element involved in the reading process, with different surveyors potentially giving differing values. Being able to automate this step would remove these issues and potentially allow for continuous loading operations while vessels are at berth.

1.2 Artificial Intelligence and Computer Vision

Computer vision (CV) is a field of research concerned with using computers to analyse images and extract information from them, which can then be used to inform other decisions. Early methods were heavily reliant on image processing to identify edges and then construct simple shapes but were limited in identifying more complex objects. The rise of artificial intelligence (AI) in the 2010s led to deep learning methods, which instead use artificial neural networks (ANNs) to extract features from images, with identification being limited to the types of objects the ANN was trained upon (Ren et al. 2016). To achieve this greater flexibility, far more computing resources are required, but with the technological improvements to graphics processing units (GPUs), which are now designed to efficiently run ANNs, these models can be run at large scale, either locally or in the cloud.

Broadly speaking, there are four methods of recognising objects with computer vision (He et al. 2018). Illustrated in Figure 1, these are:

- Image classification, where the object classes present in the image are identified.
- Object detection (Figure 1b), where each instance of an object is given a bounding box for its position.
- Semantic segmentation (Figure 1c), where each pixel in the image is assigned to an object class.
- Instance segmentation (Figure 1d), where object detection and semantic segmentation are combined, assigning each pixel to unique instances of each object class.

By using these computer vision techniques, if a live camera feed of a vessel's draft marks were available, an ANN could be trained to recognise the draft marks and report the draft in real time, preventing the need for surveyors to manually view each mark. This problem is solved by OMC International's Optical Draft Intelligence Network (ODIN) technology (patent pending), which observes the draft marks through a combination of cameras and LiDAR devices, continuously providing the draft of a vessel times while it is at berth. ODIN is a passive system that is completely port based, imposing no further restrictions on vessels than those required for a traditional draft survey, and so can be used with all vessels.

2. Data Collection

To determine the quarter mean draft of a vessel, the draft of all six draft marks must be obtained. A typical ODIN installation will do this by using cameras installed on a wharf to provide a real time video stream of the wharf side draft marks, to which we can apply computer vision to determine the wharf side draft. Obtaining the opposite side draft marks is more difficult, as these may be facing out to sea, where no hardware can be installed, or backing on to a channel, where you will have passing vessels or possibly other berths. Wharf side LiDAR sensors are therefore used to precisely measure the vessel's angle of list, from which we can obtain the opposite side draft marks using trigonometry.

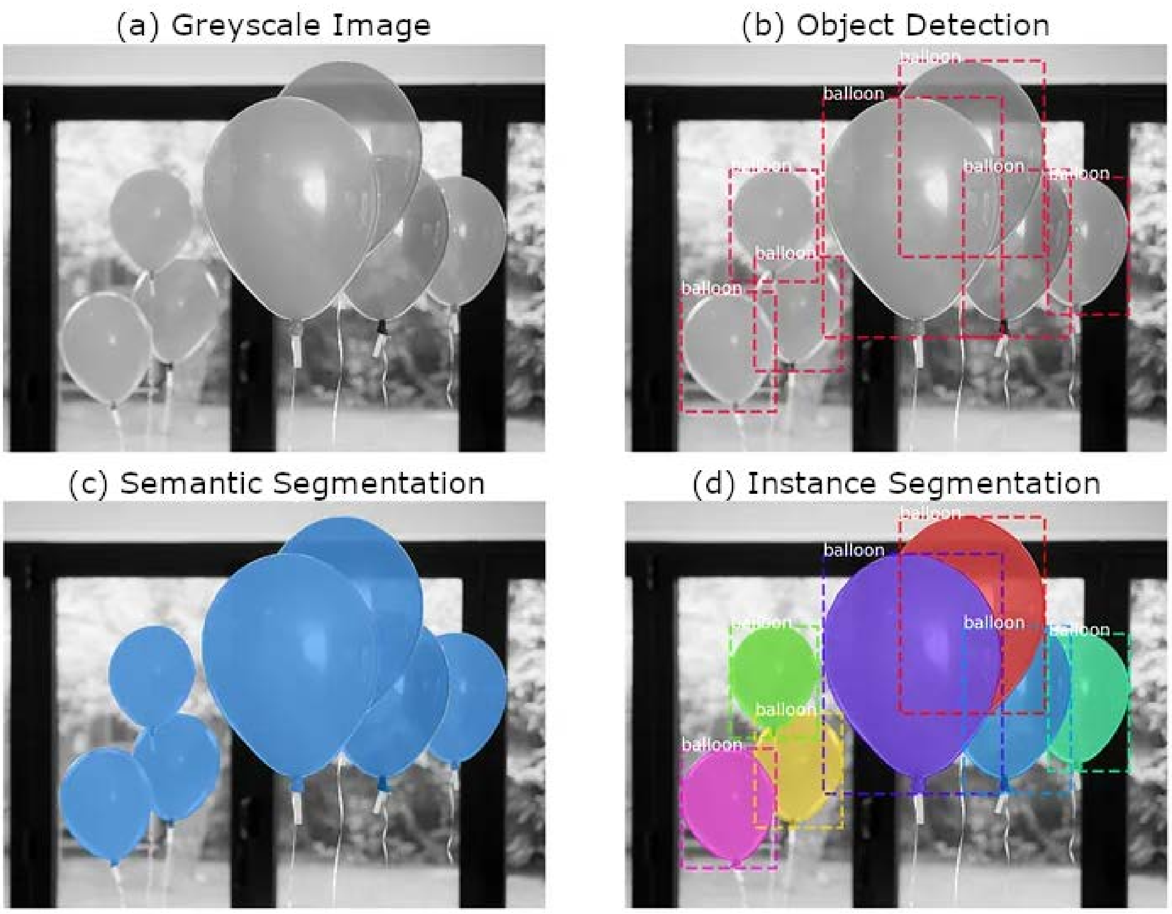


Figure 1 Illustration of computer vision methods, demonstrated on an image of balloons. Showing the original image (a), object detection (b), semantic segmentation (c), and instance segmentation (d). Adapted from Abdulla (2018).

As the length of cargo vessels can range significantly depending on vessel class, sensors must be carefully placed across berths to capture all necessary information. Choosing these locations is a complex process that must consider the following factors:

- The existing wharf infrastructure (fenders, dolphins, etc.) that may block view.
- Where vessels are aligned with the wharf.
- Variations in draft mark location on vessels.
- Minimum and maximum effective distances for each sensor.
- Lighting and environmental conditions.
- Access to power and network utilities.

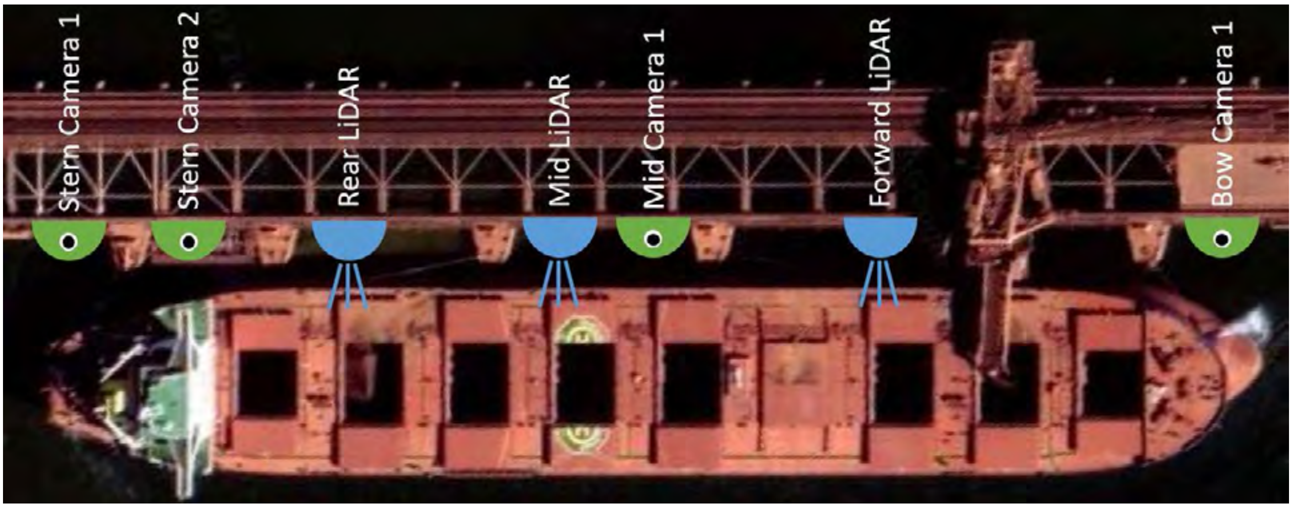


Figure 2 Example berth layout of ODIN sensors, with cameras shown in green and LiDAR shown in blue. Two stern cameras are required to ensure the stern draft marks can always be viewed around the stern mooring dolphins.

As such, each berth will have a custom setup to ensure all draft marks can be determined, possibly with multiple sensors for some locations. Figure 2 shows an example berth layout, requiring four cameras and three LiDAR sensors to accurately capture all draft marks.

2.1 Cameras

Cameras are the primary data collection device for ODIN, providing a real time stream of video data of the wharf side draft marks of a vessel. By using cameras, the fundamental process of visually observing the draft remains unchanged, with a computer now interpreting the visual instead of a person. Additionally, the recorded video feed can assist in validation if there are ever any queries about ODIN results.

As all vessels are different and never align at berth in the same location, cameras must support pan, tilt, and zoom (PTZ) functionality and not be fixed to one viewing angle, allowing the device to rotate and zoom to the correct orientation to view the draft marks. Continual camera adjustments are required throughout the time a vessel is at berth as it rises and falls with the tide, and if there is any lateral movement along the berth.

2.2 LiDAR

Light detecting and ranging, abbreviated to LiDAR, is a method for determining distances by shooting a target object with a laser and measuring the time it takes for the reflected light to return. By using a mirror rotating in one dimension to angle the laser, a scan can be made in a line, allowing for a 2D plane to be constructed, while rotating in another orthogonal dimension allows for a 3D scan to be taken.

For use in ODIN, LiDAR sensors are mounted on the wharf to take a vertical scan of the vessel hull. They are mounted more toward the centre of the vessel where the freeboard is flat, as opposed to near the bow or stern where there is more curvature, to ensure the list is accurately calculated. Multiple sensors will generally be installed, allowing the list along the vessel to be determined, which can also be used to show torsional rotation of the vessel.

3. Data Processing

3.1 Reading the wharf side draft

The wharf mounted cameras provide a constant video stream, which is made up of HD images at 25 FPS. To determine the draft in each frame, the below steps are followed, shown in Figure 3.

1. The image is sent through a CV model that performs object detection to identify the draft marks and their locations.
2. A draft ruler is created by fitting a line through the identified draft marks.
3. The image is sent through another CV model that performs instance segmentation to identify the water and the vessel. The waterline on the hull is extracted from this.
4. The intersection of the draft ruler and the waterline is found. The value of the ruler at this point is the draft for this image.

This processed is repeated continuously while a vessel is at berth, reading the latest available frame from the camera once the previous has been processed. With current processing

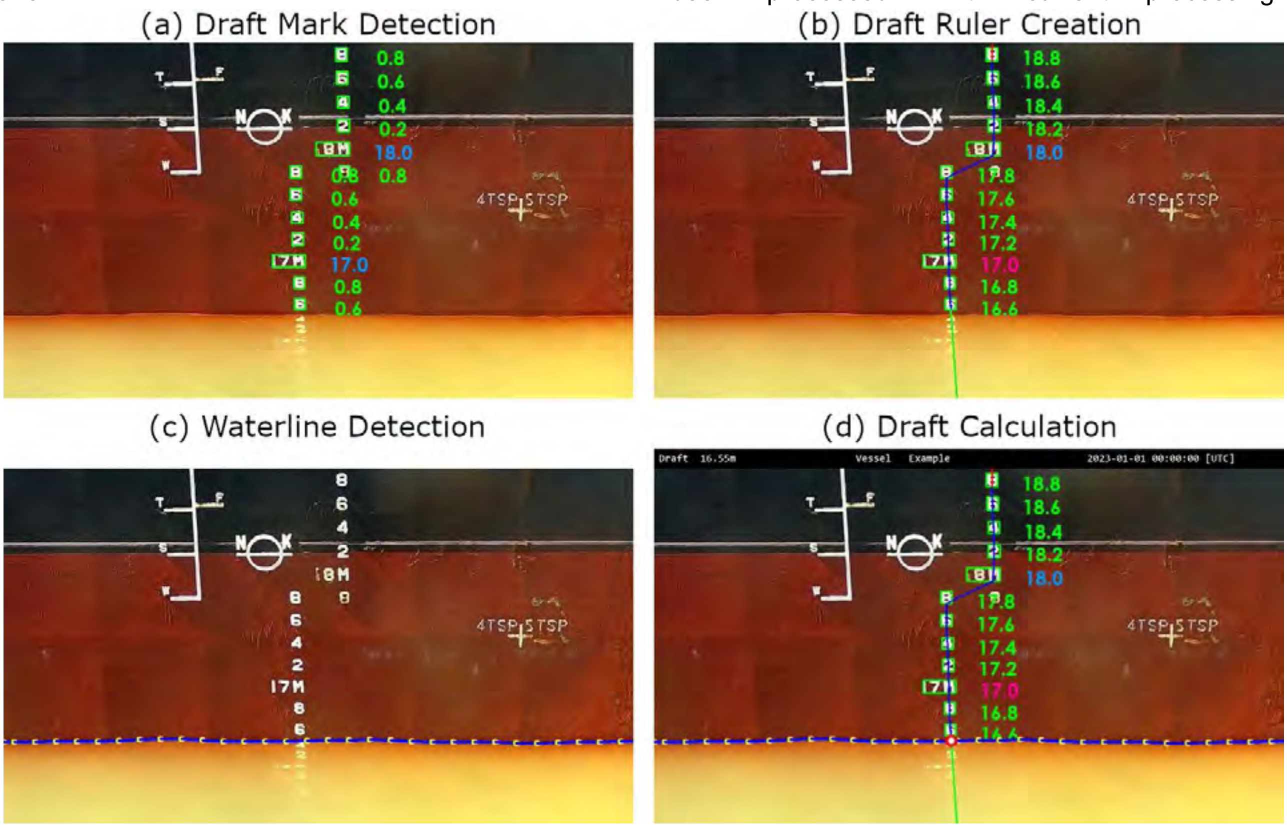


Figure 3 Process for reading the draft for a single camera image. Showing draft mark detection (a), conversion to a draft ruler (b), detection of the waterline (c), and finding the intersection to obtain the draft (d). The draft in this frame was calculated to be 16.55 m.

algorithms and hardware, a real time processing speed of 5 FPS is achieved, which will increase as hardware becomes more efficient and faster ANN models are developed.

To achieve the necessary accuracy from the CV recognition of the draft marks and waterline, the ANN models require extensive training. This is initially performed by humans manually annotating images (known as supervised training), drawing bounding boxes around each draft mark and assigning them a label, and by masking out the water. These annotations must be highly accurate, as any errors, such as labelling a draft mark incorrectly or not having a tight enough bounding box, can result in the ANN model returning bad observations. This training process is done on thousands of images, for a wide variety of vessels, time of day, and camera angle, to ensure the model can read an image in any conditions. Once a model has been created, further training can be done in an unsupervised manner, where the model will train and refine itself, with a human still involved to ensure the unsupervised training is successful.

3.2 Calculating the opposite side draft

Occurring simultaneously while the wharf side draft is being calculated, the LiDAR sensors are constantly scanning the vessel hull to determine the angle of list. Depending on the model of sensor used, more than fifty scans per second can be taken, each comprised of thousands of returns from the hull, as shown in Figure 4. These are oversampled and trimmed to ensure that only the freeboard is analysed, to which a mathematical regression is applied to calculate the line of best fit. The deviation of this from the vertical gives the list of the vessel at that point, with list to the starboard side being positive.

With the wharf side drafts ($draft_w$) and the vessel list known, the opposite side drafts ($draft_o$) can be calculated using trigonometry, shown in Equation 6. The vessel width at each set of draft marks is a configurable input if known, with default factors relative to the beam (which can be retrieved automatically from AIS messages) setup for different vessel classes if not provided.

$$draft_o = draft_w + width * \tan(list) \quad (6)$$

Applying Equation 6 to each set of draft marks allows all six draft marks to be determined, and hence the quarter mean and maximum drafts can be calculated for use in displacement and UKC calculations. Figure 5 shows the result of this process, displaying annotated frames and the draft history for a wave event while a vessel was at berth.

While draft and list are the main outputs of this processing, several other parameters can also be determined from the data collected. These include:

- Trim, the difference in the bow and stern drafts.
- Hog/sag, the difference of the bow and stern drafts compared to the mid draft.
- Drift from berth, as the LiDAR calculates the distance to the vessel.

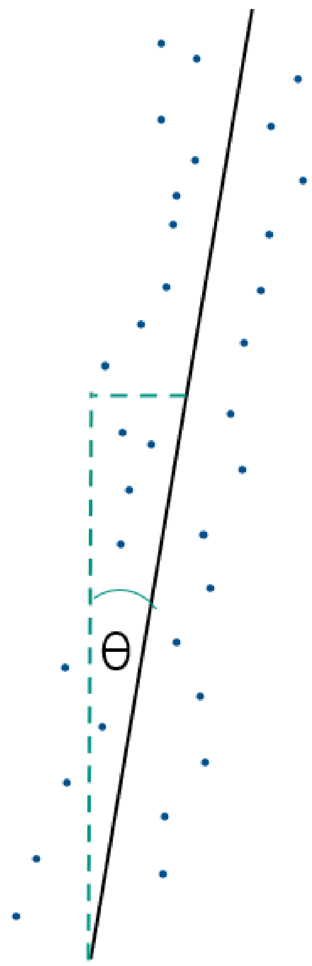


Figure 4 Pictorial example of a LiDAR point cloud that is obtained when scanning a vessel hull. Distance between points has been exaggerated for display. A line of best fit is calculated, with the angle of deviation from the vertical, θ, giving the vessel list.

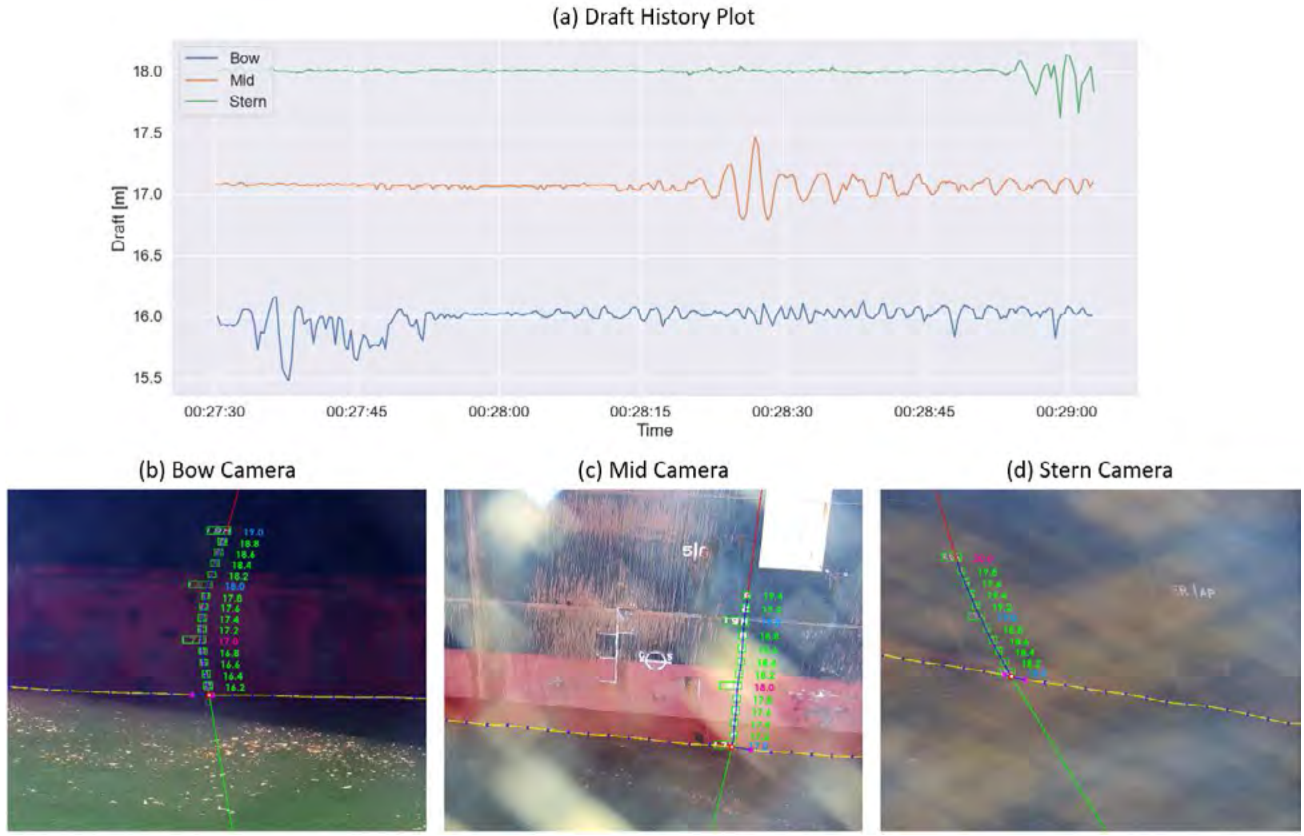


Figure 5 (a) Time history of vessel draft during a wave event. Draft has been averaged between the port (observed) and starboard (calculated) draft marks. (b), (c) and (d) show the annotated camera images at 00:28:29.

3.3 Limitations

As with any automated computer system, ODIN does have limits under which it can operate. In particular, if the cameras cannot record a good quality image of the draft marks, poor readings are likely to result. Examples of scenarios that can cause this, along with methods of remediation, are listed below.

- Draft mark obstruction. If obstructed by temporary objects, such as cable washers, these may need to be moved for a time when a draft reading is required. If obstructed by permanent objects, alternate camera locations may be required.
- Draft mark fouling. If the draft marks are unable to be read by a human, ODIN will also have similar issues, with an example shown in Figure 6. In this case, the vessel should clean and repaint the draft marks, allowing for them to be read again and ensuring compliance with Australian Maritime Safety Authority (AMSA) regulations (AMSA, 2016).
- Poor lighting, generally at night. Wharf mounted lights may need to be installed to ensure the draft marks are clearly illuminated.
- Camera alignment, particularly around the curvature of the hull on some vessel classes at bow and stern. Additional cameras at better locations may be required to ensure the draft marks can be clearly viewed.

Figure 6 Fouled draft marks on a vessel. The marks from 9.4 m and lower are covered by rust and marine life, rendering them unable to be read at a distance.

Another limitation of the system is the type of draft marks that ODIN has been trained on. As of 2023, ODIN has been trained to recognise two formats of metric system draft marks, viewable in Figure 7. To be able to interpret other formats (such as the imperial system), further training of the ANN models would be required.

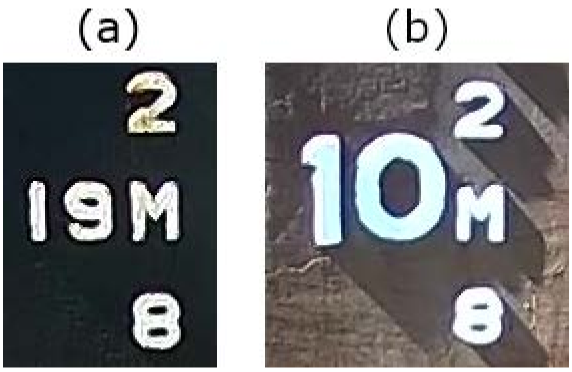


Figure 7 Metric draft mark formats that ODIN has been trained to interpret. (a) shows draft marks where the meter digits are 10 cm in height, while (b) shows draft marks where they are 20 cm in height.

4. Data Usage

To make use of the information provided by ODIN, a web interface is provided to users, allowing access from anywhere with an internet connection. The interface provides both a live view of the current vessel at berth, as well as historical views to see what happened with previous vessels. Time series plots of the draft are displayed, along with annotated images and videos of the vessel. Reports can be generated to provide a summary of a vessel at a point in time, while raw data can be exported for further analysis if desired. Alerts are also able to be created if any parameters fall outside configured bounds.

The ability to integrate ODIN with other products or services is built into the system, with various APIs available that can provide both live and historic data for needed use cases. These may include other systems such as automated ship loaders, which need to know the draft in real time to ensure they are loading the correct amount of product into a cargo hold.

Depending on the existing method draft surveyors use to do their surveys, draft information from ODIN may be either manually entered or retrieved automatically via the API for use in the calculations. As the other necessary information for completing a draft survey is either vessel specific (hydrostatic tables) or changes with each visit (tank soundings), ODIN is currently unable to perform the full process and determine the amount of cargo on board. As vessels become increasingly fitted out with technology, live feeds for these may be available in the future, allowing ODIN to perform the entirety of the draft survey process.

5. Conclusions

We have demonstrated the ability to remotely obtain the draft of a vessel from all six draft marks, without requiring a human to be involved. Through a combination of cameras and LiDAR devices, ODIN provides an uninterrupted, real-time feed of the draft, with accompanying images and videos giving confidence to users in the numbers they receive. Several other parameters are also obtained, such as list and trim, with a web interface and API exposing all of this for usage by humans and other systems.

By removing the need for surveyors to read the draft marks, they no longer need to enter hazardous areas around the vessel to perform their job, improving safety and allowing them to instead get the draft in seconds instead of hours. Cargo transfer operations also no longer need to be stopped during this process, potentially allowing vessels to depart hours earlier.

While ODIN is for now limited to just determining the draft, it is envisaged that in the future it will be able to do the entirety of the draft survey process as vessels become more equipped with technology, eventually allowing for a real-time feed of cargo on a vessel throughout the entirety of a stay at berth.

6. References

Abdulla, W. (2018). *Splash of Color: Instance Segmentation with Mask R-CNN and TensorFlow.* https://engineering.matterport.com/splash-of-color-instance-segmentation-with-mask-r-cnn-and-tensorflow-7c761e238b46

Australian Maritime Safety Authority (2016). *National Standard for Commercial Vessels, Part C Design and Construction, Section 6 Stability, Subsection 6C Stability Tests and Stability Information.* https://www.amsa.gov.au/about/regulations-and-standards/national-standard-commercial-vessels/nscv-sub-section-c6c-stability

Dibble, J. & Mitchell, P. (2009). *Draught Surveys: A Guide to Good Practice (Second Edition)*. North of England P&I Association.

He, K., Gkioxari, G. Dollár, P. & Girshick, R. (2018). *Mask R-CNN*. arXiv:1703.06870 [cs.CV]

Ren, S. He, K. Girshick, R., Sun, J. (2016). *Faster R-CNN: Towards Real-Time Object Detection with Regional Proposal Networks.* arXiv:1506.01497 [cs.CV]

United Nations, Economic Commission for Europe, Committee on Energy, Working Party on Coal (1992). *Code of uniform standards and procedures for the performance of draught surveys of coal cargoes.* https://digitallibrary.un.org/record/168125

The impact of cybersecurity management in the maritime industry: threats and solutions

Ship at Bonny River – cybersecurity and cyberattack is home!

THE maritime industry has been impacted negatively by cyberattacks, even recently leading to losses in billions of dollars. The way forward is for a country and companies with large maritime coverage to pursue coordinated cybersecurity management by investing massively in the cyber-security industry in the maritime sector and embark on continuous training of maritime personnel.

To begin with, we must understand what cyber is and the source of derivation of cyber-security. A ship that is cyber-attacked in Bonny River may run aground into the Bonny oil and liquefied natural gas terminals and berthing facilities due to erratic behaviour of the engine and other computers, network, AI-aided navigation systems causing fires, especially during manoeuvring into port. Cyber-attack is that serious, systems can be jammed, and your location in Nigeria can be seen as if you are in an Australian port.

Origin of the word "cyber"

Who will ever believe in today's AI generation that from understanding the logics of mathematics and the use of its theory in controlling ship's steering gear and the rudder to give direction, including multi-faceted use of other machines and system communications for ship's motion will lead us to the word "cyber".

Well, that is what happened during the 1940s, when a mathematician named Norbert Wiener. of American origin, who understood the teachings of communication and control systems of machines in Greek terms, and thus derived from that wisdom the word "cybernetics" to mean a ship's "steer man" from the original Greek word of "kubernetes".

When you steer a ship, you are controlling the direction and communication; in the olden days, such communication was received initially through men who lined up from the ship's bridge to the aft steering gear flat, and later modernised by machine controls and currently aided by artificial intelligence (AI) innovation.

So, the communication of control from the bridge originally will be a shout like "Rudder Port Side"; that communication will pass through lined-up hands on deck until it reached the steering gear flat and the steer man who will finally activate the rudder control to port side for the ship's navigation.

The word "cybernetics" gained importance in the 20th Century when internet technology, cloud and submarine cables with computer aided networking becomes the order of the century in machine control.

The danger that accompanied these technological and engineering innovations led to genuine concern about security; that is, how safe, how secure and how being in charge of the happenings are we, resulting into what we now called "Cybersecurity".

The arising fear and danger from thinking about Cybersecurity is the belief, albeit a genuine belief, that the "bad child" may do something or attack, as we call it, to breach the security or harm the control and communication technological internet systems. That something which the "bad child" may do is what is called Digital Cyberattack, which is regarded as a crime internationally.

The term "cybersecurity"

Arising from the explanation of the word cyber and security, the term "cybersecurity" is the assurance which a person or an entity or organisation envisaged to attain, to ward-off cybercrimes from bad child digital cyberattack of protecting systems, including attack on control internet networking, programs and data with storages, with the intention of accessing these systems, controls and storage facilities, and destroying any sensitive information or communication, thereby changing the smooth operational format of systems, simply for the purpose of:

- ❏ interrupting normal operation of business processes such as ship operations for the attacker's aggrandisement;
- ❏ extortion of money or unfair bargain or peculiar demand; or
- ❏ causing havoc and panics in the maritime community and industry.

Arising from the above definition it is evident that cybersecurity is about curing prematurely the effect of digital cyberattack which can bring about the following:

- ❏ maritime operational disruption;
- ❏ financial and wealth losses;
- ❏ fraud;
- ❏ data losses and breaches;
- ❏ mistrust about the personnel, about the systems and about the system providers;
- ❏ personnel or company identity theft; and
- ❏ privacy invasion of the company and the personnel in the maritime industry.

Cybersecurity management

Cybersecurity management cannot be understood without understating the concept of risk management.

The maritime environment is open to sea exploitation through the use of marine platforms and facilities, and sea trade facilitation by ships, all of which are prone to cyberattacks because of usage of current technological knowhow with internet and AI-aided computer system facilitation, and as such must involve cybersecurity management to be viable in the industry facing various cyberattack while experiencing plethora of local and international regime of regulatory control.

It is in this light that Widdowson 2003 stated that "Experts agree that the means of achieving the desired balance between trade facilitation and regulatory control is through the use of risk management". (David Widdowson, *Intervention by Exception: A Study of the Use of Risk Management by Customs Authorities in the International Trading Environment,* 2003, a thesis submitted in fulfillment of the requirements for the degree of Doctor of Philosophy, University of Canberra, September 2003.)

Risk management

- ❏ In the world of international trade, there are four key stakeholders: the trader;
- ❏ the government;
- ❏ customs authorities; and
- ❏ the WTO (World Trade Organization) and the WCO (World Customs Organization).

The trader is more interested in his or her trade, and its facilitation for quicker and bigger returns with less restriction.

The government is interested in the revenues that come with trade, but exercises and enforces regulatory control over any form of trade that crosses its borders subject to its duty and maritime delimitation under UNCLOS, to overcome risk and now cybersecurity associated with trade movements.

Customs authorities are the primary checkpoint and in the forefront of ensuring compliance and deriving revenue for the nation through the ship-port maritime industry.

The WTO (World Trade Organization) and the WCO (World Customs Organization) are interested in facilitating trade, and encouraging agreements, conventions and treaties.

Also, of no less importance, are the International Maritime Organization which oversees the international law that supervises the legal activities on the seas through the United Nations Convention on Law of the Sea (UNCLOS) and other regulatory regimes, and the International Labour Organization, which supervises the Maritime Labour Convention 2006 (MLC 2006).

"Risk" is the danger posed by an activity such as cyberattack, which may have an immediate harmful effect or delayed harmful effects or loss targeted towards protected facilities of mobile or immobile maritime platforms, including ports facilities and ships.

The management of this risk is important to smooth operation of the maritime industry.

Risk management in the maritime environment is therefore border protection management, which requires profiling of ships by types, cargoes, crew nationality, last port of call and Flag State of the ship, used to enable the regulatory authorities to ascertain the level of risk associated with that ship or mobile facility, including the potential of digital cybersecurity attack likely to come from the marine vessel or towards the vessel as a target or random victim.

Sometimes, a cyberattack may not be targeted as such, but may be unleashed on random to catch unprepared victim or weak link of a system using internet technology and computer cloud data storage facilities.

The effectiveness of risk management strategies may reduce cost and increase government customs revenues, preserve interest of stake holders in the maritime front of international trade and improve trade facilitation.

Maritime control, enforcement and compliance have been an issue of contention among states and, in some instances, the issues in question have led to conflicts and "trade wars" between states. The contentions have always followed the same pattern of where does the maritime control, enforcement and compliance of a state begin and end such that it does not offend legitimate international activities flowing across boundaries.

Some issues that arise includes who to blame over cyberattack and from which country does the cyberattack emanate. This is important because an attack does not need to come from close range.

In the light of the understanding governing customs operations, the question that attends any regime in the maritime front was when a state can rightly claim that its maritime regulatory regime cum customs regimes are effective and in compliance with the existing customary law and international law regimes, and whether such regimes of policing have been breached by another, affecting its revenues drive.

It is arguable that a key performance indicator to improved customs revenue of a nation lies in the effectiveness of sea border management and risk management for a developing maritime nation such as Nigeria, in the West African region.

Nigeria offers a strategic location of ports and operation within the West Africa coastal maritime region. Nigeria is rich in crude oil and gas, and exports the same, while Nigeria imports various commodities, mainly by sea. Those attributes make Nigeria – a developing nation which adopted risk management and border protection management prescriptions with various ports of operation – a better case study to elucidate the impact of cybersecurity management in the maritime industry.

Nigeria has witnessed changes and experiences over the years, going by the Organisation for Economic Co-operation and Development (OECD) reports.

Nigeria is considered to be a regional leader in Africa, and in particular within the Economic Community of West African States (ECOWAS), on matters involving international trade, commerce, policy and practice.

Nigeria continues to play an important role in regional (Economic Community of West African States – ECOWAS), continental (African Union – AU) and international trade agreements. On the regional front, the ECOWAS customs union is viewed as a step towards an economic and monetary union with a single currency under the West African Monetary Zone (WAMZ). (AfricanEconomicOutlook2006-2007 www.oecd.org/dev/publications/africanoutlook)

Nigeria is a principal and founding member of the New Partnership for Africa's Development (NEPAD), which came into force in October 2001. The country is also a key member of the Economic Community of West African States (ECOWAS) and contributes significantly to the economic integration of the sub-region. (WTO 2005 page 6).

The OECD 2006 publication noted that seaports and inland waterways play a crucial role in shipment of freight. More than 80 per cent of Nigeria's merchandise trade is handled by the seaports. The navigable waterways are centred on the Niger and Benue rivers, which join at Lokoja and flow into the Atlantic Ocean. The coastal waterways extend from Badagry through Warri to Calabar, including Bonny to Port Harcourt. (AfricanEconomicOutlook2005-2006 www.oecd.org/dev/publications/africanoutlook, page 10.)

The body of knowledge available identifies risk management and border protection management as means of achieving appropriate balance between trade facilitation and regulatory control by the authorities; however, the impact of cybersecurity needs to be factored in the management to address the current risks posed by cyberattack in the maritime industry.

Cybersecurity needs to be coordinated as part of coordinated risk management strategies designed to facilitate trade and help the maritime industry move ahead of the effect of cyberattack. The concerns that the adoption of risk management will adversely impact, for instance the customs revenue of developing nations, are not realistic, as the COVID 19 pandemic shows that risk management strategy was the effective strategy in the circumstance and posed no concern that cannot be managed with coordinated risk management.

For a state to effectively harness its maritime resources to boost its customs revenue management drive and, in turn, its economy, and carry out its maritime responsibilities, it must have in place effective customs management, port control, border watch, sanitary and immigration control systems to allay fears, especially in terms of giving away sovereign control in the course of adopting international collaborations, like the ABUJA MOU.

The management of cybersecurity in the maritime industry may be faced with jurisdictional constraint, the effectiveness of local and international laws, negative impact of porous border control of one jurisdiction on the revenue generation of another, and comparison of regulatory regimes and if any losses in terms of revenues arising from ineffectiveness of a given regime.

A regime may be too effective and cause losses to revenues, while, on the other hand, an ineffective regime enriches smugglers and cyber attackers to the detriment of the customs revenue drive.

Prior to the current influence of cybersecurity, and the use of Artificial Intelligence (AI) aided cyberattacks, Creck Buyonge was of the view that "there are three forces that are having an impact on the role of African customs administrations in this century.

"The first is the push for revenue optimization, an agenda pursued through revenue consolidation using the revenue agency model. The second is a demand for Customs to play a greater role in facilitating trade in the context of various preferential trade arrangements. The third is the requirement for Customs to take on more enforcement responsibilities either as part of a global Customs response to the threat of terrorism, or part of the mission of Customs to protect society and the nation through enforcement of various restrictions and prohibitions." (See Creck Buyonge, "Emerging Issues on the Role of Customs in the 21st Century: An African Focus" in the *World Customs Journal*, Volume 1, Number 1, p 55.)

In any event, maximisation of the use of communication technology has been long advocated, and Kafeero, in support of risk management in the East African Countries, stated that: " Apart from the provisions of Article VIII:1(c) of GATT 1994, it should be noted that the Revised Kyoto Convention has a lot to offer to trade facilitation through its key standards, principles and best practices that contribute to the simplification and harmonization of customs procedures and formalities.

"Such procedures and principles include standardized and minimum requests, minimum intervention and the use of risk management, separation of release from clearance, audit-based control, maximum use of information and communication technology, specially simplified procedures for authorized traders, and cooperation with other agencies as well as cooperation with foreign counterparts." (See Edward Kafeero, "Customs and Trade Facilitation in the East African Community (EAC)", *World Customs Journal*, Volume 2, Number 1, April 2008, p 67.)

In relation to current cyberattacks in our AI age, the suggestion of reducing the use of IT and other technologies is retrogressive. As far back as 2010, Enrique Fanta concluded that internationally agreed principles for improved border management included "Minimum intervention (based on identified risk), integrity, transparency and accountability, consistency and predictability. harmaonisation with international standards, improved cooperation with the private sector, coordinated approach to border management, maximum use of IT".

In examining the trend and growth in customs revenues since 2006 in Nigeria, it is pertinent to compare the context attending the growth with those that prevailed prior to the commencement of the government deregulation projects leading to the final adoption of the risk-based border management strategies in Nigeria.

Widdowson noted that: "Appropriate levels of both trade facilitation and border protection may be achieved and maintained, however, by incorporating supply chain security requirements into broader partnership arrangements between customs authorities and the private sector." (See Widdowson, David [2006], *Border Protection and Trade Facilitation – Are the Two Compatible?* p 9.)

Cybersecurity and cyberattack are not a one-sided issue: all stakeholders in the maritime industry must be involved to address the menace caused by cyberattack.

Border management

Goods of various kinds and people go through the border, including inshore and offshore economic infrastructures installations. However, the movement of some goods and people offends local regulatory regimes and, in some cases, international regulations, and in effect pose economic, political and social risks.

Some of the risk and unacceptable movement across the border includes illegal imports and exports, and people smuggling. Other matters which a country is under obligation to prevent include piracy, drug trafficking and slavery, illegal exploitation, acts of terrorism and home-grown cyberattack, to make the maritime industry safe.

The border management procedures adopted by one country may defer from that adopted by another and may compromise trade facilitation. It is more so that trade facilitation may be affected when there are various government agencies duplicating work and carrying out their authorised functions at differing times over the same goods, persons and infrastructures.

Coordinated border management

Coordinated border management is the contemporary, in-vogue approach to border management. This form of border management brings in to play at the same time all agencies of government sharing the same goals. Many experts have written on the topic of coordinated border management, listing its benefits as including efficient and cohesive response to border management operations, trade facilitation and improved border security. However, achieving this is also dependent on legislative coherency.

The intervening circumstances around the world may define the border administrative benchmark and the whole-of-government approach adopted by countries to the in-vogue coordinated border management.

In defining borders, Dunne – citing Ladley and White – suggested that "borders are places where governments exercise their sovereignty and that this is done by raising or lowering the fences into and out of the country to achieve a range of different policy objectives." (See Martyn Dunne, "New Zealand Customs Service: Changes Over the Last Decade and Into the Future", *World Customs Journal*, Volume 1, Number 1 [March 2007], page 42.)

While there are commentators on coordinated border management and different nomenclature of border protections aiming at the same purpose of coordinated border management, it appears none considered the implications (and, in particular, how the concept applies in a developing country such as Nigeria in the West African region) in the current AI and cybersecurity and cyberattack era.

The term "coordinated border management" (CBM) has been introduced in view of its encompassing nature. A 2009 Background Paper – WCO Inter-Agency Forum on Coordinated Border Management, introduces the evolved thinking of the WCO about CBM and outlines its major principles: coordinated border management (CBM) represents an approach to manage borders involving public-service agencies working across portfolio boundaries in a coordinated manner to achieve a shared goal, thus providing a cohesive government response to the challenges of border management.

CBM can be referred to as meaning a logical way to manage border operations to ensure efficient and effective processes and procedures used by all regulatory agencies who are involved in border security and regulatory requirements that apply to travellers, goods and conveyances crossing international borders.

The objective of a coordinated border management system is to facilitate trade and the clearance of travellers at the same time ensuring secure borders (WCO 2009, p. 5). (See Mariya Polner, page 52, Volume 5, Number 2, International Network of Customs Universities, *World Customs Journal*.)

The concepts of CBM have their antecedents in key WCO instruments, especially the International Convention on the Simplification and Harmonization of Customs Procedures (as amended) (the revised Kyoto Convention), and the SAFE Framework of Standards to Secure and Facilitate Global Trade (the SAFE Framework).

The revised Kyoto Convention entered into force in 1974 and was revised in 1999. One of the major principles of this convention was to simplify, as well as standardise, customs procedures. In particular, Chapters 3, 6 and 7 touch upon CBM mechanisms, such as the concepts of "juxtaposed office" and "joint controls", and the enhancement of international cooperation with other customs administrations. The standards relating to Single Window (Standards 7.3 and 7.4), which supports CBM through the exchange of information between the related ministries and agencies, are also stipulated in the Convention.

Techniques such as risk management (Standard 6.3) would benefit from the implementation of CBM, as it would assist in areas such as sharing information, intelligence and examination results. These actions will considerably enhance intelligence-driven risk management and promote coordination among the agencies. Thus a CBM approach, when used in conjunction with the standards and guidelines contained in the revised Kyoto Convention, provides a strong foundation upon which streamlining the border processes associated with both facilitation and control take place. (Polner, p. 51.)

Coordinated cybersecurity management

Coordinated cybersecurity management is akin to the approach to coordinated border management. It is a form of management that, when carefully adopted, brings into play at the same time all agencies of government and private stakeholders sharing the same goals – including international collaborations such as the Abuja MOU, for efficient and cohesive response to maritime cybersecurity threats and its management operations, trade facilitation and improved border security by making safe internet technology, computer, data and cloud data storages systems applicable in the maritime industry in protection of ships, cargoes and trade movements and facilitation.

However, achieving this is also dependent on legislative coherency and a willingness to act honestly in the interest of the maritime industry.

By the international collaboration under the Abuja Memorandum of Understanding (Abuja MOU), which is the MOU on Port State Control in West Africa and Central Africa, Nigeria arrested and detained the container ship *Athens Bridge* (IMO9409053, built 2009, with Panama flag) at Tin Can Island Port on 18 September 2025, arising from an inspection which showed various observations and inspection deficiencies. About nine deficiencies were outlined to warrant the detention by Nigeria's port state control inspector, who determined that the ship was unfit to proceed to sea and posed an unreasonable risk to the ship, its crew and the maritime environment.

Under the same MOU, Nigeria detained a container vessel MSC *Georgia II* (IMO:9357107, built 2007, Liberian flag) in Onne port in Rivers State on 8 September 2025, where the vessel revealed about 15 deficiencies. (These two vessels have since been released, having addressed the identified deficiencies.)

While the Abuja MOU appears to carry out its inspection work in compliance with the MOU and international collaboration to keep the maritime industry and environment safe, the website of the Abuja MOU Information System (AMIS) is developed and hosted by the Information and Coordinating Center on Port and Flag State Control of the Russian Federation in Moscow.

It is intended that such designed database collect and store Port State Control (PSC) inspection data from the Abuja MOU member states authorities and to provide information exchange on PSC data within the region.

This collaboration exhibited a form of coordinated risk management information sharing, usage, and storage to protect the maritime industry.

It is important to face reality from the above records: digital maritime has come a long way, and maritime organisations or entities are now using predictive maintenance deploying AI, which has exponentially reduced equipment downtime and cut maintenance costs and losses in time and revenue.

There is no doubt, given ships and the maritime industry usage of internet, computer technology that cyberattacks on shipping have dramatically increased in this AI era, with high costs of recovery in the millions for one incident.

However, with integrated systems of cybersecurity protection systems and effective collaboration, many shipping companies moving with the technology growth and with personnel training have less or no incidence of cyber-attack because of training and information harvesting enforcing cybersecurity.

Personnel and seafarers on board ships will benefit from basic cybersecurity training and ships with integrated bridge systems currently show significantly low navigation incidents, and substantially improved fuel efficiency with the new AI-aided technology.

Nowadays, remote monitoring and relevant integrated sensors with AI automation systems can predict engine failures months before they occur, and this will lead to prevention of breakdown maintenance. It is true that various roles in the maritime industry will change to make way for effective maritime cybersecurity, yet humans are not replaced, because people and machines complement each order for a better deal in our digital age.

In the olden times on board a ship, we shouted to reach the desired communication stations, say from bridge to engine room or steering gear flat, but now many ships do not use papers any more, and we have moved from the use of paper handwriting to smallest unit of digital picture display or pixels and thus invited cyberattack as we enjoy the sweetness of the technology rise in the AI-aided era.

About two decades earlier, there was regulatory change, allowing the International Maritime Organization (IMO) to make it mandatory for Electronic Chart Display and Information Systems (ECDIS), signalling a turning point from paper-based navigation about 2012. As at 10 January 2025, with AMSA's last update, Australia now requires up-to-date Electronic Navigational Charts ENCs for ships visiting Australia.

Internet and satellite connectivity becomes easier to use and adopte, but most radical changes were accelerated during COVID-19, with improved training such that inspections are conducted remotely, with digital exchanges meant to avoid contagious infection; but this drastically changed the maritime industry for good, with sea and shore-based operations becoming easier.

Now, AI-enabled machinery monitoring systems ashore detect faults that are not visible to the human eyes at sea, recalling a vessel back to port for maintenance sighted from shore, with a high degree of efficiency and accuracy.

It can now be said that AI and Digital recordings make it easier to demonstrate adherence to international and port control requirements for regulatory compliance, and easy communication for personnel.

The maritime industry is no exception to the tradition of scepticism for change, as this opposition to change appears real when one sees the trend of rapid change to AI machines as losing old knowledge and work status.

The real threats which now bring attacks also to the maritime environment include the following four.

Phishing attacks, which aim to trick uninformed or untrained crew members into sharing sensitive login details to enable the cyber attacker access the system to cause harm.

Ransomware, which, as the name indicates, aims to obtain financial and other benefits to ransom by locking or securing for harm critical navigation or operational systems, unless the said ransom was paid at a set location and time.

Disruption arising from remote breaches to stop bridge control operation, intended navigation blackouts, stopping or halting engines and other essential communication systems.

Internet and computer cloud-data connectivity enables efficiency, including quick data sharing for a real-time decision-making, however it also makes that data and the systems that run ships open to vulnerability, requiring essential investment in cybersecurity.

However, these threats, with effective investment in cybersecurity, can be significantly reduced by:

❏ personnel training in cyber defence before it happens, encouraging strong and unique passwords with notation to make regular changes of the password with many characters;
❏ making it a priority to avoid known unsecured devices or networks, or at least learn how to clean your footprint from the accessed network;
❏ being careful and slow to click to avoid bait, and not to open any unknown attachments or links without verification by a reliable authority or system in place for that purpose; and
❏ mandatory reporting of any iota of suspicious activity, even in the face of threats.

With cybersecurity at sea, all it takes is to transfer the already embedded culture of work safe and vigilance for safety in the maritime shipping industry to a cybersecurity management awareness in all personnel to avoid cyberattack that may affect or harm a ship's operations at sea or in port.

In any event, AI lacks the practicability of empathy in an immediate situation, and such ethical manoeuvre and emotional intelligence provide for the human's superiority over AI. Thus, while the use of AI appears inevitable, there are limits to its use.

Real tension amongst personnel can only be sensed by another human, and addressed by a human with emotional intelligence and the ability to provide a morale booster with empathy. It is the humans that remain when systems fail, and who correct the failure and meet the unpredictable realities of perils at sea.

The European Union's cybersecurity agency, reporting on 22 September 2025 about the disruption in airline operations in Europe, said that ransomware was deployed in the attack.

The attack affected check-in software of the US software provider Collins Aerospace. As part of investigation, the UK National Crime Agency reported that a West Sussex man in his forties had been detained. This cyber attack, demanding a ransom, disrupted several European airports, including Heathrow, which depended on the Collins Aerospace software.

The implication of this airline-operations cyber ransomware attack is that the maritime environment is not immune from attack, and active investment in cybersecurity is imperative to protect the maritime industry.

"Be prepared" is a Scout moto which the maritime industry must adopt, with extensive investment in cybersecurity, if the industry is to survive in our AI cyber threat age.

The recent European airport and airline lesson is what maritime companies and ship-owners and every seafarer must internalise, with the understanding that the maritime ecosystem is open to similar attack if we don't act now.

The use of flag of convenience may do the maritime industry more harm than good if inspections and verifying vessel condition are not taken seriously. However, while a ship may be registered in the country of the owner – or another country that may provide more benefits, including greater flexibility – effective maintenance is crucial in our AI world of cyberattacks.

Thankfully, the arrangement of a maritime Memorandum of Understanding, like the Abuja MOU, puts the duty on visited ports to ensure some compliance – and even arrest a vessel showing non-conformity or deficiency warranting detention of the ship.

The MOU allows the Port State Control (PSC) to inspect foreign ships in its national ports to verify that the operating condition of the ship and its equipment are in compliance with the requirements of all relevant international regulations and that the ship's crew is manning and operating the vessel in compliance with international regulations for maritime safety, security and prevention of pollution to the marine environment.

The website of the Australian Maritime Safety Authority record for the Port State Control (PSC) states that: "While in an Australian Port, your ship may be subject to inspection. If your ship is found to have deficiencies, it may be detained until the issue is resolved."

These requirements put ships and ship owners is a state of preparedness before arriving in Australian ports. The Tokyo MOU, of which Australia is a member state, is also hosted by the Russian Federation, as is the Abuja MOU.

The bulk carrier *Navios Amethyst* (registered in Panama, built in 2022) was detained in the Chinese port of Zhangjiagang on 1 September 2025 for three deficiencies. In Port Hedland, Westen Australia, the bulk carrier *Frontier Garland* (registered in Panama) was detained on 1 September 2025 for a fire safety deficiency. (Both ships have since been released.)

PSC Code-15 means you can rectify your ship's deficiency at the next port, while a Code-16 must be rectified in 14 days and a Code-17 deficiency must be rectified before departure. However, a Code-30 is a detainable deficiency.

The world regional maritime delimitation for the purposes of compliance and detention of vessels under the PSC MOU like the Abuja MOU are grouped as follows.

❑ Abuja MOU: West and Central Africa.

❑ Acuerdo de Viña del Mar: Latin America.

❑ Black Sea MOU: Black Sea region.

❑ Caribbean MOU: Caribbean region.

❑ Indian Ocean MOU: Indian Ocean region.

❑ Mediterranean MOU: Mediterranean region.

❑ Paris MOU: Europe and the North Atlantic.

❑ Riyadh MOU: Persian Gulf region.

❑ Tokyo MOU: Asia and the Pacific.

❑ United States Coast Guard: A separate PSC regime.

Some countries belong to two PSC MOUs; for example, Australia has a dual MOU region of Tokyo and the Indian Ocean, while Canada also has dual MOU regions of Tokyo and Paris.

Risk profiling may lead to inspection of a ship and may vary between different MOUs, and the nature of deficiency may determine detention and type of regulatory requirement that will be applied for compliance.

Besides the PSC inspections, there are other external audits carried out, including classification authorities' verification processes, usually carried out for class survey renewal every five years, with in-between audits also carried out. These audits are also carried out for ports and ports facilities at port.

Oil tankers, gas tankers and chemical tankers have a special regime under the SIRE (Ship Inspection Report Programme) inspection, now SIRE 2.0, carried out under the direct supervision of the Oil Companies International Marine Forum (OCIMF), and are all prone to cyberattack.

There is also P&I Club Condition Survey, among others, with the only purpose being to ensure safety and be cyberattack-ready under the company safety management system procedures and manuals.

Threats and solutions in the maritime industry

AI and cybersecurity threats cut across all walks of life. The Chief Justice of Nigeria, Kekere-Ekun CJN, described the danger posed, stating: "With the increasing digitization comes the responsibility to secure sensitive judicial information from cyberattacks, data breaches or misuse. Confidentiality is the lifeblood of trust in the judicial process. The robust protocols must be developed to safeguard data integrity and preserve the rights of litigants." (See *Cybersecurity in AI-Drive Justice Systems: The Bar, the Bench and Other Ethical Concerns*, Olumide Babalola.)

The increased digitisation is more felt in the maritime industry where a cyber breach can stop an engine, and an engine stop will sink the ship in rough weather. (For example, the Nigerian cargo ship *River Gurara* sank on 26 February 1989, during a storm, following engine failure off Cape Espichel in Portugal.) When a ship sinks, cargoes are lost and people can die at sea. The same thing applies when navigation equipment and data are breached and compromised by cyberattacks.

In 2017, Maersk ships and its cargo shipment logistics had the worst maritime cyber attack. Known as "Petya", it was a ransomware attack that spread through Maersk's global network, disrupting and shutting down its systems, leading to losses in the billions of dollars.

As recently as 10 November 2023, Australian ports managed by DP World were hit by a cyber attack that disrupted various operations affecting exports and imports and revenue from the ports. However, it was managed by responses that included disconnection of the systems from the internet, according to a DP World media statement.

It is certain that these cyberattacks and threats will continue unabated till effective solution are in place. In Australia, the telecommunication industry faces cyberattacks and is investing heavily in cybersecurity. Some of the companies involved provide services to ships at sea. The primary solution is training of all personnel to identify threats and to report any iota of threat The second is to invest heavily in cybersecurity programs and firewalls that are anti-cyberattack or at least minimise the effect of any attack.

Ensure personnel keep personal information private to avoid identity theft. The impact could be devastating to the ship or maritime facilities, and for the individual through loss of finances, credit cards details and loss of mental wellbeing.

Be prepared for sophisticated attacks. These attacks include email phishing, text smishing and other social engineering techniques, such as ransomware (where a ransom will be demanded to return the disrupted and breached system to normalcy).

Be vigilant with your communication and, before responding, be aware of who the person at other end is or represents.

Report your doubts, crosscheck and verify email addresses. Before you click any link or attachment, be sure of the author and the expectation from the link and attachments.

It is important that the procedure of the company prevent personal information through email or phone to a person that you do not know and does not represent a genuine business.

Use authentic company websites when required to do something unusual that awakens your suspicion.

If in doubt, go slow, and think carefully before you do anything further with any unknown request or attachment. Ask question from your superior or others if suspicion arises.

Be extremely careful when the demand comes with a sense of urgency, fear or curiosity, or seems unreasonable and greedy.

Check the greeting patterns and whether the target is your personal password or company-secured data, and ensure you change or update your software and password regularly.

Don't create the opportunities for the hackers by providing more information than asked or required in order to be polite.

Maintain software updates and preferably enable update automation to avoid forgetfulness. These days, some apps remind you to update. Personnel also need to be careful with the link provided by an app for update: it may come from attackers.

Make sure your password is beyond an ordinary guess to avoid easy access and being a weak link.

Make it mandatory that you do not use one password for two or more platforms; depending on sensitivity, multiple stages of verification should be activated.

Even in Freetown, things are not free, so be careful when invited to use free Wi-Fi; because it is public, it is prone to be used also by cyber criminals and attackers waiting for opportunities to access and steal important information and company or personal data.

Ensure you erase your footprint on visited sites if you must use public Wi-Fi. Disable all options that say save passwords and ensure you logout.

Report and share your experience and knowledge. When upgrading, be sure you are not giving away your life by authorising the app to take all the information about you.

Ensure to put eyes on the demands of cookies, cache and routinely delete browsing history.

Foolproof cybersecurity management is impossible in this current AI era, however multiple layers of protection which spread across the computers, networks, programs or data that is protected may provide a degree of success that is reasonable to allow smooth operation until the investment in the cybersecurity industry can yield an absolute protection dividend.

In a maritime organisation, unified threat management – as in the form of coordinated cybersecurity management – may be the gateway system that is currently needed. For the maritime industry, with various security outposts, it may be easier to coordinate to checkmate cyberattacks, as the system of coordination already exists.

The vulnerabilities faced in the maritime industry are multifaceted; even when protected against outsiders, there is also a threat of a malicious insider manipulating or giving out security breaches. Cheating personnel wages and unreasonable sacking from work must be stopped to avoid cyberattack retaliatory actions, as these attacks can be performed remotely.

The attack in the European airports showcases weakness involved in being dependent on a single provider of software; there may be competition of software and poor design errors which overlooked weaknesses and security implications. Yet, investment in cybersecurity management and personnel training is the way to move forward for a cyber-secured maritime industry.

There is need for a targeted regulatory regime which grows with the cybersecurity industry – and in facts grows faster than it – to ensure compliance and that effective protection with a regulatory framework is available.

Nigeria may work with Australia collaboratively to exchange knowledge, experience and one another's working regulatory regimes, given that both nations are big maritime nations and apply the maritime Port State Control Memorandum of Understanding: for Nigeria, the Abuja MOU, and, for Australia, the Tokyo MOU or India MOU.

Professor Chief Emmanuel Tam. Ezekiel-Hart
AIMS Member

Note: This article is based on a lecture paper delivered by Professor Chief Emmanuel Tam. Ezekiel-Hart (Australia), who is Professorial Chair, Faculty for International Trade Relations and Logistics Management, EBS / HIBC College of Divinity, and an AIMS Member.

Cyber security

MARINE surveyors are on the frontline of the maritime industry, assessing the condition and safety of vessels.

Unlike the days before technology, the toolkit of a surveyor today has evolved from clipboards, film cameras and filing cabinets to tablets running specialised software, cloud-based data storage and artificial intelligence for data analysis.

With technology, marine surveyors are equipped with the digital tools to enhance efficiency, accuracy and reporting quality but they also introduce new risk. By relying on a chain of third-party software providers, surveyors inherit the security vulnerabilities of those platforms. Additionally, the amount of sensitive data surveyors handle is also seen as a treasure chest for cyber criminals.

Vessel blueprints, structural deficiency reports, client financial information and personally identifiable information make surveyors high-value targets for data theft and extortion.

The 2023 ransomware attack on maritime software provider DNV is a reminder that a similar flaw in a surveyor's software can also create a direct gateway for cyber criminals to steal data from the cloud or launch an attack that disrupts the surveyor's own operations.

In Australia, 62 per cent of small-to-medium enterprise (SME) businesses have experienced a cyber security incident. The average cost to recover from a cyber incident can easily reach six figures, an expense that a comprehensive Cyber Liability Insurance policy is designed to cover.

This insurance not only provides financial indemnity but also provides immediate access to the expert incident response, legal, forensic and public relations services necessary for business survival in the aftermath of an attack.

Getting a quote via our insurance partner is easy.

Follow this link now (Cyber Insurance - abcountrywide) and you will find Austbrokers Countrywide dedicated Cyber Insurance info page.

Alternatively, contact Amber Draffin at Austbrokers Countrywide Insurance Brokers on 1800 245 123.

Austbrokers Countrywide Countrywide Insurance Group Pty Ltd ABN 49 625 733 539 AFSL 511363

Managing scheduled extinguishing agents in the marine industry: safety, best practice and environmental responsibility

FIRE safety is paramount in the Australian maritime sector. From leisure craft and fishing vessels through to ferries, offshore supply vessels, tankers and container ships, all vessels face inherent fire risks, particularly in engine rooms, galleys and other confined spaces.

For many operators, gaseous fire-suppression systems rely on scheduled extinguishing agents, which are fire-suppression gases regulated under Australian law because they have the potential to damage the ozone layer or contribute to global warming if released. While these systems play a critical role in protecting lives and vessels, best practice in their use is essential to ensure fire safety outcomes are achieved without causing avoidable environmental harm.

The Fire Protection Industry (ODS & SGG) Board (FPIB) is the Australian Government appointed body responsible for overseeing the safe and lawful use of ozne depleting substances (ODS) and synthetic greenhouse gases (SGGs) used in fire protection. Acting on behalf of the Department of Climate Change, Energy, the Environment & Water (DDCEW), the Board administers the fire protection division of the *Ozone Protection and Synthetic Greenhouse Gas Regulations 1995*.

This includes managing the national licensing and permit schemes that apply to individuals and businesses who acquire, handle, install, service, maintain or dispose of scheduled extinguishing agents. Through this role, the Board promotes compliance, supports industry best practice and works to prevent unnecessary emissions that undermine Australia's domestic and international environmental commitments.

Within the maritime sector, commonly used scheduled extinguishing agents include FM-200® and NAF-S-III, which are widely installed in fixed gaseous fire suppression systems protecting engine rooms and other high-risk enclosed spaces.

These agents are valued for their ability to rapidly suppress fire where water is unsuitable. However, they require a licence to use because of their environmental impacts if released unintentionally. Some scheduled agents can contribute to Ozone Depleting Potential (ODP), while others are potent SGGs, with a Global Warming Potential (GWP) many thousands of times greater than carbon dioxide. From a best practice perspective, preventing avoidable discharge is therefore just as important as ensuring a system will operate effectively during a fire.

Best practice begins with ensuring systems are properly designed, installed and commissioned for the space they are intended to protect. Changes to a vessel over time, such as engine upgrades, structural modifications or ventilation alterations, can affect whether a system will perform as designed. Ongoing maintenance and inspection by licensed technicians is critical to confirm that systems remain within their design parameters and that components such as cylinders, actuators, pipework, nozzles and fire flaps are functioning correctly.

Regular testing and servicing also play a key role in preventing unintended releases of scheduled extinguishing agents. Some vessel owners may view maintenance as an avoidable cost, particularly if a fire incident seems unlikely. In practice, the longer a system remains untested, the greater the risk of accidental discharge or complete failure. For an average-sized vessel, a single gas cylinder can contain around 13 kilograms of scheduled extinguishing agent, with replacement and installation costs often exceeding $2,500.

An avoidable discharge not only carries a high financial cost but also results in the release of environmentally harmful gases into the atmosphere.

To better understand how these risks arise in practice, the FPIB consulted John Nightingale, Special Hazards Fire Technician at Wormald Australia, who regularly installs, tests and services gaseous fire suppression systems on marine vessels. John notes that maintenance is often overlooked, particularly in parts of the private sector where servicing requirements may not be well understood.

"We often find that private vessel owners wait until something goes wrong. It's akin to driving on bald tires and only seeking repairs after an incident," he says.

Australian Standard AS 1851 recommends annual servicing of fixed fire suppression systems and six-monthly servicing of portable extinguishers, along with pressure testing of gas cylinders at prescribed intervals. From an environmental perspective, these measures are critical. Low-pressure gas cylinders, in particular, present a higher risk of leakage over time, which can result in slow and unnoticed emissions of scheduled extinguishing agents into the atmosphere.

"Many owners don't realise their system contains environmentally harmful chemicals," John explains. "When we install a system, we explain how it works and the potential atmospheric impacts if gas is unintentionally released. The actions taken today affect future generations."

Best practice also involves actively managing the risk of accidental discharge during vessel maintenance. Many marine fire suppression systems are located in engine rooms and operate via mechanical or cable activation. If cylinders or activation cables are not adequately protected, unintentional discharge can occur while other work is being carried out.

"The risk is often highest during engine servicing," John says. "Sometimes owners don't realise they can secure the cylinder or temporarily disconnect the system. A licensed fire protection company can do this safely and prevent a very costly and environmentally damaging mistake."

Ensuring only appropriately-licensed technicians handle scheduled extinguishing agents is another cornerstone of best practice. Under Australian law, any person handling extinguishing agents listed in Schedule 1 of the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* must hold a valid Extinguishing Agent Handling Licence (EAHL) issued by the FPIB. Licensed technicians are trained not only in fire safety, but also in environmental protection and regulatory compliance. Engaging unlicensed operators increases the risk of incorrect installation, system failure and uncontrolled emissions.

"If fire flaps don't close properly, the gas escapes and the engine

room is left unprotected," John notes. "These are issues that only come to light when systems are properly inspected by someone who understands them."

Beyond safety and compliance, best practice has broader implications for insurance, liability and environmental responsibility. Insurers may deny claims where fire suppression systems have not been serviced in accordance with standards, and avoidable emissions of scheduled extinguishing agents undermine Australia's efforts to reduce ozone depletion and limit SGGs under the Montreal Protocol and Kigali Agreement.

In support of improved outcomes across the sector, the FPIB is expanding its field engagement activities through increased site visits to marinas and marine facilities across the country.

These visits provide an opportunity to engage directly with vessel owners, operators and marina managers, to offer practical guidance on compliance and best practice, and raise awareness of licensing and permit requirements. Strengthening the ground engagement helps address knowledge gaps and reinforces the importance of safe, compliant and environmentally responsible fire protection practices.

Ultimately, best practice in the use of scheduled extinguishing agents in the maritime industry means achieving fire safety without unnecessary environmental cost. This includes proper system design, routine servicing, use of licensed technicians, prevention of avoidable discharges and consideration of environmentally preferable alternatives where feasible.

By integrating safety, compliance and environmental stewardship, the maritime sector can protect lives and assets while also playing its part in safeguarding the ozone layer and limiting the impacts of global warming.

Fire Protection Industry (ODS & SGG) Board

Case Study: "The Seaforth Case"

THIS article outlines a series of events that unfolded in the Northern Beaches of Sydney, beginning in 2016, that has become known as "The Seaforth Case".

The Seaforth Case is ultimately a case involving an unregistered surveyor undertaking a land survey that sparked a series of events resulting in significant financial damage to a member of the public.

The case also gives insight into how other professions, including local councils, deal with issues arising from incorrect boundaries shown on survey plans.

The chain of events

The original partial detail survey that was used for the design and Development Application for a concrete block garage was undertaken in mid-2016.

The unregistered surveyor who undertook this survey failed to identify a road widening that was registered in the mid-1950s. For this reason, the title boundary of the subject land was shown on the detail survey incorporating six metres of council-owned public road.

Interestingly, at the time of the original survey, the Digital Cadastral Data Base (DCDB) also did not identify the existing road widening. The New South Wales Government's interactive SIX Maps shows topography, features such as road names, local government areas, suburbs and property boundaries from the DCDB.

In December 2016, a Development Application was lodged with Northern Beaches Council for a proposed garage to be constructed at the front of the subject land. The local Council also failed to identify the road widening due to their heavy reliance on the SIX Maps viewer.

Development consent for the garage was given in May 2017.

Construction of the garage commenced in September 2018, at which time the neighbours to the immediate south of the development contacted Northern Beaches Council with concerns that the garage was being constructed on Council-owned public road.

The neighbours were aware of the road widening, as they had an identification survey undertaken when they purchased their property some years earlier. At that stage, Rygate were engaged to undertake an Identification Survey of the partially constructed garage.

The Rygate survey identified the garage as being constructed wholly on council owned public road (as shown in the diagram below).

The construction of the garage continued, as the applicant was advised by Northern Beaches Council that the Development Consent is valid until it's declared invalid by a relevant court and that the works as undertaken are consistent with the development consent and the construction certificate.

Legal proceedings commenced between the applicant, "The Waldings", and the neighbours to the south. "The Lus", which eventually resulted in a court case in the Land & Environment Court in 2021: "Lu vs Walding [2021] NSWLEC 21".

The court case

This article will comment on certain parts of the case relating to survey matters. However, I would like to point out that I have no legal training except for that associated with being a professional land surveyor.

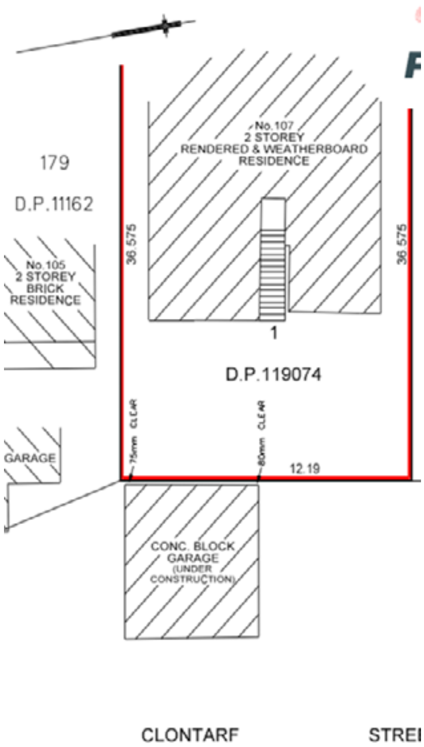
All 113 pages of the court case are available online if any readers would like to read it in its entirety.

The case put forth by the Lus' legal team endeavored to prove that improper landowner's consent was obtained for the development and that the Lus should be compensated accordingly or that the garage should be demolished.

Northern Beaches Council attended court in an observing capacity.

Some things that were of interest in the judge's findings are that the words "SIX Maps" appear 30 times but the words "Registered Surveyor" only appear once.

This one mention is in relation to the report provided by Rygate, not to do with the unregistered surveyor who undertook the original survey.



The most relevant item to me in the judge's findings is item 253 (shown below), where the judge rejects the original survey as being suitable for annexure to a DA and makes some interesting comments on Council's reliance on SIX Maps boundaries.

Item 253

No Boundary survey or site plan was prepared for the Waldings' DA – despite the requirements in Sch 1 Pt 1 cl 2(1)(a) and (2) of the EPA Regulation – with the result that their front boundary was not identified correctly at the time their DA was submitted. All the plans lodged in support of the Waldings' DA show their front boundary in the wrong location. The perils of relying on Six Maps to identify legel property boundaries, as the Waldings and the Council's assessing officers did, are well and truly highlighted by these events. While the respondents submitted that Six Maps is published by the NSW Government for use by the public to identify boundaries of land on aerial photographs, that is clearly not correct for all purposes.

The results of the court case were as follows:

- The Judge determined that demolition of the garage was not warranted.
- The Judge found that the construction of the garage was a breach of the EP&A Act, as proper landowner's consent was not obtained.
- The Waldings were ordered to pay costs in relation to compensating the Lus, as well as court costs.

The outcomes

As previously mentioned, Northern Beaches Council attended court in an observing capacity, so they did not suffer financially from the case. However, it appears the Seaforth Case has served as a catalyst for change at Northern Beaches Council.

In December 2019, just before the court case, Northern Beaches Council CEO Ray Brownlee released a press release stating: "In other changes, A Boundary Identification Survey will need to be submitted to ensure accurate assessment and identification of property boundaries. It's very important when assessing a development application that we have absolute clarity on property boundaries. Boundary Identification Surveys provided by Registered Surveyors enable this."

This marked a big change in Northern Beaches Council, as the original detail survey accepted for the Seaforth Case in 2016 was not only prepared by an unregistered surveyor but also did not have a company name or contact details on the plan.

The real loss in the Seaforth Case belongs to the Waldings. After paying court costs, paying compensation to the Lus and going through the road closure process to formalise the encroachment, the Waldings were out of pocket over $900,000.

The unregistered surveyor was reported to the NSW Board of Surveying & Spatial Information (BOSSI) and received a warning letter. This was due to the original survey being discovered well outside the six-month period required for prosecution.

The unregistered surveyor did not hold professional indemnity insurance. A claim against the unregistered surveyor would need to be via a civil claim.

The future

There are many lessons that can taken from the Seaforth Case, not only for surveyors but also for other professionals too. For other professions, the key lesson is the over-reliance on DCDB boundaries and understanding a registered surveyor's role in defining title boundaries.

The Seaforth Case also raises the issue of ethics. As the initial survey contains no company or contact information, it appears that it was undertaken without supervision or insurance.

The Institution has now added a Survey Ethics component to the candidate workshops, and we are looking at how we can get that message across to students at university and TAFE.

The Seaforth Case highlights the need for BOSSI to have more power to prosecute unregistered surveyors. In this case, the unregistered surveyor received nothing more than a warning letter. ISNSW has formed a Surveying Legislation Working Group. Former MP Melanie Gibbons is on board to help ISNSW with this.

Ultimately, it is up to us as surveyors to educate the next generation of surveyors and other professionals to prevent another Seaforth Case from happening in the future.

Mick Brown
ISNSW Director and Director at Rygate

Uncertain future for marine businesses in Sydney's Rozelle Bay as rezoning looms

MARINE businesses in Sydney's Rozelle Bay face an uncertain future due to a possible decision to rezone the area for more housing .

According to a report on ABC Sydney Radio in early February, the New South Wales Government's Cabinet Office is examining the potential of housing coexisting with the working port.

And, according to a story by ABC Radio Sydney journalist Declan Bowring, the future of some of Australia's oldest ships is uncertain as harbour leases near expiration and development pressure comes to bear.

A business known as Sydney Heritage Fleet (SHF) maintains and restores some of Sydney's oldest marine vessels, including the tall ship *James Craig*, built in 1884, the 1927 steamship *John Oxley* and the 1912 Sydney ferry *Kanangra*.

SHF spokesperson Brett Smith was reported as saying the Rozelle shipyard's lease on the Government-owned land expires in 2028 and he is concerned the organisation may be left without a home if the land is acquired amid Bays West transport oriented development (TOD) rezoning.

Mr Smith says there is nowhere else in Sydney that could accommodate the fleet: "There's nowhere left because it's all been developed and sold off. It's not just water frontage – it has to be water frontage in an area where you can make a bit of noise. If they did come to us and say, 'Sorry, you're out in 2028', we don't know where we're going to go."

Across a 10-lane highway connecting the city's Inner West to the Anzac Bridge is the site of the future Bays Metro station, which is due to be completed in 2032, the story says. Plans for the development include rezoning land for new homes within 1,200 metres of the station.

A Department of Planning, Housing & Infrastructure website said the plan would be made public by 2025 but that date has been missed. A Department spokesperson told the ABC the plan was subject to a review of the working port by the State's Cabinet Office.

Mr Smith says moving the working port for housing will make repair and maintenance jobs in Sydney Harbour more expensive.

"If the right balance isn't struck on the housing versus commercial-industrial use of this land ... I know that governments will look back and really regret that," he said.

A metro station is planned for the Bays West precinct by 2032 to connect open spaces and social infrastructure. (Photo: Infrastructure NSW)

"The only way to maintain things in and around the harbour will be to bring things in from other ports via barges. There'll be extra costs involved in that, all sorts of issues with weather, when you can't actually do those sorts of transport work."

Other marine companies based at Rozelle Bay say they have leases until 2028 and are also facing an uncertain future. Clement Marine Constructions director Richard Oppedisano told the ABC he does not know whether they will be able to continue to do emergency work on ferry wharves.

"I'm not sure if we can even carry out the work that we do now and meet our obligations under our contracts, because part of those obligations are we've got time limits on how long it takes us to get the equipment to the job site," he said.

Mr Oppedisano said the company had not had alternative locations proposed by the State Government.

Brad Hosemans from Polaris Marine, a maintenance contractor for Transport for NSW, wrote a submission during the Bays West station consultation process in which he said there was no other site on the harbour that would allow the company to continue at the same scale.

"That is because no such site exists," he said. "The combination of deep-water access, industrial zoning, sufficient land area and continuous navigational access does not exist elsewhere in the harbour."

Mr Hosemans rejected the idea of moving to Port Botany or Port Kembla, south of Wollongong, because it would make the day-to-day maintenance of harbour assets untenable.

The ABC reported that, despite the planning department website stating the Bays West TOD rezoning plan would be publicly available in 2025, they have not been published.

Rozelle Bay is home to a mix of commercial, recreational and historical vessels. (Photo by Declan Bowring, ABC Radio Sydney.)

Bays West is one of eight TOD precincts in Sydney and is the only one that does not have a finalisation report exhibited. The website states that the Bays West TOD rezoning will track on a different timeline due to the need to "resolve working harbour and ports uses".

The spokesperson for the Department of Planning, Housing & Infrastructure told the ABC the rezoning proposal is subject to a review led by the Cabinet Office, and that the review is examining the potential of housing co-existing with the working port, according to a 2025 Transport for NSW report.

"The review has involved extensive consultation with stakeholders, including leaseholders operating out of the precinct," the spokesperson said. "No decision has been made on the future of the precinct. The NSW Government will have more to say once it has considered the findings of the review."

The precinct includes parts of the working harbour at Glebe Island in White Bay, which handles large amounts of the State's cement, sugar, salt and gypsum.

To learn more about Sydney Heritage Fleet and the fight to protect the future of Rozelle Bay as a maritime precinct, click on this video link: https://www.youtube.com/watch?v=B0bkGQSGN1M

STOP PRESS

ON March 3, NSW Premier Chris Minns issued a media release saying bulk port operations on adjacent Glebe Island would cease by 2030 but promising that "working harbour operations across the precinct will be consolidated, mostly into (nearby) White Bay, ensuring the precinct will continue to provide critical services for the harbour, including boat maintenance and marine construction and as a base for tug boats and for emergency services", and including the Sydney Heritage Fleet (SHF).

When contacted, a spokesperson for SHF said they had seen the media release, but were waiting for more details.

Mr Minns said urban development on the site would include up to 8,500 homes.

Further information: https://www.nsw.gov.au/ministerial-releases/minns-government-to-deliver-thousands-of-homes-near-bays-metro-station-while-retaining-our-working-harbour

Slow brain, fast brain: understanding panic decisions under chronic unease in marine survey operations

IN the marine survey industry, technical competence is only one dimension of safe and effective practice. Equally critical, yet often overlooked, is the cognitive environment in which surveyors make decisions.

Whether conducting a hull inspection under time pressure, assessing a machinery space with incomplete information or managing trimming survey with tidal time pressures, the quality of our decisions is shaped not only by our expertise but also by the state of our minds.

Two complementary modes of thinking, commonly referred to as "slow brain" and "fast brain", play a central role in how surveyors interpret risk, respond to uncertainty and act under pressure. When chronic unease is present, these systems can shift in ways that increase the likelihood of reactive, sub-optimal or panic-driven decisions.

This article explores these cognitive dynamics and their implications for marine survey practice.

Fast Brain vs Slow Brain: a brief overview

Modern cognitive science distinguishes between two broad modes of thought:

Fast Brain (System 1):

- automatic, intuitive and rapid;
- operates with minimal conscious effort;
- useful for pattern recognition and routine tasks; and
- vulnerable to bias, assumption and emotional influence.

Slow Brain (System 2):

- deliberate, analytical and methodical;
- requires conscious attention and energy;
- essential for complex assessments and risk-based decisions; and
- more resilient to bias but slower to activate.

In marine surveying, both systems are essential. Fast Brain allows experienced surveyors to identify anomalies quickly – an unusual vibration, a non-compliant fitting or unexpected drafts. Slow Brain, however, is required to validate those impressions, weigh evidence and document findings with professional rigour.

The challenge arises when operational conditions suppress Slow Brain and allow Fast Brain to dominate.

Take this example. A vessel travels 30 nautical miles at 10 knots, then 30 nautical miles at 20 knots. What is the vessel's average speed over the full 60 nautical miles?

Your fast brain will probably say: "Easy, The average of 10 and 20 knots is 15 knots."

Now, slow it all down. Break it down into three steps.

Step 1: At 10 knots, the vessel has steamed for 30 -:- 10 = 3 hours.

Step 2: At 20 knots, the vessel has steamed for 30 -:- 20 = 1.5 hours.

Step 3: Total steaming time = 4.5 hours. Distance covered = 60 nm. Average speed = 60 -:- 4.5 = 13.33 knots

Chronic unease: a double-edged sword

Chronic unease is a well-recognised concept in high-reliability industries. It describes a persistent, low-level vigilance – a sense that something may be wrong even when no immediate hazard is visible. In moderation, chronic unease is protective. It encourages thoroughness, cross-checking and a healthy scepticism of assumptions.

However, when chronic unease becomes excessive or prolonged, it can degrade cognitive performance in the following ways.

- Reduced capacity for analytical thinking: Slow Brain becomes harder to engage, especially under fatigue or time pressure.
- Increased reliance on heuristics: Fast Brain shortcuts such as "this looks fine" or "I've seen this before" take over.
- Heightened emotional reactivity: stress hormones narrow attention, making it harder to consider broader context.
- Lower tolerance for ambiguity.

Surveyors may rush to conclusions simply to resolve discomfort.

In this state, even highly experienced professionals can make decisions that feel decisive in the moment but are poorly aligned with best practice.

Panic decisions: how they emerge

Panic decisions are not always dramatic. In marine surveying, they often appear as subtle deviations from standard procedure, such as:

- accepting incomplete evidence because the environment feels pressured;
- over-relying on memory rather than documenting observations;
- avoiding a difficult conversation with a client or crew;
- rushing a report to "get it off the desk"; and
- failing to notice that continuing to load may result in being over-draft and a cancelled departure.

These behaviours are rarely the result of incompetence. More often, they reflect a cognitive system overwhelmed by chronic unease and defaulting to Fast Brain responses.

Operational implications for marine surveyors

The marine environment is inherently dynamic and surveyors routinely work in conditions that challenge cognitive stability: confined spaces, variable lighting, noise, time constraints, commercial pressure, and the need to maintain independence and objectivity.

Understanding the interplay between Fast Brain, Slow Brain and chronic unease provides several practical benefits.

1. Improved Risk Recognition: Surveyors who recognise when they are operating in Fast Brain mode can pause, recalibrate and re-engage analytical thinking before making critical judgments.
2. Enhanced Report Quality: Slow Brain thinking supports structured reasoning, evidence-based conclusions and defensible documentation – essential in a regulatory or legal context.
3. Better Client Communication: Awareness of cognitive state helps surveyors manage difficult conversations without slipping into reactive or overly cautious responses.
4. Stronger Safety Culture: Teams that openly discuss cognitive load and decision pressure create an environment where uncertainty can be acknowledged rather than concealed.

Strengthening Slow Brain thinking in practice

Marine survey organisations can support better decision-making through several strategies.

- Structured checklists and decision frameworks: these reduce cognitive load and help ensure Slow Brain engagement.
- Time-out protocols: a brief pause before finalising a conclusion can prevent premature decisions.
- Peer consultation: discussing ambiguous findings activates analytical thinking and reduces isolation.
- Fatigue management: adequate rest is essential for maintaining Slow Brain capacity.
- Psychological safety: teams must feel comfortable expressing doubt, raising concerns, and challenging assumptions.
- Boy Scout principle: being prepared for any scenario will ease chronic unease by way of shutting out fast brain thoughts.

Conclusion

Marine surveyors operate at the intersection of technical expertise, environmental complexity and commercial expectation. In this demanding context, understanding how the mind functions under pressure is not a theoretical exercise, it is a practical necessity.

Wrong Fast Brain decisions made under pressure can snowball, resulting in poor and or dangerous outcomes. Being armed with the correct tools is essential in avoiding these outcomes.

By recognising the influence of Fast Brain and Slow Brain thinking, and by managing the effects of chronic unease, surveyors can strengthen the quality of their decisions, enhance safety outcomes and uphold the professional standards on which the industry depends.

Capt Louis Koutelas
Hunter Marine Surveyors
Director & Senior Marine Surveyor
AIMS member


AUSTRALASIAN INSTITUTE
OF MARINE SURVEYORS