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OF MARINE SURVEYORS

Shipshape

March 2025

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FROM THE BRIDGE	4
THE CEO'S DESK: A BUSY YEAR AHEAD.....	6
NEW ZEALAND COMPLIANCE PLATE CERTIFICATION.....	11
CHANGING VESSEL CLASSIFICATION SOCIETIES	14
“PENGUIN” RESTORATION PROJECT PROGRESSING.....	16
AUGMENTED REALITY IN MARINE SURVEYING.....	19
AMSA'S EVOLVING COMPLIANCE LANDSCAPE	22
LOAD RESTRAINT INSIGHTS	24
JOURNEYS TO BECOMING A MARINE SURVEYOR	
NORMAN MANINGO.....	26
ROD TWITCHIN	27
PSYCHOLOGY OF A MARINE SURVEYOR.....	30
GRAIN-SURVEYOR SCHEME REVIEW.....	32
LOW-RISK LITHIUM BATTERY INSTALLATION	35
PROFESSIONAL INDEMNITY INSURANCE	43
Front Cover: A cray-fishing boat at Victoria Dock in the heart of Hobart.	



From the Bridge. (Page 4.)



NZ compliance plate (page 11.)



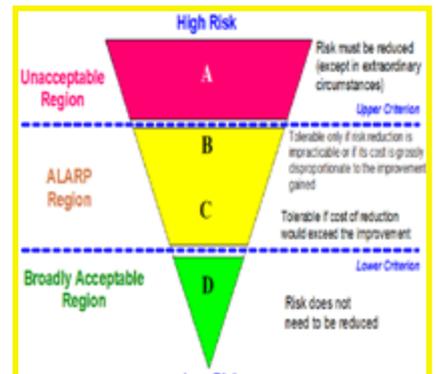
Penguin project progress. (Page 16.)



Load restraint insights. (Page 24.)



Grain scheme review. (Page 32.)



Lithium battery installation. (Page 35.)

ADVERTISING AVAILABLE

Advertising is now available in *Shipshape*, the official journal of the Australasian Institute of Marine Surveyors (AIMS). For all the information about advertising in our quarterly magazine, contact AIMS CEO Eric Perez at gm@aimsurveyors.com.au or on +61 492 881 737.

An honour and a privilege

IT is an honour and a privilege to have been entrusted with the Chairmanship of AIMS. As Chairman, my duty is to the organisation and membership. That duty is to ensure that AIMS continues to maintain its place as the pre-eminent professional body for marine surveyors in Australia, New Zealand and beyond.

Our members rely on AIMS to provide them with the services needed to maintain their professional standing in the maritime industry, and it's these services that I seek to continue to maintain and uphold for our members.

AIMS is a membership-based organisation. It does not exist nor function without the input and drive of the membership. I want to take this opportunity to welcome two new Board members: Wade Nagel and Captain William Burton.

Both Wade and William bring years of expertise, skill and knowledge as marine surveyors to the Board, and I am looking forward to their input in continuing to build on the success of AIMS and to continue to grow the organisation, both within our current boundaries and beyond.

The growth of any organisation requires careful and thoughtful planning. Our Chief Executive Officer, Dr Eric Perez, has been working on developing a strategic plan.

This plan will give the organisation a pathway to ensure that AIMS provides its membership with the resources they need to function as marine surveyors, to provide their customers with the level of integrity of service that will ensure continued success, and to maintain their level of professional standing with the marine community and the wider general community that is expected of us as professional practitioners.

The plan Dr Perez has developed consists of four pillars:

- ❑ Partnerships;
- ❑ Building our Membership Base;
- ❑ Marketing and Promotion; and
- ❑ CPD and Professional Standards.

I will expand on each of these headings to give you, as members, a broader understanding of where the Board would like to take this organisation.



Partnerships

“No man is an island” is an oft-quoted phrase which each of us would have heard many times before. As such, it is a truism which the Board is going to use to continue our standing in the maritime industry. Marine surveying is a broad church and our members work in many varying parts of the marine industry. Our customers, likewise, are broad and varied. They range from recreational, weekend boaties, to domestic commercial vessel operators, to cargo and freight carriers and handlers to insurance and legal firms.

As such, we, as an organisation, need to identify other similar bodies who engage with our customers that we can partner with to improve AIMS' visibility and provide greater value to our customers. Partnerships ensure that, together, the sum of the parts is greater than the parts alone.

Building our Membership Base

Presently, our membership base is limited, both geographically and professionally. The “Australasian” descriptor in our name indicates that we operate in the Australian and New Zealand sectors of the maritime industry. There are potential markets for our services beyond this current area.

The Oceanic region and South-East Asia are on our doorstep. These areas, given both their size and economic footprint, provide a rich potential market for AIMS to seek membership and to offer our

services. There are also other marine professions who we can potentially approach to seek partnerships with to benefit both memberships.

Marketing and Promotion

Nothing sells success like success. AIMS has a fantastic story to tell and the world needs to know about it. Our relevance with the maritime community and the general public is what helps our members stay in business.

By telling the story of how marine surveyors de-risk important business decisions for their customers, we are selling how marine surveyors use their integrity and knowledge to improve vessel safety and improve the decision making process.

CPD and Professional Standards

The world is a fast-paced and ever-changing place. Technology and changes to legislation and policy require us, as marine surveyors, to stay on top of this ever-evolving space. What was relevant 20 years ago, or even five years ago, is no longer so.

Therefore, we all need to keep abreast of the changes that affect our customers and, in turn, the wider community. AIMS is going to be assisting

members to keep up to date with this ever-changing space by providing numerous and varied CPD opportunities through podcasts, events, conferences and workshops.

AIMS is putting in place new initiatives around recreational insurance reporting standards to help our members and their clients provide insurers with all the relevant information to allow insurers to correctly risk-assess a client's insurable asset.

An exciting time

The next two to three years promises to be an exciting time for AIMS and our members. Marine surveyors hold a special place in the maritime industry, acting as the eyes and ears of our clients and helping them make the right decisions for their assets and their business.

I look forward to working with the Board and the members as a collective to keep AIMS as the premier professional body for our profession within our region and potentially beyond.

Eric McIlwain
Chair of the AIMS Board



Looking forward to another busy year

WE are now in full swing, and I am looking forward to building on the value proposition of being a member of AIMS.

As a member of the Australasian Institute of Marine Surveyors (AIMS), members gain access to a network of highly-skilled professionals and a wealth of resources to support you. AIMS provides continuing professional development opportunities, ensuring you stay up to date with industry trends.

By being part of a respected organisation, members enhance their credibility and reputation with clients. AIMS members are recognised for their expertise and commitment to ethical practice.

The Institute's advocacy efforts on behalf of members further strengthen your position in the maritime industry, ensuring that your interests



are represented in key discussions and regulatory decisions.

Ultimately, AIMS membership offers both professional support and personal growth opportunities.

The AIMS traditional and social media channels provide the Institute with the means to communicate with members, provide professional development opportunities and link to the community.

1. Industry Wand Webinars

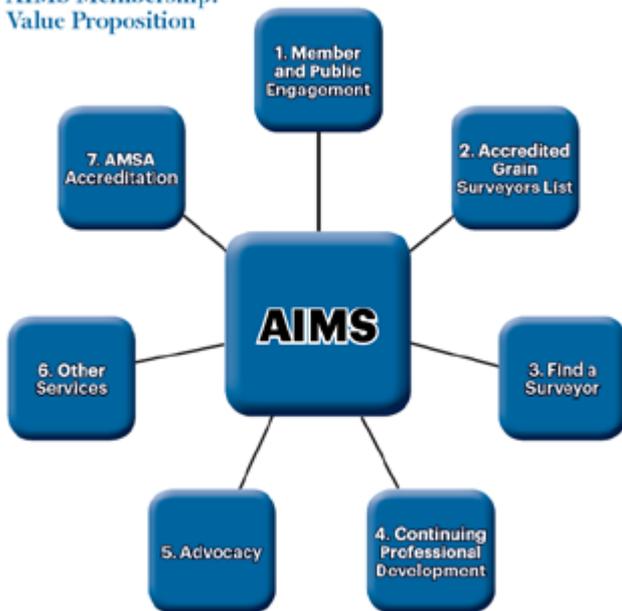
The AIMS continues to provide workshop and webinar content for members to engage with continuing professional development (CPD).

This year, we are on track to deliver 40 workshops and webinars between February and November. Forty different opportunities for AIMS members to engage in technical workshops.

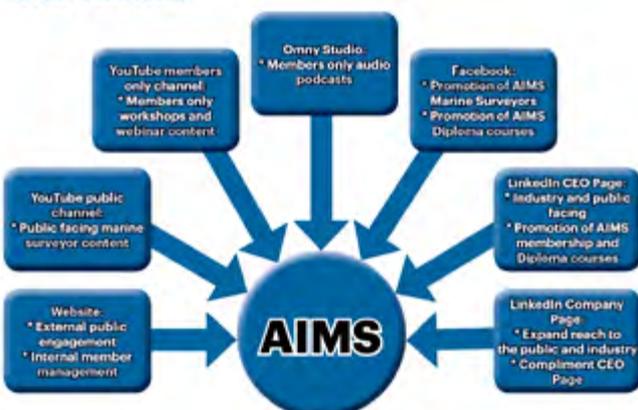


Workshop 1: Trent Firth, Managing Director, X-Pak Global – 6 February 2025

AIMS Membership: Value Proposition



Traditional and Social Media Platforms



Topic: Cargo securement - Load restraint guidance for Marine Surveyors

Trent Firth is Managing Director of X-Pak Global, bringing 14 years of practical experience in freight and logistics.

Starting his career in sales before moving into leadership, Trent has developed comprehensive expertise in load restraint technology and cargo protection solutions. Holding qualifications and extensive experience with restraint systems, Trent is actively involved in product research and development. Trent regularly attends international trade shows to evaluate emerging technologies and industry trends, ensuring X-Pak's solutions evolve with changing market needs.

His presentation will focus on practical sea cargo protection strategies, drawing from his extensive work with maritime operators and understanding of current industry challenges.



Workshop 2: Matt Kuc, Manager - Technology and Distribution, Austbrokers Countrywide - 12 February 2025

Topic: Understanding a Marine Surveyor's Professional Indemnity policy, plus insurance trends and implications

As an experienced Financial Lines, Technology and Distribution Manager with over 15 years' industry experience, and a shareholder of the business, Matt forms a key pillar in devising and driving company strategy at Austbrokers Countrywide Insurance Brokers.

Bringing together a deep understanding of translating complex professional risks into insurance solutions, as well as a personal interest in translating emerging AI and Automation technology into business practice, Matt is able to wear a number of hats adding value across a wide number of areas with clients and the broader insurance industry.

Key experience includes:

- ❑ Complex, Corporate and Listed Financial Lines Broking.

- ❑ Professional Indemnity advice to a broad range of member Associations.
- ❑ Management and Distribution of Insurance Binders, Facilities, and SME portfolios.
- ❑ Development and Integration of Automation in business.
- ❑ Cyber Security Management, advice to clients.
- ❑ Training, Presenting and Contributing to the wider industry including board presentations, client conferences, and industry groups such as Australasian Professional Indemnity Group, Australian Institute of Conveyancers and the Australian Institute of Quantity Surveyors.



Workshop 3: Capt. John Kavanagh, Director / Principal Solicitor / Master Mariner, Pacific Maritime Lawyers and Notaries - 20 February 2025

Topic: Australian Consumer Law and Marine Surveyors

John has more than 30 years' experience in the maritime industry, in a broad range of sectors, including in merchant shipping, in dredging, in government, in defence, and in commercial law.

As one of only a handful of master mariner / lawyers in Australia, John has the practical experience, the commercial expertise and the legal know-how to achieve superior outcomes for our clients. Our significant successes include:

- ❑ Acting in relation to ship repair claims, including defective paint claims.
- ❑ Advising and preparing vessel chartering contracts.
- ❑ Acting in the purchase of multi-million dollar vessels.
- ❑ Defending statutory demands and winding up applications for maritime businesses.

In addition to his Master Unlimited certificate of competency (AMSA), John holds a Diploma of Applied Science (Nautical Science) from the Australian Maritime College, a Bachelor of Laws (IIA Hons) from Deakin University, a Graduate Certificate in Military Law from the Australian National University, and an unrestricted Principal's Practising Certificate as a legal practitioner in

Queensland. John is also admitted as a legal practitioner to the High Court of Australia.

John is certified by the International Register of Certificated Auditors as a Maritime Safety Management System Auditor, and is an active member of the Royal Australian Navy Reserve. John was appointed as a Notary Public in New South Wales in 2023.



Workshop 4: Nick Parkyn, Nick Parkyn Marine Surveying / MarineML – 26 February 2025

Topic: Virtual Reality and Augmented Reality in Marine Surveying

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.

Capt. Louis Koutelas is the CEO and Director of Hunter Marine Surveyors.

Louis holds a Diploma Applied Science – Nautical Science and a Master Class 1 Unlimited, MAIMS. Louis has spent his entire working life in the shipping industry with 13 years at sea and 28 years as a marine surveyor. He is also the creator and author of the award winning CargoMax software range.



Workshop 6A: William E. George, Marine Educator, Consultant and Expert Witness at William E. George and Associates

Topic: Stability and Trim

William E. George is an internationally recognised author and expert in ship's stability, trim and hull strength. His book, *STABILITY AND TRIM FOR THE SHIP'S OFFICER*, is used as a USCG Licence reference. As a marine cargo surveyor with almost 38 years of experience, he is also very knowledgeable about cargo stowage, securing, segregation of Hazardous Cargo (HAZMAT). He holds a USCG Master's Licence, a Masters of Ocean Engineering degree from Stevens Institute of Technology, and a Bachelor of Science Degree from the United States Merchant Marine Academy.



Workshop 7: Capt. Louis Koutelas, CEO and Director, Hunter Marine Surveyors – 19 March 2025

Topic: AR (augmented reality) glasses as a tool for surveying



Workshop 8: Nick Parkyn, Nick Parkyn Marine Surveying / MarineML – 26 March 2025

Note: Brad Fisher (Workshop 5), Maritime Safety Queensland was set to present 'Abandoned vessel/wreck removals – role of Marine Surveyors',

and I was set to present on 'AIMS and Continuing Professional Development' in March. Brad's session has been postponed and my session (Workshop 6B) will now take place in late April.

2. Navigating the Future

The AIMS Board met in late January to develop a strategic, long-term pathway to ensure the longevity of the Institute. The Institute's vision, mission and core values remain unchanged:

- *Vision – Excellence in marine surveying, safe vessels, safe seas, safe surveyors.*
- *Mission – To promote, maintain and advance the specialised discipline of marine surveying in Australasia.*
- *Expertise – Build and enhance skills through participation in continuing professional development activities, providing access to technical resources, and facilitating industry events and networking opportunities.*
- *Integrity – Commitment to the Institute's code of professional practice, access to affordable professional insurance and a complaint management policy in line with a process of procedural fairness.*
- *Quality – Promotion of industry best practices and quality survey standards including recognition of achievement with our Awards for Excellence.*

The AIMS Strategic Plan 2025-2030 is underpinned by four key pillars: (1) Partnerships and Affiliations, (2) Building the Membership Base, (3) Business Development, Marketing and



Promotion and (4) Professional Development and Standards.

3. WISTA Australia and AIMS Partnership

WISTA Australia and AIMS are forging a partnership to promote diversity and professional excellence in the maritime sector.

I want to thank Emma Campbell and Kendall Messer, Queensland and Western Australian State representatives from WISTA Australia and Donna Jones, GAICD, WISTA Australia's President, for helping launch the partnership.

I would also like to thank the AIMS Board and





**MEDIA RELEASE
FOR IMMEDIATE RELEASE
17 FEBRUARY 2025**

- Professional Development
Collaborative training programs, workshops, mentorship opportunities and addressing skill shortages.
- Networking and Events
Co-hosting networking events and providing sponsorship opportunities at conferences and forums.
- Advocacy and Awareness
Campaigns and publications to promote diversity and raise awareness of its importance.

WISTA Australia and AIMS forge partnership to promote diversity and professional excellence in maritime sector

TWO prominent maritime organisations are joining forces to encourage greater participation of women in the marine surveying sector.

The Women's International Shipping and Trading Association (WISTA) Australia, and the Australasian Institute of Marine Surveyors (AIMS) today announced their organisations have negotiated a first-time partnership.

WISTA Australia President and Chair Donna Jones said the partnership will help create a more diverse, resilient and innovative marine surveyor sector in Australia.

'This collaboration aims to foster talent development and professional excellence within the maritime industry,' Donna said.

'Both organisations are committed to building a sustainable and inclusive maritime sector driven by innovation, equity and sound leadership.'

AIMS Chair Eric McIlwain said the collaboration was an opportunity to engage and work across industry to encourage more women in the maritime sector to consider a career as a marine surveyor.

'AIMS supports a focus on encouraging women in the maritime sector to seriously consider a career pathway as a marine surveyor,' Eric said.

They said key areas of collaboration include the following:

- Inclusion
Joint initiatives to increase female participation in marine surveying and related professions.

Background

The Women's International Shipping and Trading Association Australia is part of WISTA International, which supports a vibrant network of professionals across the maritime industry and operating in 62 countries. Celebrating over 50 years of operation, WISTA Australia's vision is to empower women in maritime by fostering diversity, leadership and innovation. Its mission focuses on attracting and empowering women through mentorship, networking and educational opportunities, enhancing their ability to lead with confidence and purpose.

The AIMS is the peak industry body for marine surveyors in Australasia, and it is the largest marine surveyor association in the Southern Hemisphere. AIMS has members in all States and Territories of Australia as well as New Zealand, the Asia and South Pacific regions.

Media contacts: Donna Jones, President and Chair, WISTA Australia | M: 0427 819 450 | E: Donna.Jones@ashvilleconsultinggroup.com

Eric McIlwain, Chair, AIMS | M: 0490 106 242 | eric.mcilwain@hastingsme.com.au

Kerryn Woonings (Senior Marine Surveyor & Loss Adjuster - Global Technical Services, Crawford & Company and AIMS member).

4. Newsletter Contributions

Thank-you to the members that 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 make a contribution to the newsletter. If you would like to know more, please contact the office.

5. 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

The New Zealand Compliance Plate Certification (CPC) Programme

ERIC, our AIMS CEO, asked me to pen an article for this edition of *ShipsShape*. A minor health warning: while this article explores the NZ CPC programme, its foundations, its current status and what it means for both OEMs and consumers, I do not profess to be an expert, and what I would encourage is feedback on any aspect of it, in perhaps the format of brief “Letters to the editor”, which we hope to launch in the next edition. I’m sure our CEO would also be pleased to award those pesky CPD points for any submissions!

The New Zealand Coastguard, in conjunction with the NZ Marine Industry Association (NZMIA), run a vessel certification programme. Its full name is “*The New Zealand Audited Boat Building Standard Compliance Plate Certification (CPC) Programme*”.

This is a voluntary certification programme for NZMIA members, with over 20 currently on the books. It should be noted, however, that there are still manufacturers in New Zealand who build and sell boats to the domestic market with no CPC or equivalent compliance or assurance programme.

CPC is designed to give consumers, and recreational boat users, confidence in the design and manufacturing processes. The programme sponsors note that it is unique in that each manufacturer is “visited” annually by a Marine Surveyor to make sure the boats are built not only to the CPC standards for safety, but also for workmanship as well”.

Any programme that provides quality assurance to the consumer is, of course, a good thing, and we should encourage our national

manufacturers to continue to build vessels to a published standard. The CPC programme also has the added benefit of facilitating the sale of AS1799-compliant NZ-built vessels into Australia.

But what is this standard? The NZ CG and NZMIA CPC programme is based on the Australian Standard AS1799.1:2021 (Amended 2022) and is prepared by the Australian Standards Committee (CS-114) and published by Standards Australia.

The committee has current representation from:

- Australian Maritime Safety Authority
- Australian Sailing
- Boating Industry Association
- Marine & Safety Tasmania
- Maritime Safety Victoria
- NSCA Foundation
- NSW Police Force

- Queensland Transport & Main Roads
- Royal Institution of Naval Architects
- Surf Life Saving Australia and
- Transport for NSW.

The Standards objective “s “to provide requirements for maximum load, persons and power capacities, reserve buoyancy, stability, fire protection and other safety aspects for powered craft up to 15m in length used as recreational boats”. Again, so far so good.

The AS1799.1:2021 standard has a number of amendments from the 2009 version, including improvement to a number of test requirements, calculations and assessments. These are detailed below:

- Manoeuvring test, used to confirm maximum power capacity.
- Tabulated data for determining

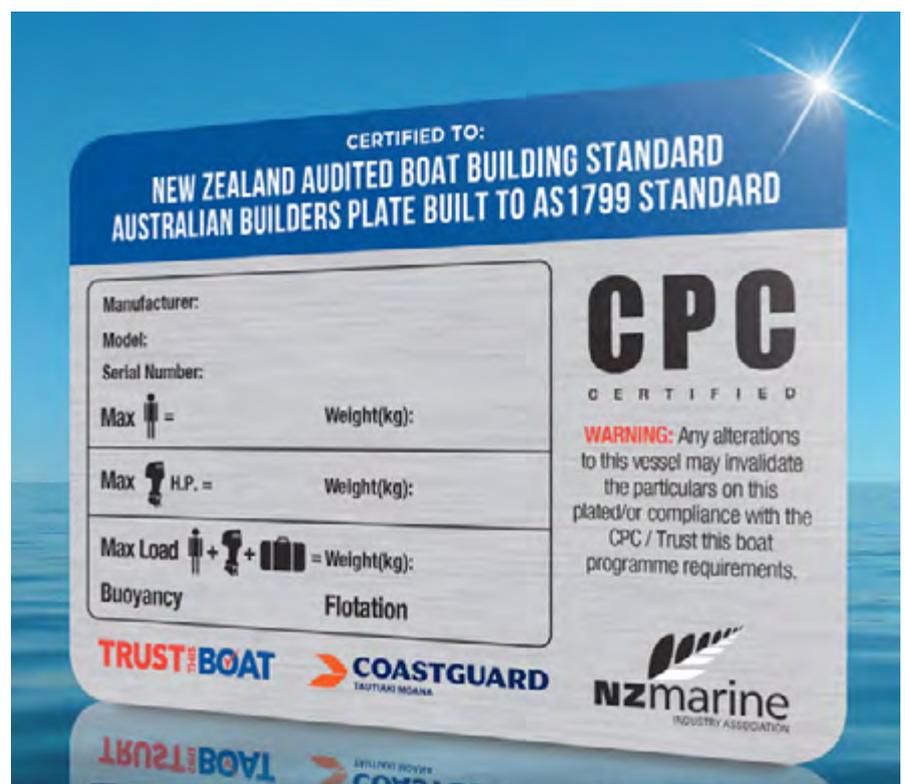


Figure 1. CPC Plate (<https://cpestandard.com/#home>)

masses of outboard motors and related equipment, used as part of the calculation for maximum load capacity.

- ❑ Expansion of stability assessment options for multihulls, to include use of options for monohull craft.
- ❑ Clarification of calculation to determine load capacity for inboard powered vessels.

The ASI799.1:2021 Standard relies heavily on ISO Standards, and satisfying the requirements of ASI799.1 is based on conformance in full, with the equivalent ISO standards for the appropriate Design Category (A,B,C,D). In addition, ASI799.1 also draws from other domestic and international standards and legislation such as ABYC, IMO Resolutions and the NSCV code.

The NZ CPC standards website (www.cpcstandard.com) notes that collaboration between the Coastguard-run programme and NZMIA sets additional (non-technical) standards and or requirements on the manufacturers¹, including:

- ❑ The provision of a two-year structural guarantee
- ❑ Coastguard NZ endorsement²
- ❑ Designed & built for NZ conditions³
- ❑ Recommended horsepower rating⁴
- ❑ Recommended people loading rating
- ❑ Higher resale value⁵

Making for safer boating.

As Coastguard and NZ Marine utilise the Standard, and note

1. [CPC Standard](#)
2. It is unclear what form the endorsement takes.
3. It is unclear how Coastguard define NZ Conditions outside of any published frameworks such as design categories.
4. It is unclear the relationship between recommended and maximum people and horsepower rating as noted on the plate.
5. No quantitative data sourced to support this.

their wish to have input into “what is deemed a safe boat”, it may well be timely for Coastguard to request representation on the CS-114 committee?

It is also clear that the programme has been successful in New Zealand, with over 20

Manufacturers – including well-known OEMs such as Haines Hunter, Extreme and Rayglass Boats Ltd – being participants.

But what about the rest of the world? While CPC facilitates the export of NZ-built OEM vessels to Australia, it does

not provide access for those OEMs (without additional certification) to expand into the US, European and UK markets, where additional certification is required.

In the case of Europe and the UK, this will be CE & CA Certification, which is based on the EU Recreational Craft Directive (Directive 2013/53/EU) and the UK’s (post-Brexit) Recreational Craft Regulations (RCR) ... sort of!

CE & CA Certification could provide additional markets for NZ OEMs but also provide routes for recreational vessels to

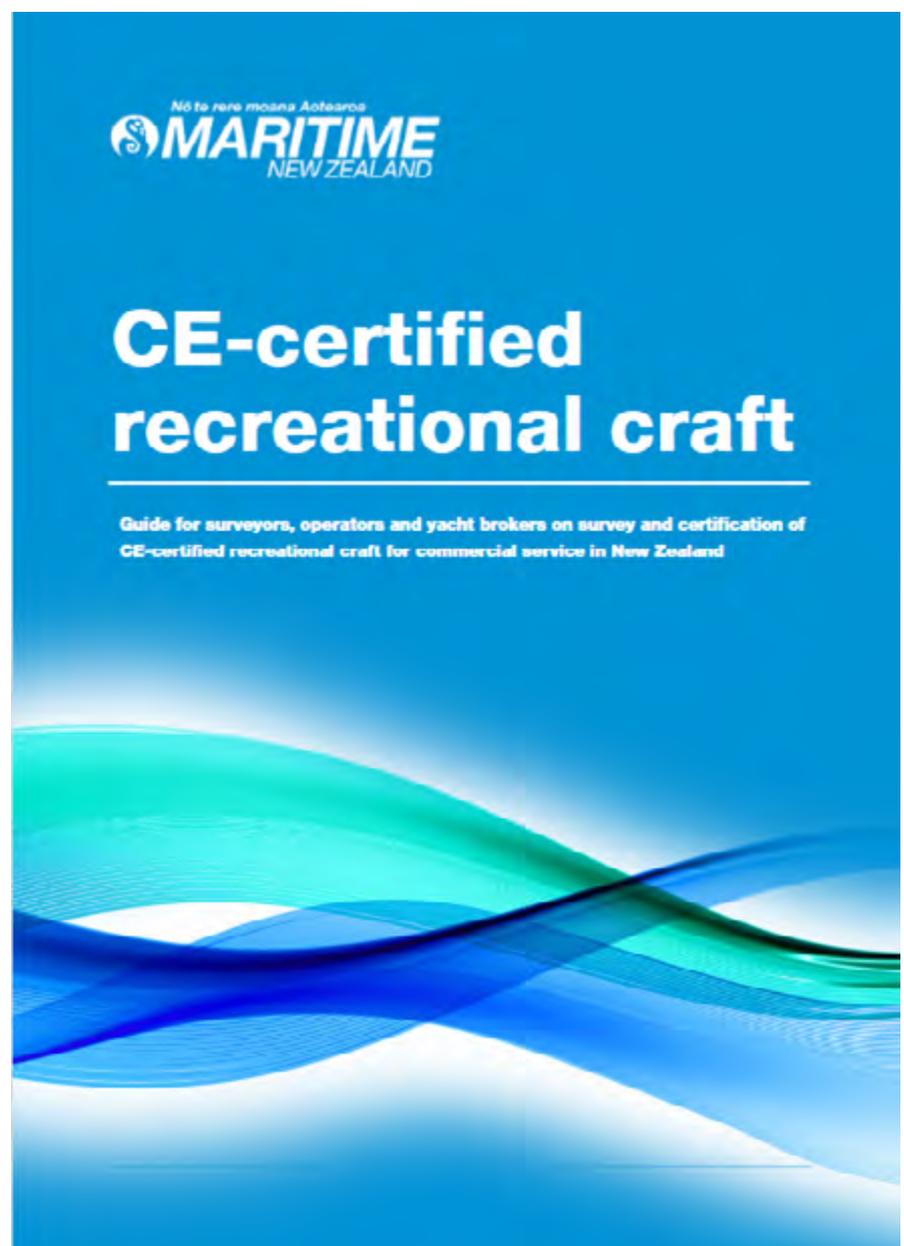


Figure 2 – MNZ CE-certified recreational craft for commercial use. (<https://www.maritimenz.govt.nz/media/uz2fsax4/ce-certified-recreational-craft.pdf>)

be certified for commercial use, utilising the protocols set out in *MNZ CE-certified recreational craft: guide for survey and certification – August 2019*.

Information is also available to Australian-based surveyors in DVC-ITS-016 (05/19). A link is here to the AMSA website: <https://www.amsa.gov.au/sites/default/files/2023-11/dcv-its-016.pdf>

Where to next? In December 2024, consultation closed for submissions on the draft AS1799.2. This draft Standard is an update to the 2021 edition, and focuses on technical updates such as cockpit design, fire protection, electrical and gas systems.

Definitions have also been improved and a clearer statement about full conformity has been drafted to clarify that all required assessments and tests must be completed in full.

Draft technical changes proposed for AS1799.2, includes the maximum persons and stability assessment testing for vessels over six metres in length, including an improved definition of cockpit and well deck boats.

The specification of watertight compartments and details regarding the enhanced requirements for open waters are also included. These enhanced requirements for open waters have particular reference to the number of persons carried in open waters and is subject to the wind heeling resistance capacity of the vessel. The wind heeling test itself has also been improved, based on contemporary methodologies used in comparable ISO and ABYC standards.

But what does all this mean for consumers here in NZ? Consumers should check, when purchasing a vessel, that it shows not only the CPC plate itself but also that the plate is supported by the required audit report which includes information regarding which standard the vessel has been built to (a previous or the latest published or amended standard) and, in addition, that all the testing required has been completed with the associated test reports.

A couple of further questions have been posed, and I look to the community across the ditch to provide some additional insights. How does this affect second-hand or older vessels exported across the ditch for private use,

if at all? Is there any assurance process in Australia to confirm NZ produced vessels meet the current AS1799 standards?

In summary, the AS1799.1 provides a useful tool for both NZ manufacturers and consumers. It has the support of both the New Zealand Coastguard and the NZMIA, with a significant number of NZ OEMs part of the programme.

Some manufacturers have however evolved this local certification programme to full CE / CA Certification opening up opportunities for their vessels both domestically for commercial use and for global sales. More info on CE/CA Certification can be found at www.IMCI.org.

Greg Marsden
AIMS Vice Chair

Greg Marsden is a New Zealand based MNZ and AMSA recognised surveyor, qualified marine accident investigator, and International Marine Certification Institute (IMCI) Inspector specialising in CE and CA Certification. Greg's work primarily focusses on recreational and commercial vessels to 24m but also undertakes some cargo work from time to time.



Figure 3 – A CE Certified Rayglass 410 Protector undertaking sea trials prior to export to Europe.

What happens when a vessel owner wants to change classification society?

IN the commercial shipping world, we may have often come across a situation where the vessel owner decides to change the classification society of the ship (Transfer of class or TOCA).

While the change of class procedure for a vessel maintained under class and of a relatively young age may be a simple enough process, understanding the various scenarios of class transfer process and the changes in survey requirements due to variables like age of vessel, vessel built under non-IACS class society, vessel having class certificate withdrawn would be important to appraise the complete process.

A vessel can attain the class certification under two scenarios:

- ❑ vessel built under IACS class society supervision as per class rules and assigned a cert of class upon completion of newbuilt and associated test; and
- ❑ vessel entering an IACS class society after completion of construction (while in service).

Let us try to understand the above situations.

1. Vessel built under IACS class society supervision as per class rules

The class certificate will be issued (and associated class notations assigned) after the completion of the following activities by class society:

- ❑ vessel construction plans and documentation as required by the Rules are accessed and found in compliance by the

Class society plan approval centre;

- ❑ appraisal of the design of materials and equipment used in the construction of the ship and their inspection at equipment manufacturer factory/workshop (if deemed necessary);
- ❑ surveys carried out to obtain satisfactory evidence that the scantlings and construction standards / methods meet the requirements (as mentioned in approved drawings); and
- ❑ tests and trials (Including sea trails, inclining experiment etc) are carried out as per class rule / requirements.

2. Vessel entering a class society after completion of construction (while in service)

When we consider entry into class or change of class for ships which are already in service, we can have multiple scenarios:

- ❑ a ship which is currently maintained under a IACS class society and changing class (or adding class) to another IACS class society;
- ❑ a ship which was built under a IACS class society and was previously maintained under a IACS class society, but the class has been withdrawn (currently not under any class society)' and
- ❑ a vessel which was not built under class society rules (or built under rules of a non-IACS class society) and trying to enter class of a IACS class society.

The IACS (International Association of Classification

Societies) has laid out clear guidelines about the procedure to be followed under the above mentioned scenarios (via Procedural requirements PR 1A, PR 1B, PR 1D).

PR 1A is for ships changing class from a IACS class society to another IACS class society.

PR 1B is for ships adding a IACS Class society, while already maintaining class under another IACS class society.

PR 1D is for ships not built as per class rules or built under rules of non-IACS class society (ships which have never been classed by an IACS class society).

While the detailed understanding of PR 1A, PR 1B and PR 1D is beyond the scope of this article, the thought process behind these procedures is discussed below.

- If a ship which has not been built under class rules (or under non-IACS class rules) is trying to acquire IACS class society certification.

The IACS class society would require all the essential structural drawings of the ship to be evaluated against the class rules and a detailed inspection/evaluation of the ship construction standards, followed by drydocking of the vessel and complete survey (Initial survey scope along with inspection of tail shaft, propellers, internal inspection of tanks etc).

- If a ship has been built under IACS class society rules but currently has class certificate withdrawn (not maintaining class).

The vessel plans / drawings which were already evaluated by class during construction and previously expired class certification, may be accepted as evidence of vessel construction complying with IACS class requirements. The scope of survey would be drydocking of the vessel and complete survey (Renewal survey scope along with inspection of tail shaft, propellers, internal inspection of tanks, Thickness gauging of hull plating and other structures etc).

- If a ship is classed by an IACS class society and wants to change class to another IACS class society.

The change of class survey scope would depend on the age of the vessel (higher the age of the vessel more detailed surveys to be carried out).

- For a vessel less than 5 years in age

Survey equivalent to Annual survey scope.

- For a vessel more than 5 years but less the 10 years in age:

Survey equivalent to annual survey scope along with inspection of representative ballast tanks (fore peak tank, aft peak tank and some ballast tanks within length of cargo space).

- For a vessel more than 10 years but less the 20 years in age:

Survey equivalent to annual survey scope along with inspection of representative ballast tanks (fore peak tank, aft peak tank and some ballast tanks within length of cargo space), inspection of representative cargo tanks or cargo holds.

- For a vessel more than 20 years in age:

Survey equivalent to special (renewal) survey scope, along with drydocking of vessel (or underwater inspection of vessel if the drydocking is not due).

Any pre-existing COC (condition of class) or overdue

surveys have to be cleared by the losing class society prior transfer of class (for ships more than 20 years of age)

- For vessel with class notation (ESP) more than 15 years but less the 20 years in age:

Survey equivalent to special (renewal) survey or intermediate survey (whichever is coming due), along with drydocking of vessel (or underwater inspection of vessel if the drydocking is not due).

While this article outlines the basic change of class requirements, the scope of survey, the cost involved and the time required for the process have to be evaluated on a case-to-case basis. A detailed understand if the PR1A, PR1B and PR1D requirements will be essential to evaluate the process and scope of survey.

Kalyan Das
ISM-ISPS & Service supplier
Auditor & MLC Inspector at
RINA
AIMS member

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Penguin restoration project: progress, challenges and future plans

THE *Penguin* restoration project was driven by three key members of the Queensland Maritime Museum Association (QMMA): Chris Dorrrough, Andrew Massey and John Hockings.

As passionate volunteers with a deep appreciation for sailing vessels and boat restoration, they recognised the need for skilled leadership to ensure the project's success. A call for assistance on Facebook led me to join the effort.

My background includes completing a shipwright apprenticeship at the South Brisbane Dry Dock in the late 1960s and further honing my skills at Bundeng Shipyards in Bundaberg.

Over the years, I advanced to roles such as Foreman Shipwright, overseeing lofting, construction, and repair of vessels, including wooden and steel ships up to 200 feet. Later, I transitioned into the construction industry, managing projects and ensuring compliance with workplace health and safety (WHS) standards. This diverse experience positioned me to contribute significantly to the restoration effort.

Planning

Recognising the complexity of the project, the team began by creating a detailed plan based on an inspection report from our marine surveyor. The plan outlined tasks in a logical sequence and incorporated input from the team's management experience. (See *Shipshape* magazine, December 2024.)

Safety management

The safety of volunteers and Museum visitors was a top priority. To address this, the

project adopted construction site safety protocols, including:

- ❑ installing secure fencing to protect visitors;
- ❑ developing a WHS-compliant safety management plan;
- ❑ implementing an emergency evacuation plan;
- ❑ conducting site-specific safety inductions and training on tools like shipwrights' adzes and woodworking equipment and electrical power tools; and
- ❑ regular "toolbox talks" to address safety concerns and procedures.

These measures ensured a safe working environment for all participants.

Challenges – funding, equipment and materials

Restoration projects require significant resources and, at the start, we lacked funding, equipment and materials. Volunteers stepped in, loaning essential tools, such as a grandfather's adze, wooden planes and a bandsaw from a family estate. Donated funds allowed us to purchase kauri planks and seasoned Oregon timber to begin the restoration.

We secured a \$50,000 grant from the Copland Foundation. This funding has been instrumental in driving progress.

Commitment

The project began in October 2021 with the initial inspection report by Russ Behan. The physical hands-on work started in April-May 2022, after many months of meetings and planning.

With just four volunteers, work progressed. A volunteer recruitment drive in 2024

increased the team to 19 active members, with an average of eight volunteers on-site each workday. The lines plan of Penguin were courtesy of Rupert Rathbone, and Matthew Morgan did the original 3D scans and processing from which the plan was produced.

Collectively, volunteers have contributed 7,039 hours from May 2022 to November 2024. Their dedication, and the support of their families, have been crucial in advancing the restoration.

Looking ahead: plans for 2025

Work will continue through 2025, with a focus on completing the bow section by June. Tasks include:

- ❑ replacing planking on the bow and port side;
- ❑ installing new Oregon decking over a marine plywood substructure;
- ❑ rebuilding and installing the windlass, Sampson post, and refurbished bowsprit; and
- ❑ reinforcing the hull with like-for-like repairs under the supervision of our AMSA-accredited marine surveyor, with all work completed to Uniform Shipping Laws (USL) Code.

The vessel currently holds an AMSA certificate of operation (UVI460689) and is registered with the Australian Register of Historic Vessels (ARHV00369).

Call for volunteers and support

We invite new volunteers to join us in bringing this project to completion. Interested individuals can email russell.cobine@maritimemuseum.com.au.

Additional funding is still needed, and donations can be made through the address above.

Acknowledgments

This restoration project is made possible by the unwavering commitment of our volunteers, and the generous support of suppliers who have contributed materials, expertise and time. Their contributions are invaluable and we extend our heartfelt gratitude to all involved.

Together, we are working to restore a piece of maritime history for future generations to enjoy.

**Russell Cobine
Lead Shipwright**



Figure 1. *Rotten Decking*



Figure 2. *New hanging knee with original in background*



Figure 3. *Replacing frames and hull planks*

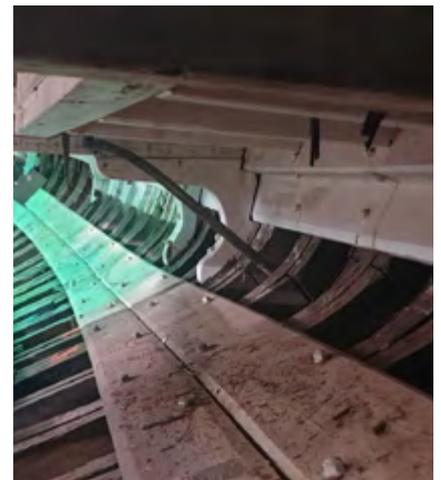


Figure 4. *Beautiful Internal Lines*

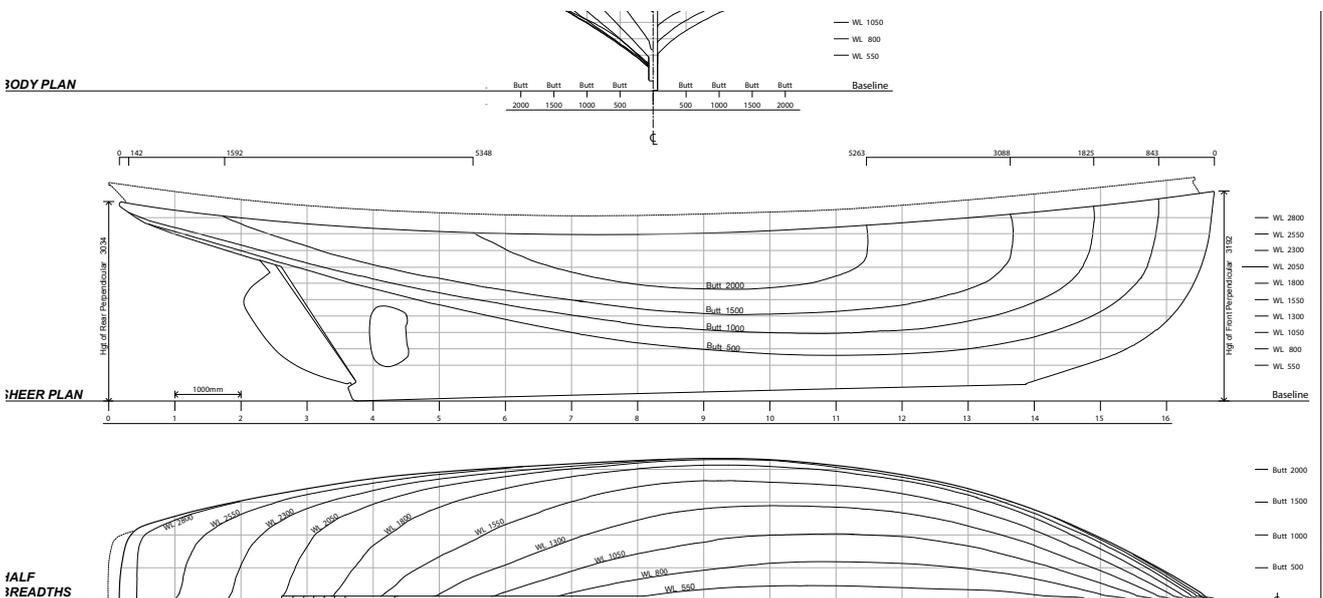
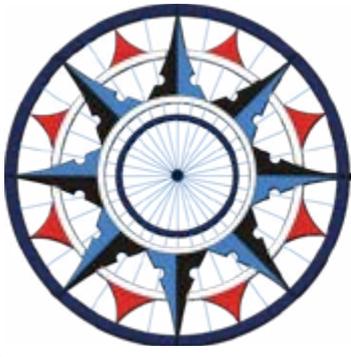


Figure 5. *3D modelling creates actual lines plan of Penguin as built*



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Augmented reality in marine surveying

AUGMENTED Reality (AR) is the technology used to augment a user's surroundings by overlaying digital information and objects onto their vision of the real world, mostly using a smartphone, smart glasses, AI Glasses or similar electronic devices.

"I feel that Augmented reality is perhaps the ultimate computer."
– Satya Nadella

The purpose of AR is to enhance and modify your surroundings.

AR does this by integrating digitally created elements into a live view, usually by using a smart device's camera.

AR can make digital information accessible instantly by overlaying animations, images, text or other information without disrupting the environment of a user.

AR technology is normally used in mobile applications that combine real-time visuals with useful digital content and context.

With the help of AR, a user can understand and evaluate their surroundings in a better way.

There is no doubt that AR is the mobile computing platform of the future.

History of AR

1968: Harvard Professor Ivan Sutherland, with the help of his students, including Bob Sproull, created what was widely considered to be the first head-mounted display system for use in immersive simulation applications. It was called "The Sword of Damocles" and used computer-generated graphics to enhance sensory perception.

1990: This technology was given the name "augmented reality" by Boeing researcher Tim Caudell.

1992: "Virtual Fixtures", a pioneering fully-functional AR system, was developed to allow US military personnel to control machinery virtually. This solution enabled safer training for US air force pilots.

1994: AR made its mark in the entertainment space with "Dancing in Cyberspace", a theatre production with acrobats interacting on stage with projected virtual objects.

1998: AR gained mainstream recognition with Sportsvision enhancing live NFL broadcasts with the virtual 1st & Ten graphic system that overlaid a yellow line for indicating the "first-down" marker. (Watch any game from the recently-concluded 2024-25 NFL season and you will see these in action.)

1999: NASA leveraged AR in its X-38 spacecraft to enhance navigation during test flights.

2000: The ARToolKit, an open-source software library for developers to build AR software, was introduced.

2009: Print media witnessed the advent of AR when *Esquire* magazine featured augmented reality on its cover. By scanning the cover, readers could see American actor Robert Downey Jr. speaking to them.

Since 2009: Major tech players have entered the AR space. Advancement in computer technology (size, computing power and lower power requirements) has now reached a point where AR as wearable AI can now be practically realised.

In computing and computer science, a processor or **processing unit** is an electrical component (digital circuit) that performs operations on an external data source, usually memory

or some other data stream. It typically takes the form of a microprocessor, which can be implemented on a single or a few tightly integrated circuit chips.

While the idea is not new, it has required advancement in computer technology, particularly:

- ❑ reduced size of processing units;
- ❑ increased power of processing unit;
- ❑ reduction in the electrical power requirements of the processing unit; and
- ❑ advances in display technology to realise mass-market AR product requirements for all-day wearable AR devices.

Technology has now advanced to a point where AR Glasses are practical and usable.

As AR continues to advance, it will grow to impact most industries, disciplines and our everyday lives.

Examples of general AR usage include the following.

- ❑ Generative AI on the go.
- ❑ ML based image augmentation.
- ❑ Computer vision research.
- ❑ QR code and barcode detection.
- ❑ Heads up telemetry.
- ❑ AR app and game design.

AI Glasses

AR typically requires AI Glasses or Smart Glasses, which are eye- or head-worn wearable computers.

The lack of a compelling mass-market AR product was due to the initial inability of existing display architectures to meet requirements for all-day wearable AR that pose extremely challenging and, in many cases, competing requirements.

Most AI Glasses (Figure 1) include displays that add information into the real-time view of the wearer. Superimposing this information onto a field of view (FOV) is achieved through an Optical Head-Mounted Display (OHMD) or embedded wireless glasses with transparent heads-up display (HUD) or augmented reality (AR) overlay. These systems have the capability to reflect projected digital images and text as well as allowing the user to see through it or see better with it.

Early models performed basic tasks, such as serving as a front-end display for a remote system. Modern AI glasses are effectively wearable computers which can run self-contained applications. Both types utilise Bluetooth, cellular technology or Wi-Fi communication to connect them to the Internet.

Some are hands-free and can communicate with AI engines and other applications on the Internet via Natural Language voice commands, while others use touch buttons.

Most AI Glasses include a camera an Inertial Measurement Unit (IMU).

Natural Language, or ordinary language, is any language that occurs naturally in a human community by a process of use, repetition and change. Natural language processing (NLP) is a subfield of computer science and especially artificial intelligence. It is primarily concerned with providing computers with the ability to process data encoded in natural language

Miniaturised hardware concealed in the frame of the glasses includes:

- ❑ processing unit (onboard computer);
- ❑ camera;
- ❑ display;
- ❑ microphone; and
- ❑ motion sensor.

The processing unit (onboard computer) serves as the main processor for AI Glasses. It handles all Bluetooth communication and running of user logic.

Typically, a front facing camera sensor to support AI applications such as image capture and image recognition.

It typically allows the user a large amount of control over resolution, gain and exposure for maximum flexibility.

The display used is micro-OLED or similar. It features 640x400 RGB pixels or more and is optically bonded to the prism assembly which directs the image into the user's eye. The result is a transparent floating display with a 20° field of view, and appears to be the size of a tablet display at arm's length.

The microphone is connected directly to the Bluetooth MCU, which allows for low-power operation and applications such as periodic recording and wake up detection.

The motion sensor, or IMU, is typically 6-axis, with both an accelerometer and electronic compass. Processing by the onboard computer calculates the raw X, Y and Z values of both sensing elements into angular values which allows detection of head position.

An IMU - an inertial measurement unit - is an electronic device that measures and reports a body's specific force, angular rate and sometimes the orientation of the body, using a combination of accelerometers, gyroscopes and sometimes magnetometers.

Marine surveyors work in a real world, not a virtual world, so AR is a practical enabler for marine surveying.

AR can support marine surveyors with activities including, but not limited to:

- ❑ inspections;
- ❑ surveys;
- ❑ AI summarisation of findings;
- ❑ access to knowledge in the field;



Figure 1: AI Glasses - miniaturised computer hardware is concealed inside. Re-chargeable batteries are contained in the circular lobes at the end of the arms (picture by the author)



Figure 2: AI Glasses - Micro OLED Display and prism are visible in the lens for the right eye (picture by the author)

- ❑ access to cloud-based AI in the field; and
- ❑ image overlay of technical details.

Usage example

Here are some examples of usage.

- ❑ Marine surveyor in the field is AR enabled using AI Glasses (Figure 3).
- ❑ The AI Glasses communicate using Bluetooth with the marine surveyor’s smartphone, which provides local storage and internet gateway capability.
- ❑ The smartphone is connected to the internet using mobile data connectivity.
- ❑ A cloud on the internet is hosting an AI engine (such as ChatGPT).
- ❑ The AI Glasses can communicate with the cloud-based AI engine.
- ❑ Software applications developed by specialist companies running in the AI Glasses and mobile phone to collaborate to provide context-specific AR experiences.

With the appropriate AI-enabled software, the AR setup indicated in Figure 3 would be capable of enabling:

- ❑ inspections;
- ❑ surveys;
- ❑ AI summarisation of findings and report creation;
- ❑ access to knowledge in the field;
- ❑ access to AI guidance in the field; and
- ❑ image overlay of technical details.

Suitable AI Glasses are available and innovative software applications are in the pipeline.

We are always looking to the future; the present does not satisfy us. Our ideal, whatever it may be, lies further on. You can’t have a better tomorrow if you are thinking about yesterday all the time.

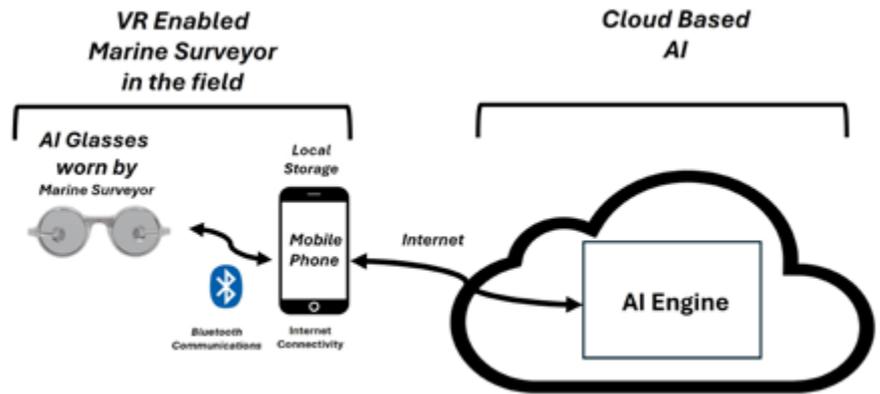


Figure 3: AR usage example

“I believe that augmented reality will be the biggest technological revolution that happens in our lifetimes.” – Tim Sweeney

“I regard [AR] as a big idea, like the smartphone. The smartphone is for everyone, we don’t have to think the iPhone is about a certain demographic, or country or vertical market: it’s for everyone. I think AR is that big, it’s huge. I get excited because of the things that could be done

that could improve a lot of lives.” – Tim Cook

Nick Parkyn
Marine Surveyor / Director
Nick Parkyn Consulting & Design Pty Ltd

Note: The author, through his company, MarineML, is currently developing AR capability for marine surveyors built around AI Glasses and AI Wearables. MarineML believes AR will transform marine surveying, creating new ways of working, learning and innovation.

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Navigating change: AMSA's evolving compliance landscape for domestic commercial vessels

THE Australian Maritime Safety Authority (AMSA) has been undergoing significant regulatory shifts in how it oversees the domestic commercial vessel (DCV) fleet.

From changing compliance expectations to new surveyor obligations, these developments are reshaping the landscape for vessel owners, operators and surveyors alike.

For many in the industry, AMSA's approach to compliance feels increasingly rigid, with greater scrutiny placed on surveyor accountability. While ensuring safety and seaworthiness is paramount, the rate of regulatory change has led to growing concerns over inconsistent interpretations, unrealistic enforcement expectations, and the administrative burden placed on surveyors and operators.

Shift towards standardisation

In recent years, AMSA has pushed toward greater standardisation in DCV compliance, particularly through:

- ❑ the General Exemption (EX02 & EX40) amendments, affecting periodic and renewal surveys;
- ❑ updated Instructions to Surveyors (ITS) and associated standards, which replaced IS-47, outline surveyor obligations regarding compliance, defect reporting, and enforcement; and
- ❑ new audit and oversight mechanisms, increasing scrutiny on surveyors and their reporting practices.

While AMSA's objective is to improve safety and regulatory consistency, the application



David Higgins

of these changes is not always uniform across different regions. Many surveyors have expressed frustration at AMSA auditors challenging long-standing industry practices without offering practical alternatives.

The shift from risk-based assessment toward rigid compliance enforcement has created operational challenges, particularly for independent surveyors tasked with interpreting evolving regulations.

The unintended consequences of compliance overreach

The DCV sector – which includes charter vessels, fishing vessels and other workboats, and passenger vessels – operating within Australian waters, is increasingly burdened by excessive paperwork and shifting compliance targets.

While safety should always be the priority, the practical application of AMSA's

expectations is often misaligned with real-world vessel operations.

Below are some key concerns from operators and surveyors.

- ❑ Inconsistent application of standards.
- ❑ Surveyors report cases where AMSA delegates apply differing interpretations of NSCV and USL Code requirements.
- ❑ Increased scrutiny on surveyor reporting.
- ❑ The ITS framework places greater liability on surveyors, requiring meticulous defect documentation, even for minor, non-safety-critical issues.
- ❑ Rising compliance costs.

Vessel operators face increased expenses due to additional survey requirements, modifications and administrative hurdles.

These challenges disproportionately impact smaller operators, particularly those running vessels under 12 metres in the tourism, fishing

Guilty pleas and convictions for master and company of Horizontal Falls boat crash

A JANUARY 2025 Australian Maritime Safety Authority (AMSA) media release reinforces the need for safety management systems that are not only understood but also implemented to the benefit of passengers and crew.

AMSA media release
31.01.2025

A horrific and high-profile incident involving a domestic commercial vessel has demonstrated that a safety management system is only as effective as its implementation.

Twenty-five passengers and two crew were onboard Journey Beyond Adventures Pty Ltd owned and operated high-speed commercial vessel *Falls Express* when it crashed into Horizontal Falls at McLarty Range in the West Kimberley in Western Australia on 27 May 2022.

Charges were laid by the

Commonwealth Director of Public Prosecutions, on referral from AMSA, following an investigation which built a weight of evidence against both the master and company.

Yesterday, the Perth Magistrates Court convicted the master and Journey Beyond Adventures Pty Ltd, operator of a domestic commercial vessel responsible for involved in the Horizontal Falls boat crash in May 2022.

The court took into consideration victim impact statements and safety and training measures when it handed down its verdict.

Australian Maritime Safety Authority (AMSA) Acting National Operations Manager David Marsh said it was fortunate that no-one died in the incident, which triggered a commendable multi-agency

response in a remote location, and an extensive subsequent investigation by the safety authority.

“A safety management system shouldn’t be seen as a document that gathers dust on a shelf somewhere – it’s a living system that must underpin effective and safe vessel operations,” Mr Marsh said.

“Failure to implement a safety management system as it’s intended can lead to devastating consequences – for human life and for businesses.

“This should be a lesson to all adventure ride masters and operators to take safety seriously, and not as a box-ticking administrative exercise.”

In the Perth Magistrates Court of Western Australia, the vessel’s master pleaded guilty to two charges contrary to the Marine Safety (Domestic Commercial Vessel) National Law and was fined \$12,000 with a conviction recorded.

Journey Beyond Adventures Pty Ltd pleaded guilty to a single charge and was fined \$15,000.

and transport sectors. In some cases, the cost of regulatory compliance now outweighs the financial viability of maintaining certain operations.

Balancing safety with practicality

To ensure safety regulations remain effective without being unduly burdensome, AMSA must work more collaboratively with industry professionals. Some proposed measures include:

- establishing clearer, centralised guidance for surveyors, reducing the likelihood of varied interpretations between AMSA auditors and independent assessors;
- re-evaluating the defect reporting process to ensure it

captures critical issues without forcing surveyors into excessive liability concerns over minor defects; and

- providing industry consultation on key changes before enforcement, allowing surveyors and operators to highlight real-world implications before new mandates take effect

Conclusion

Australia’s coastline is safeguarded by a diverse fleet of domestic commercial vessels, each with unique operational challenges. While AMSA’s intent to strengthen compliance is commendable, the practical execution of these regulations must balance safety with operational feasibility.

Surveyors play a crucial role in this ecosystem, and their ability to conduct risk-based assessments should be supported, not constrained, by evolving compliance frameworks.

As we navigate these regulatory waters, continued dialogue between AMSA, surveyors and vessel operators will be essential to ensuring that compliance measures enhance safety without placing unnecessary strain on the industry.

David Higgins

Note: David Higgins, Class 1 Chief Engineer, Dip.DCV-AIMS, AMAIMS, and MIMarEST, is an AMSA-accredited surveyor and AIMS member.

Load restraint insights: a marine surveyor's guide

DURING X-Pak Global's extensive work with sea export, we have gathered significant insights into cargo securement best practices. Our experience supplying and implementing load restraint solutions has highlighted critical factors that make the difference between secure cargo and potential failures.

Critical compliance framework

Industry best practices form the foundation of safe operations. There is no single binding international regulation, however key guidelines and standards to refer to include:

- [CTU Code](#) requirements;
- IMO/ILO/UNECE Guidelines;
- [IMDG Code](#) specifications; and
- industry best practices from leaders like Hapag-Lloyd.

Pre-loading checklist

To assist marine surveyors, we have developed a simple and practical pre-loading checklist. It is essential to review:

- detailed cargo characteristic evaluation;
- weight distribution analysis;
- centre of gravity considerations;
- securing method selection; and
- documentation requirements.

Technical implementation guide

Based on thousands of successful cargo securing cases, we recommend surveyors verify:

- friction material selection and placement;
- lashing angle compliance and tension settings;
- strategic dunnage positioning;
- attachment-point load ratings; and
- documentation accuracy.

Field experience shows horizontal lashing angles between 30 and 60 degrees deliver optimal security. When using loop lashing, both single and double configurations need careful tension monitoring. Web-lashing ratchets, one-way systems, chains and wire ropes each serve specific purposes – no single solution fits all scenarios.

International certification

X-Pak's range of web and one-way lashing systems are strictly tested at point of manufacture to ensure pre-tension capabilities and max break load numbers are accurate. We place high importance on quality products to the market to give every piece of cargo the greatest chance of reaching its destination, as it left.

Common pitfalls observed

Our site assessments regularly identify preventable issues, including cost-driven decisions overlooking safety requirements, limited product application knowledge, inadequate equipment training and reactive security measures.

Working closely with marine surveyors, X-Pak Global emphasises practical solutions to these challenges. On-site demonstrations and hands-on training bridge the gap between theoretical knowledge and real-world application.

X-Pak Global supports marine surveyors with technical expertise, while respecting their critical role in maritime safety. By combining our load restraint knowledge with surveyors' maritime expertise, we create safer, more efficient cargo transport solutions.

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My journey to becoming a marine surveyor: Norman Maningo

IN 1995, I graduated from maritime college in the Philippines and took my first step into the maritime world as a seafarer. Little did I know that this would be the beginning of a journey that would ultimately lead me to become a marine surveyor, a profession I would come to cherish for its dynamic and fulfilling nature.

As a seafarer, I spent years on the seas, in different countries, but often traveling to Australia, one of my favourite places to return to time and time again. My career as a seafarer took me through various positions. It took me over 10 years of hard work onboard and dedication to studying to obtain my master's certificate.

The last position I held onboard was Chief Mate. These roles came with great responsibility, overseeing the safety of the vessel and crew, navigation, taking care of the cargo, and maintenance of ship systems. However, being away from my family for months at a time was one of the hardest aspects of my career.

While I found great satisfaction in my work, I wanted more stability and a closer connection to home.

My career path changed in 2007 when I was chief mate of a bulk carrier vessel which regularly called at Newcastle, Australia. It was there that I met Capt. Louis Koutelas and Capt. Andrew Graver, the owners of Hunter Marine Surveyors.

Observing my strong work ethic, they offered me an opportunity that would set the course for the next phase of my career. It was an offer I couldn't refuse – a position at their company, coupled with the



Norman Maningo.

chance to settle down in Australia with my young family. The idea of finally having a stable home life, while still being part of the maritime industry, was a dream come true. Without hesitation, I accepted their offer.

In 2008, I officially became a Hunter Marine Surveyor. My transition from a seafarer to a marine surveyor was both exciting and challenging. While I had an excellent foundation in maritime operations from my seafaring days, the world of marine surveying was a whole new realm. It required me to expand my knowledge and hone a new set of skills, and I was eager to rise to the challenge. Immersing myself in a new culture and allowing myself to learn new skills, gain new experiences, in a new role and country was incredible.

To further my expertise, I pursued formal training. I enrolled in long-distance courses with the International Institute of Marine Surveyors (IIMS) in London, where I earned my

Diploma in Marine Surveying. This program deepened my technical understanding and provided the credentials needed to advance in the field.

Additionally, I studied at the Australasian Institute of Marine Surveyors (AIMS), where I obtained my Diploma in Marine Surveying in 2016 and the Advanced Diploma in Marine Surveying in 2024.

This study gave me invaluable insights into the marine surveying standards specific to the Australasian industry.

These studies laid the foundation for my practical skills and helped me navigate the regulatory and technical nuances of surveying within the region. To further deepen my knowledge and understanding of various marine surveying works, I pursued accreditation as an AMSA (Australian Maritime Safety Authority) Accredited Marine Surveyor for statutory survey of Domestic Commercial Vessels (DCV). I also obtained

my accreditation as an Authorised Officer on behalf of the Department of Agriculture, Fisheries and Forestry (DAFF) for surveying the suitability of empty bulk vessels to load grains in Australia.

Since my entry into marine surveying, I have committed myself to continuous career development. With each new project, I gain more experience and knowledge.

I take part in specialised training, taking modules in marine surveying through AIMS, learn from seasoned colleagues, and attend industry networking events that expose me to new trends and technologies. This professional development ensures that I am always ready to tackle new challenges head-on and adapt to an ever-evolving industry.

One of the most rewarding aspects of being a marine surveyor is the sheer variety of the work. No two days are ever the same. Every project presents its own set of complexities, from inspecting ships and cargo to evaluating safety procedures, compliance and even damage assessments.

Each vessel I encounter has its own unique characteristics and the conditions in which we work constantly change.

Whether I am conducting a survey at a bustling port or travelling to remote locations, the work remains both intellectually stimulating and rewarding.

Moreover, as a marine surveyor, I have had the privilege of meeting people from all over the world. The maritime industry is global, and this has exposed me to countless cultures and perspectives. The diversity of my colleagues and clients has enriched my professional life, offering me the chance to learn and grow personally as well.

The connections I've made in the industry have helped me understand how different nations approach maritime operations, and how we can all collaborate to ensure safety and efficiency.

Being a marine surveyor, I also enjoy the freedom and flexibility the profession offers. While much of the work requires being on-site at various locations, there is also a level of autonomy in

how I manage my schedule and workload.

This flexibility has allowed me to maintain a healthy work-life balance, which, after years of being away at sea, has been incredibly valuable.

In conclusion, the journey of becoming a marine surveyor has been both challenging and immensely rewarding. The profession offers a unique blend of intellectual stimulation, hands-on work and global exposure.

My transition from seafaring to surveying has been one of personal and professional growth, and it is a role that I continue to find fulfilling and dynamic. The marine surveying industry has not only provided me with a stable career but also allowed me to continuously learn, explore new places and meet people from all walks of life. I can honestly say that I have found my calling, and I look forward to the new challenges and experiences that await in the years to come.

Capt. Norman Maningo
Hunter Marine Surveyors
Senior Marine Surveyor
AIMS member

My journey to becoming a marine surveyor: Rod Twitchin

MY journey into the marine industry started at a very young age, boating with my family on the Hawkesbury River when I was still in nappies. As I grew older, I became deeply involved in waterskiing, both socially and competitively through waterski racing. I then trained as a mechanic, working on boats and just about anything with an engine or complex systems.

In the early 1990s, I moved to Hamilton Island, where I had my first exposure to commercial vessels and crew accreditations. From there, I left the island in the

mid-1990s as an engineer-mate aboard a 100ft commercially-registered luxury motor yacht. We were fortunate enough to travel extensively, covering most of Australia's waters, as well as the Solomon Islands, the Louisiade Archipelago, New Zealand and the South Pacific.

During these years, I gained firsthand experience in seamanship, navigation, emergency preparedness, machinery and propulsion systems, ancillary system monitoring and maintenance, watertight integrity, and overall

seaworthiness. I also learned what a yacht truly experiences in a heavy sea state. This period ignited my passion for the marine industry and provided a platform for learning that no shore-based institute could ever replicate.

As an engineer (and later as master), I was heavily involved in the yacht's survey requirements and found myself increasingly interested in the process. Over time, I pursued and obtained engineering and master's certifications, while remaining deeply engaged in survey-related matters. I developed a strong

understanding of maintenance, procedures, emergency preparedness, risk management and all aspects of yachting.

Twenty years ago, I moved ashore and took on roles as a project manager and general manager in larger refit companies, servicing luxury yachts. Even then, ensuring survey compliance and safety remained a core responsibility, and my learning never stopped.

Fifteen years ago, I founded Rod Twitchin Marine Pty Ltd (RTM), shifting my focus exclusively to professional marine services, with surveying as the main priority. With the guidance of my colleague, Chris Hutchings, I became deeply immersed in the world of marine surveying, conducting commercial, pre-purchase, insurance and valuation surveys under his trusted mentorship. It was then that I quickly realised: it's a lot easier writing a defect list than fixing one!

Chris's guidance was instrumental in RTM's ongoing success and I'm pleased that we still conduct project work together regularly.

Over time, I gained accreditation as a surveyor through MSQ (now AMSA) and joined professional societies such as MSA and AIMS. RTM continued to grow, and the learning never stopped.

Ten years ago, my now-wife, Renee, joined RTM. Today, we work together conducting surveys of all types – sometimes travelling the world to do so.

To this day, I carry with me the invaluable advice Chris shared years ago: "Imagine you're taking your young family on a ferry. You would expect to return safely. Use that mindset whenever you're inspecting any vessel."

That principle remains at the core of every survey I conduct.



Rod and Renee Twitchin.

Here are the most important lessons I have learned.

Always act with honesty and integrity, and never speak mistruths or compromise your beliefs to help others gain.

If you tell the truth, you cannot get into trouble – although it may offend some.

Your client is the person paying your invoice, your full attention belongs to them.

If you don't know something, never pretend that you do, it can be costly.

No matter how much experience you have, there is always something new to learn every day.

Looking ahead

Renee and I look forward to many more years within this amazing industry. It continues to offer us opportunities to travel, meet other like-minded professionals, learn every day and, most importantly, help good people.

Rod Twitchin
Managing Director
Rod Twitchin Marine Pty Ltd
AIMS member

Volunteer Recruitment Drive



The Maritime Museum Maintenance Team seeks **Volunteers** with the following skills:

Carpentry

Plumbing

Welding

Painting

Gardening/Ground Maintenance

Mechanical Engineering

Electrical Work

General Handy-Person

Maintenance Team works Tuesdays and Thursdays

Grounds Team works Wednesdays and Fridays

Pearling Lugger Restoration (*Penguin*) Team works Tuesdays, Thursdays & Fridays

Times are from **8am to 3pm** with morning tea and lunch breaks

Days and Times are flexible.

Volunteers with Trade Certificates, Forklift & Scissor Lift Licenses are needed but not essential. We accommodate a wide range of skill levels.

For an introductory visit please contact:

John Imrie – john.imrie@maritimemuseum.com.au

Graham Tappenden – graham.tappenden@maritimemuseum.com.au

Russell Cobine – russell.cobine@maritimemuseum.com.au (*Penguin*)

We look forward to welcoming you onboard.

The psychology of a marine surveyor: navigating isolation and mental clarity

MARINE surveyors perform critical evaluations of vessels, assessing their structural integrity, mechanical functionality and overall seaworthiness. This role demands a keen eye, deep technical knowledge, and the ability to operate with unwavering focus in environments that can be both physically and mentally demanding.

One of the less-discussed aspects of this profession is the psychological state required to conduct a thorough survey, particularly the effect of isolation and the necessity of maintaining mental clarity.

Mental demands on a marine surveyor

The process of surveying a vessel is inherently meticulous, requiring attention to detail and an analytical mindset. Each survey involves a structured methodology, from visual inspections to the use of specialised diagnostic tools, such as moisture meters and engine diagnostics. However, the depth of focus required for these tasks can be hindered by external distractions, whether they stem from environmental factors, digital interruptions or interpersonal interactions.

Many marine surveyors find themselves working alone for extended periods, particularly during on-site inspections where concentration is paramount. The solitude associated with this work can be both a benefit and a challenge. On one hand, isolation allows for deep focus and methodical work. On the other, it can lead to cognitive fatigue, decision-making errors or even an over-analysis of findings.

Navigating isolation: the need for a clear mind

A marine surveyor must develop strategies to manage the mental strain that comes with isolation. These strategies include the following list.

Structured Surveying Process

Having a clearly defined workflow ensures that each part of the inspection is methodically addressed. Breaking the survey into distinct stages (hull inspection, mechanical evaluation, safety assessments, etc.) allows the surveyor to maintain focus without feeling overwhelmed.

Minimising External Distractions

Unlike a traditional office

setting, where notifications, emails and phone calls can disrupt work, a surveyor often works in an environment where they must consciously limit distractions. Turning off non-essential devices, setting specific times for external communication and ensuring a dedicated focus period for detailed assessments can help maintain clarity.

Cognitive Reset Techniques

Continuous focus over extended periods can lead to mental fatigue. Implementing short breaks, deep-breathing exercises or even stepping away from the vessel for a few moments can help reset cognitive function and enhance decision-making accuracy.

Sensory Awareness and Adaptation

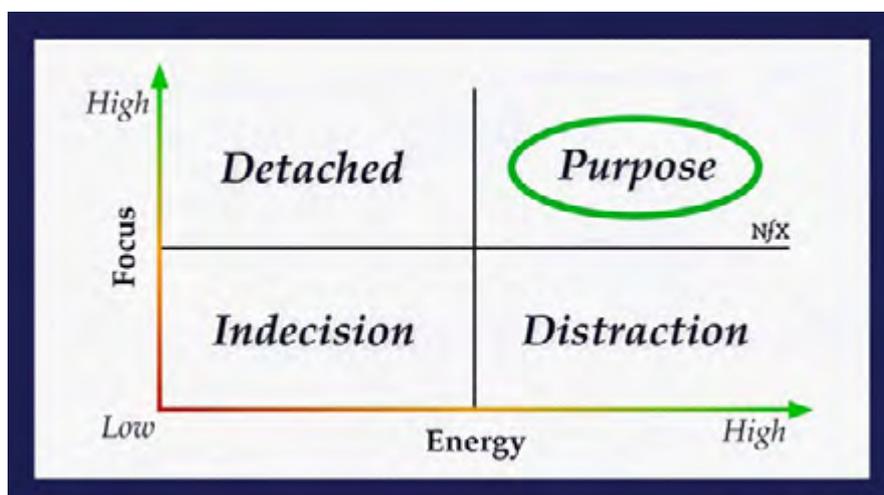
Marine environments present unique challenges, including fluctuating light conditions, confined spaces and external noises. Training the mind to adapt quickly and efficiently to these sensory changes is essential for maintaining focus and ensuring a thorough assessment.

Mental Preparation Before the Survey

Preparing mentally before starting an inspection can set the tone for a clear and productive assessment. Reviewing key objectives, setting realistic expectations for the time required and engaging in brief visualisation techniques can enhance the surveyor's ability to remain engaged throughout the process.

Managing interruptions and disruptions

Marine surveyors often encounter disruptions from external sources, including



vessel owners, contractors or buyers asking unrelated questions during an inspection. Such interruptions can break concentration, causing key aspects to be overlooked.

Here are some ideas to mitigate these issues.

Use signage

Placing notices around the vessel, indicating that an inspection is in progress, helps reduce unnecessary interactions.

Pre-emptively inform stakeholders

Letting the vessel owner or other parties know that questions should be held until the end of the survey prevents mid-task disruptions.

Setting dedicated intervals for external communication

Putting a phone on silent, with a reminder to check messages every two hours, helps balance accessibility without constant disruption.

Another common distraction occurs during the inspection itself, when a surveyor spots an additional issue while focussed on a different task. This is especially challenging for newer inspectors, who may find it difficult to redirect their attention. A useful strategy is to take brief notes of the new finding and return to the primary inspection point before moving on.

From inspection to reporting: maintaining clarity and recollection

While the physical aspect of marine surveying can be exhausting, many surveyors find the most demanding task is synthesising the collected data into a clear, logical report. The ability to structure findings, attach photographic evidence and provide coherent recommendations requires undisturbed time in the office.



Here are some ways to improve reporting efficiency.

- Create a distraction-free environment
- Ensure a quiet workspace where reports can be completed without interruptions.
- Follow a structured workflow
- Categorising notes and images into pre-defined sections allows for a smoother report-writing process.
- Avoid rushing

Pre-purchase inspections are often time-sensitive but accuracy is paramount. Allowing adequate time to review findings ensures a well-rounded and professional report.

Conclusion

The psychology of a marine surveyor extends beyond technical competence; it involves maintaining mental clarity amidst isolation and ensuring that external distractions do not compromise the integrity of the assessment.

By cultivating structured processes, managing cognitive load and developing strategies to enhance focus, marine surveyors can perform their duties with precision and confidence, ultimately providing clients with accurate and reliable insights into the vessels they assess.

Michael Fitzallen
Seaworthy Inspections
AIMS member

AGSA Scheme review

ALL members of the AIMS are most likely aware of the rationale behind the creation of the Accredited Grain Surveyor Assurance (AGSA) Scheme. However, for the benefit of the number of new members, and those who have entered the Scheme and attained their accreditation as a Grain Surveyor, I thought that it would be prudent to provide the basic background once again.

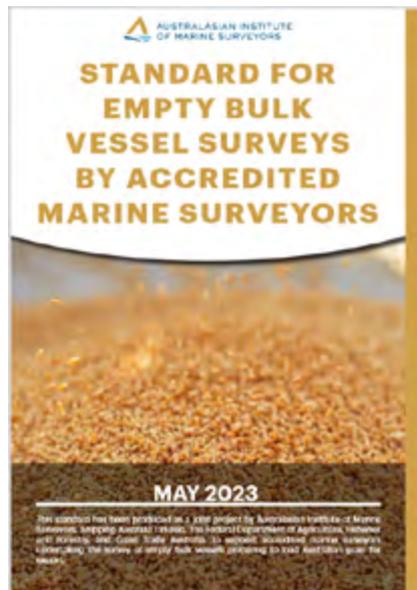
Background

In 2018, the shipping industry lobbied the then DAWE, (now the Department of Agriculture, Fisheries and Forestry [DAFF]) to provide greater flexibility for grain ships and, in short, sought many legislative changes. These included the lobbying for the introduction of an authorised officer scheme to perform the work of previous AQIS officers and to introduce fitness to load surveys at anchorage.

At the same time, the AIMS saw an influx of inexperienced grain surveyors (whose numbers nearly doubled) and, by 2020, the AIMS members who undertook grain surveys became concerned that the required standards were not being adhered to.

Complaints regarding the lack of standards were reported to the AIMS Board so frequently and to the extent that the Board was compelled to lobby for an accreditation scheme to ensure that standards were met and that the independent assessment of fitness of ships loading grain was not compromised.

The AIMS Board undertook a risk management exercise to determine whether there was a risk to Australia's reputation as an exporter of high-quality, uncontaminated grain. The findings of the risk assessment



suggested that there were enough risks to our exports to warrant increased regulatory oversight of the standards for Fitness to Load (FTL) surveys.

In 2021, the increase in poor practices resulted in the Department of Agriculture agreeing to work with the AIMS to review the situation and to potentially introduce a more effective scheme for authorised officers and marine surveyors.

The new regulations and legislative changes under the AGSA scheme were agreed with industry stakeholders, DAFF, AIMS and individual surveyors. On 1 July 2023, the Export Control (Plants and Plant Products) Rules 2021 (Plant Rules) were amended to align with current business and regulatory practices, and implemented to provide assurance to the shipping industry and Australia's grain exporters that bulk vessels comply with agricultural export legislation.

The AIMS entered into a Deed of Agreement to administer the Scheme and continues to do that to this day. The AIMS is not the owner of the AGSA Scheme;

it administers the Scheme on behalf of the Department and in collaboration with the Department.

The AIMS responsibilities under the Deed are to provide information and data to the Department on the numbers and details of accredited FTL surveyors, manage the accreditation of FTL surveyors and the website/online listing of currently accredited surveyors, address any complaints regarding the system, policy and procedures or the performance of FTL surveyors, and implement a complaints and dispute resolution process and undertake compliance audits. It must also comply with all legislative requirements in performing its obligations under the Deed.

DAFF is the owner of the AGSA scheme. The Department develops legislation and regulations, communicates with industry (including AIMS as the peak industry body for marine surveyors) on changes to legislation and approves any changes to policy, procedures, guidance notes and standards.

While there are many parts to the Deed, its main objectives are to ensure that:

- ❑ there are effective systems in place to validate and monitor compliance to the Export Control rules to mitigate risks that may result in Australian grain becoming infested or contaminated after loading and while transiting to its destination overseas;
- ❑ that the qualifications for marine surveyors to be accredited to perform bulk vessel surveys reflects the broader range of relevant training and qualifications that marine surveyors are required



to have prior to performing bulk vessel surveys;

- ❑ that a consistent set of standards for the inspection of vessels prior to loading grain is developed and implemented;
- ❑ the Scheme has in place policies and procedures for complaints to be taken seriously and addressed fairly and disputes resolved in accordance with the Deed; and
- ❑ that the FTL surveyor and the AO are not influenced in any way when undertaking their duties and that the inspection of vessels loading grain is based on an internally consistent framework of principles

Our review

It has been 18 months since the Scheme was introduced and the AIMS has commenced conducting an internal review into our performance in managing the Scheme. Our review will include how we have managed the accreditation process and the compliance of FTL surveyors and whether the Scheme overall is effective and delivering its objectives.

We have identified five markers for measuring success, these being:

- ❑ the intent of the AGSA Scheme;
- ❑ the budget;
- ❑ the deliverables required to

manage the Deed effectively and compliantly;

- ❑ risk management; and
- ❑ the stakeholders.

While considering the above measures, we have identified some very positive outcomes to date and some mildly surprising statistics on our stakeholders.

At the time of writing there are 86 accredited surveyors and 70 per cent of accredited surveyors are AIMS members. Of the 70 per cent of AIMS members, roughly 30 per cent are CCMS with the rest being made up of Full members and Associates. Ninety-nine per cent of CCMS members are employed within an organisation, 50 per cent of Full members are individual sole traders and 99 per cent of Associate members are individual sole traders.

Of the 30 per cent of accredited surveyors who are not AIMS members, 60 per cent work for either one of two major companies and the remaining 40 per cent are individual surveyors working as sole traders or similar business entity.

What this tells us is the individual sole trader surveyor is alive and well and remains a major stakeholder in all AIMS initiatives.

We have clearly implemented a very effective administration system. This is evident in two major areas, those being the fast and efficient turnaround of new applications and accreditation renewals and the insurance compliance requirements. Ninety-five per cent of all applications are processed and completed within three working days – some applications that are completed fully are finalised within two days.

Less than 10 per cent of surveyors neglected to forward their renewed insurance certificates by the deadline, however the procedures for monitoring compliance were effective and the result was 100 per cent compliance by FTL surveyors.

Mandatory acceptance of the standards and an acknowledged agreement to work to the standards for empty bulk vessel inspections has been taken up by all surveyors and now forms part of the initial application process.

Eighty-five per cent of surveyors forwarded their 2024 FTL records with their renewal application. Of the remaining 15 per cent, most were forwarded within five days and minimal follow up was required by AIMS.

The application process has

been amended to allow for an invoice to be sent prior to the application being processed. This cuts down both the financial administration side and the accreditation assessment. Rather than having renewals at different times, all accreditation renewals are due by June 30 each year.

This saves time and ensures that all records are audited for compliance during the renewal period.

Complaints to the AIMS regarding the qualifications and experience of surveyors has fallen, with only two unofficial complaints since the introduction of the scheme. This could be an indicator that there has not been sufficient communication regarding how to lodge complaints or simply that there are no major complaints regarding the management of the scheme.

Communication of changes to rules or guidance notes has been mostly effective. Surveyors are notified via email that changes have been made or new rules introduced and documentation / fact sheets, etc. are posted immediately on the Grain Surveyor page on the website.

Over the next few weeks, as part of our review process, the AIMS will provide all accredited surveyors with the opportunity to submit feedback on our performance via an anonymous survey. Feedback is voluntary but I do hope that all AIMS members take the opportunity to give us their views, as this will form part of our decision-making moving forward.

Guidance Note 2 – Conflicts of Interest

The second guidance note on Conflict-of-interest rules was introduced recently and I would like to thank those companies

¹ "Integrity." *Vocabulary.com Dictionary*, Vocabulary.com, <https://www.vocabulary.com/dictionary/integrity>. Accessed 18 Feb. 2025

and individual surveyors who have used the Disclosure Form in support of this initiative. Forms have been reviewed, recorded on file and, where necessary, the AIMS has been able to provide additional information and advice to surveyors on how to effectively manage any real or perceived conflicts.

While there have been no official complaints to date regarding this rule, I am sure that many of you will have heard either firsthand or second-hand of some dissatisfaction with its introduction. From all accounts, this is due to a lack of understanding on the wording, not the intent of the rule, however that could also be in question.

To clarify, one of the main objectives of the Scheme (as mentioned earlier) is to identify and manage risks to minimise situations that may result in fraudulent behaviour, poor quality services, lower standards, influencing the surveyor or AO or inequality in service provision and predatory pricing.

One of the primary reasons for the AIMS championing an accreditation scheme was to protect the independence of the FTL surveyor and ensure that the FTL was carried out without fear or favour. It was considered an essential mechanism to maintain standards, keep pricing reasonable and allow independent surveyors to compete in the market.

The introduction of outsourced Authorised Officers (redundancy of AQIS officers) to the private sector has resulted in dual roles or, to be clearer, the ability for an accredited surveyor to also hold Authorised Officer accreditation. This blurs the lines somewhat and creates a risk to the impartiality of the surveyor and or the AO. The guidance note seeks to mitigate these risks, not to curtail business operations. There needs to be integrity in the system and integrity means doing the right

thing in a reliable way.¹

I would like to strongly stress that, as per the Australian Competition and Consumer Commission (ACCC) guidelines, neither the AIMS nor, I believe, the DAFF hold the opinion that businesses cannot compete; in fact, both enterprises encourage competition but only if services and standards are met and there is no potential for the FTL surveyor or the AO to be compromised when carrying out a survey. We also must undertake to ensure that the rules align with legal requirements.

The ACCC clearly states that:

It's not illegal for businesses to have market power, or to out-compete other businesses, however it's illegal for businesses with substantial market power to do anything that has the purpose, effect or likely effect of substantially lessening competition. Practices that are sometimes linked to misuse of market power include refusal to deal, restricting access to an essential input, predatory pricing, margin or price squeezing, and tying or bundling services.²

If any AIMS member feels that more clarification is needed, I am more than happy to facilitate a workshop or information session to explain the rule further and when and how to use the Disclosure Form.

Please look out for emails providing survey links and / or feedback forms on the AGSA Scheme.

Thanks to all for such a great compliance outcome!

Susan Hull
AGSA Scheme,
AIMS and Grain Accreditation
Advisor

² <https://www.accc.gov.au/business/competition-and-exemptions/misuse-of-market-power>

Lithium battery technology: development of guidance for low-risk battery electric installations

ELECTRICAL Energy Storage (EES) installations on electric and hybrid vessels will undoubtedly become more prevalent on domestic commercial vessels (DCVs) as the Australian Government gradually enacts legislation to reduce greenhouse emissions, which will become more stringent over time.

An example of this consideration for lower emissions is a current project I am involved in within the aquaculture industry for a feed barge. The barge is a hybrid installation with two 110kW gensets, a 200kWh lithium phosphate battery bank, and an Insulated Gate Bipolar Transistor (IGBT) as the charger / inverter. The installation's principle is to utilise the EES during low-load periods (overnight) and have the gensets shut down (on standby) at these times.

This installation will reduce

greenhouse emissions and reduce operational costs. An example of the financial benefits is reduced fuel costs (estimated 70 per cent), a decreased amortisation cost of maintenance due to lower running hours and a reduced frequency of bunkering.

The core issue of using EES shall be the safety of personnel, the environment and the vessel. The risks of installing EES systems on vessels must be identified, and how these risks can be reduced to “as low as reasonably practicable” (ALARP) must be established. Then, the sacrifice (in money, time and effort) involved in avoiding that risk must be assessed and these points must be evaluated.

The risk spectrum ranges from low, where it is very unlikely and requires no further action, to very high. The greater the level of risk under evaluation, the more effort is needed to demonstrate that it

has been managed to an ALARP level.

I have a strong background in this area from involvement in the offshore oil and gas industry, working as a technician (Marine Engineer), Offshore Maintenance Supervisor (Chief Engineer) and Shutdown Coordinator in Floating Production Storage and Offload (FPSO) facilities. A risk management approach is paramount in the safe operation of these facilities (eg, oil tankers, FPSOs), and the principles of ALARP and the structure of the hierarchy of control are well established.

To further enhance safety measures, I have also referenced sections from “Guidelines for Vessels and Units with Dynamic Positioning (DP) System” that can be applied to the Battery Monitoring System (BMS) single-point failure, where the Worst-Case Failure (WCF) of the BMS is to be identified to mitigate single-point failures (MSC.1/Circ1580, 2017).

However, when an initial evaluation identifies the risk as high, measures have been implemented to lower the risk. This assessment may mean it is not reasonably practicable to reduce it further. The basis on which the comparison is made involves the test of “gross disproportion”.

The term “gross disproportion” refers to a practicable measure that cannot be shown to have a grossly disproportionate cost to the benefit gained; it is considered reasonably practicable and should be implemented.

The criterion is reasonably practicable, not reasonably affordable: justifiable cost and effort are not determined by a

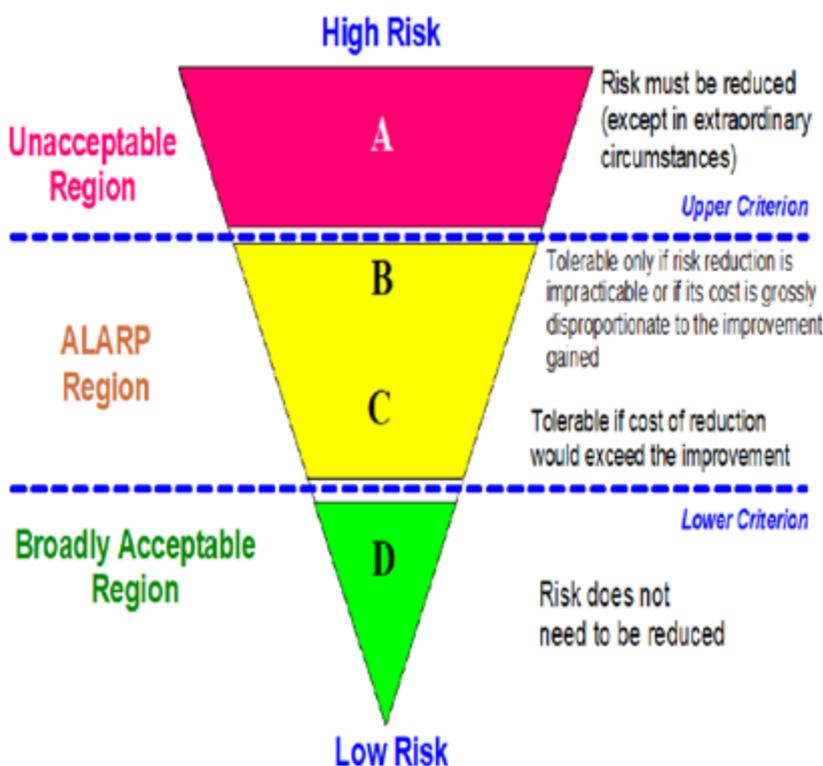


Figure 1: The ALARP Principle (Source: Dept. Production and Management Eng., Democritus Uni of Thrace-Risk-Acceptance Criteria)

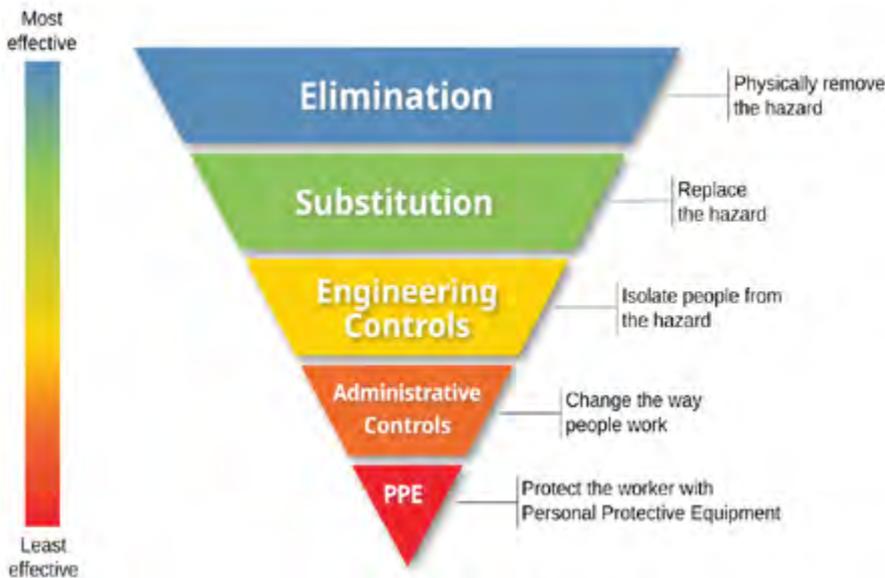


Figure 2: *Hierarchy of Control Structure* (Source: National Institute for Occupational Safety and Health)

project’s budget constraints/ viability.

Considering the above principles, the values of good practice should be undertaken using the structure of the hierarchy of controls to provide an inherently safer design. This is a step-by-step approach to eliminating or reducing risk, and it ranks risk controls from the highest level of protection and reliability to the lowest and least reliable protection.

Figure 2 shows the structure of the control hierarchy, from the most effective to the least effective.

Eliminating the hazards associated with large EES systems is the highest level of control in the hierarchy but this level of control is not practicable. The risk must then be controlled through substitution, isolation, engineering controls and administrative controls, with the lowest level of control being using protective personal equipment (PPE) (NOPSEMA, 2020).

It should also be noted that many battery chemistry types are used for large battery energy storage systems. Whether lithium or lead acid, they all have potential hazards associated with

these installations and the risks posed by associated hazards are to be minimised.

Lithium battery technology

Brief history

The lithium-ion (Li-ion) battery has become the predominant commercial rechargeable battery and is widely used in portable electronics and electrified transportation. The research underpinning modern Li-ion battery technology progressed through the 1970s and 1980s, with Sony making the first commercial Li-ion cell available in 1991. Since then, storage density has tripled while the cost has dropped tenfold.

Types of lithium batteries

There are six main types of lithium batteries, and they rely on unique active materials and chemical reactions to store energy. Each type of lithium battery has its benefits and drawbacks, along with its best-suited applications (Energy, 2022).

Lithium Nickel Cobalt Aluminium Oxide (NCA)

The battery chemistry offers high energy, decent specific power and a long lifecycle. This means they can deliver a relatively high current for extended periods.

Note: NCA batteries perform well in high-load applications and have a long lifespan, making them popular in the electric vehicle market. This battery is the choice for Tesla. However, as with most other lithium technologies, NCA battery chemistry is not the safest.

Lithium Nickel Manganese Cobalt Oxide (NMC)

The battery chemistry combines the benefits of the three main elements used in the cathode: nickel, manganese and cobalt. Nickel, on its own, has high specific energy but is unstable. Manganese is exceptionally stable but has a low specific energy. Combining them yields stable chemistry with a high specific energy.

The voltage range for a single NMC cell can range from 3.6 volts to 3.7 volts.

Note: Like LMO batteries, they are prevalent in power tools and electronic powertrains for e-bikes, scooters, and electric vehicles. They offer higher energy density and a longer lifecycle at a lower cost than cobalt-based batteries. They also have higher thermal stability than LCO batteries, making them safer overall.

Lithium Manganese Oxide (LMO)

The battery chemistry uses lithium manganese oxide as the cathode material. This chemistry creates a three-dimensional structure that improves ion flow, lowers internal resistance and increases current handling, while improving thermal stability and safety.

The voltage range for a single LMO cell can range from 3.0 volts to 4.2 volts.

Note: These batteries are commonly found in portable power tools, medical instruments, and some hybrid and electric vehicles. The significant benefit

of this type is that it is quick to charge and offers high specific power. This means it can deliver a higher current than LCO batteries.

It also provides better thermal stability than LCO batteries, enabling it to operate more safely at higher temperatures. The short lifespan of LMO batteries typically lasts 300-700 charge cycles, significantly fewer than that of other lithium battery types.

Lithium Cobalt Oxide (LCO)

The battery chemistry has high specific energy but low specific power. It performs poorly in high-load applications but can deliver power over a long period.

The voltage range for a single LCO cell can range from 3.0 volts to 4.2 volts.

Note: These batteries are commonly used in small portable electronics, such as mobile phones, tablets, laptops and cameras. Their high specific energy allows them to deliver power over a relatively long period under low-load applications.

However, they suffer short lifespans, usually between 500 and 1,000 cycles. With the relatively high cost of cobalt, this type of battery is falling out of favour with manufacturers. LCO batteries also have low thermal stability, which leads to safety concerns.

Lithium Iron Phosphate (LFP)

The battery chemistry uses phosphate as the cathode material and a graphitic carbon electrode as the anode. LFP batteries have a long life cycle, good thermal stability and electrochemical performance.

The voltage range for a single LFP cell can range from 3.4 volts to 3.6 volts.

Note: LFP batteries offer several benefits, making them

one of the more popular options for applications requiring large amounts of energy storage. They are durable and have a long life cycle (2,000 cycles). Additionally, LFP manufacturers rate their batteries at 80 per cent discharge depth; some even allow 100 per cent discharge without damaging the battery.

A fully charged LFP cell, while a discharging cell, can be around 2.5 to 2.8 volts. Thus, the operating voltage range is relatively narrow, which helps maintain stable and safe operation. LFP batteries have drawbacks compared with other lithium battery types. They have relatively low specific energy and performance can suffer in low temperatures.

Lithium Titanate (LTO)

All of the previous lithium battery types we have discussed are unique in the chemical makeup of the cathode material. Lithium titanate batteries replace the graphite in the anode with lithium titanate and use LMO or NMC as the cathode chemistry.

The voltage range for a single LTO cell can range from 1.5 volts to 2.85 volts.

Note: These are highly safe batteries with a long lifespan

and faster charging than any other type of lithium battery. They have found a market in electric vehicles, charging stations, UPS, wind and solar energy storage, solar streetlights, telecommunications systems, and aerospace and military equipment, to name just some of the use cases.

Because of their stability, this type of lithium battery is very safe. However, it offers low energy density, which means it stores less energy relative to its weight than other lithium technologies. Additionally, it is costly.

Li-ion batteries - marine installation

The attributes of the above battery types suggest that the Lithium Iron Phosphate (LFP) chemistry is the most popular for marine installations because of its high energy storage capacity, ability to withstand deep discharge (less than 80 per cent of rated capacity), durability and long-life cycle.

The drawback of this type of battery is that it has low specific energy (releases energy slower) and can stop charging / discharging cells in low-temperature conditions.

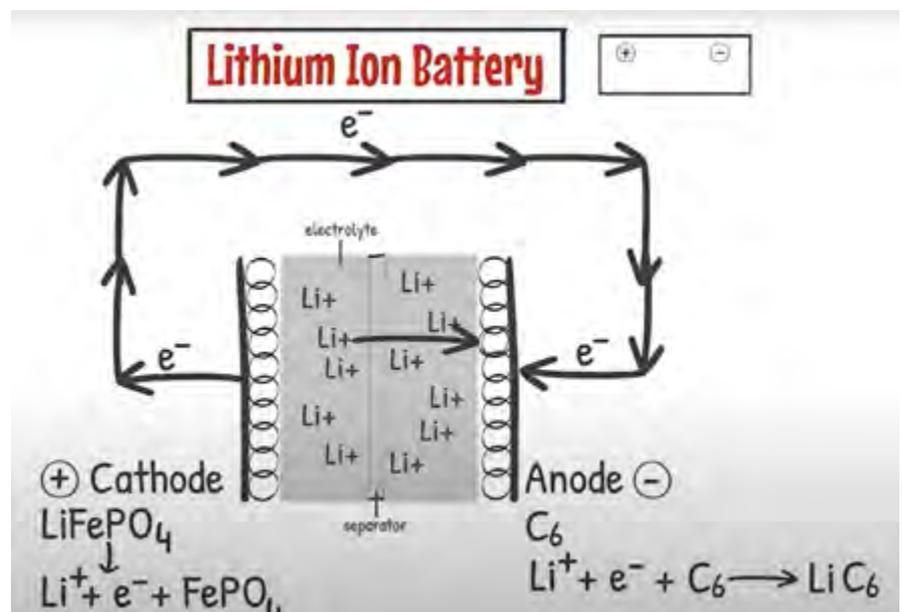


Figure 3: Fundamental Chemistry of Charging Lithium Ion Batteries (Source: Dragonfly Energy)

LiFePO₄ Lithium Iron (LFP) chemistry

Like all batteries, an LFP battery is an electrochemical cell. The cathode is an aluminium foil with a bonded lithium iron phosphate (LiFePO₄) compound. The anode is a copper foil bonded with graphite (C₆). A thin plastic separates the cathode and anode, and this material is generally polypropylene or polyethylene. The space between the cathode and anode is filled with an electrolyte liquid that contains lithium ions (Li⁺).

When charging the cell to store energy, the electrons (e⁻) move from the cathode and migrate to the anode. The LiFePO₄ chemistry changes to Li⁺ + e⁻ + FEPO₄, with the Li⁺ migrating through the separator to the anode. This then recombines with the electrons (e⁻) at the anode, where the charging process has moved it from the cathode.

The lithium-ion (li⁺) and electron (e⁻) are then combined with graphite (C₆) to form a lithiated graphite (LiC₆). When this cycle is complete, the battery is charged. During the discharge cycle, the reverse migration of lithium-ion (li⁺) and electron (e⁻) occurs; refer to Figure 3 (A. Best, 2023; HU Yin-quana, 2011).

LFP cell types

Three types of cells are used in lithium batteries: cylindrical, pouch cells and prismatic (OneCharge, 2011 -2025).

❑ Cylindrical Cells

Consists of a sheet-like battery cathode, anode and separator between them. These are rolled up into a cylinder-shaped can. This cell features multiple rows, with the arrester at the top and bottom connecting the cells. These arresters are ultrasonic metal welded to the busbars, and cylindrical cells must be fixed into a battery module or packed with rigid spacers, spacer strips, or mounting brackets. Additionally, glue can be used as the primary

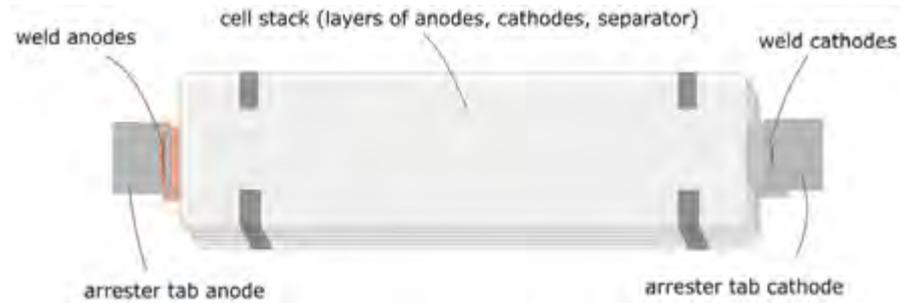


Figure 4: *Arrester Tabs* (Source: ResearchGate)

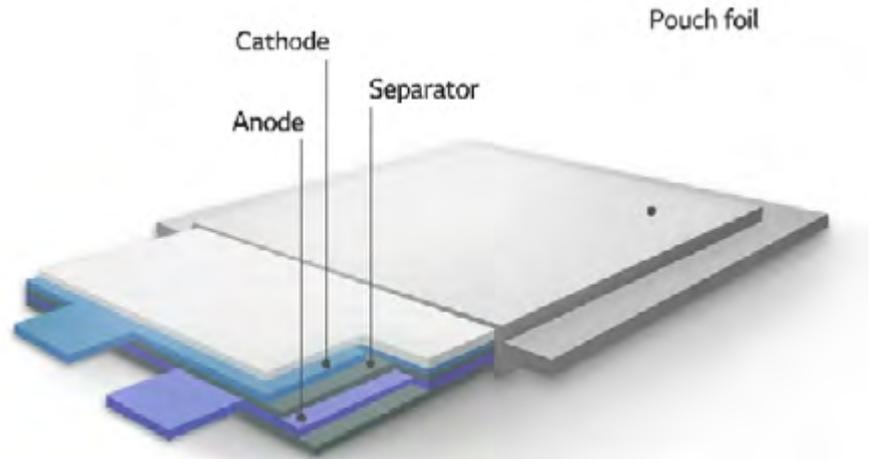


Figure 5: *Pouch Cell Construction* (Source: UFine Battery)

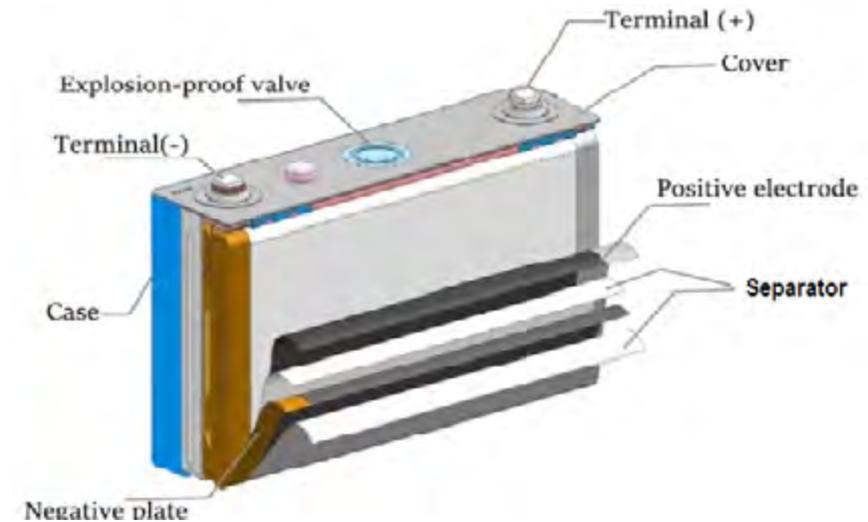


Figure 6: *Pouch Cell Construction* (Source: UFine Battery)

fixation of cylindrical cells. (S. Grabmann, 2023).

Advantage

- Batteries are suited for automated manufacturing.
- Easier pack thermal management (space between the cells lets the coolant easily circulate within a battery pack).
- Mechanical stability (the round shape of the battery distributes the internal pressure from

side reactions over the cell circumference almost evenly).

Disadvantage

- Low packaging density of cylindrical cells (the cell's circular cross-section does not allow full utilisation of the available space).
- High-capacity batteries with many cylindrical cells require excessive support and contactor systems, which increases the battery's complexity and weight.

❑ Pouch Cells

These cells do not have a rigid outside can and use a sealed flexible foil as the container. When placed in modules, sufficient space is left for possible swelling of the pouch cells, and they are aligned in single-rowed cells, with the arrester tabs positioned on the same or the opposite sides.

Pouch cells can be connected by ultrasonic metal welded and in either tab-to-tab or tab-to-busbar bridges. For pouch cells, frames are often used as primary fixation, with the space between the cells being used for a cooling system.

Advantage

- Lowest weight (among all cell types).
- Flexible cells (can easily fit the available space of a given product).

Disadvantage

- Need to customise most pouch cells.
- Need to protect against external impacts or punctures; unsuitable for industrial and machinery use.

❑ Prismatic Cells

It consists of large sheets of anodes, cathodes, and separators sandwiched, rolled up, and pressed to fit into a rectangle aluminium casing. The electrodes can also be assembled by layer stacking.

Prismatic cells are either ultrasonic metal welded to the vent-cap assembly and crimped into the can, sealing the cell. The positive and negative terminals are in the vent-cap assembly, with a gasket separating the two. Within the vent-cap assembly is a self-sealing safety vent similar to the one used in cylindrical.

Advantage

- Optimal utilisation of pack and battery compartment space.

- Cells are not subject to swelling.
- Highest Ah nominal capacity and kWh energy (battery watt-hours).
- Higher overall battery energy density (compared to cylindrical cells).
- Lighter overall LIB weight compared to batteries with cylindrical cells (no higher strength stainless steel as a battery shell).

Disadvantage

- Parts of the electrode and separator sheets close to the container corners are more likely to experience more potential stress.
- Cells can be more expensive to manufacture.

Thermal runaway (LFP)

All lithium-ion batteries are susceptible to thermal runaway under abuse conditions, such as mechanical damage, external heat, short circuits, rapid charging, excessively high discharge rate or overcharging. This can lead to the production of flammable and toxic gases. This event is generally characterised by rapid progress and can result in battery fire or, in some cases, lead to the battery's self-destruction.

The fire hazard in LFP batteries is due to the combustible system components, battery chemistry and format, electrical capacity, and energy density. Construction materials, component design and the BMS can also contribute to the hazard.

External factors and internal failures in the battery can cause thermal runaway.

❑ Physical Damage

For example, if the casing pierces the cathode, separator, and anode, this can cause a short circuit, leading to a spike of current at that point in the cell. The heat generated in a puncturing event can be between

116°C and 436°C, leading to thermal runaway.

Note: This would be an unusual event once the EES system has been installed, and maintenance works would need to be conducted under a permit to manage this risk.

❑ External Temperature

The ideal operational temperature for LFP space is between 15°C and 35°C (depending on the OEM specifications). Operating above temperatures beyond OEM specifications can degrade a battery's performance and cause thermal runaway. For an LFP battery, the external temperature at which the battery experiences thermal runaway can range from 116°C to 436°C, depending on the battery's state of charge and other factors.

Note: This would be unusual as the EES system space is to be temperature-controlled (reverse-cycle A/C), and the space temperature is to be monitored by a sensor and alarm.

❑ Internal Short-Circuit

Cells of poor manufacturing defects can affect the separator's integrity between the cathode and the anode. This can cause an internal short circuit condition that can result in thermal runaway

Note: This would be considered a rare event and most thermal runaways would more likely be attributed to one of these external factors.

❑ Rapid Charging

It has not been identified why some batteries go into a thermal runaway when at rest, and it has been suggested that the presence of significant local currents inside batteries at rest after fast charging could be one of the causes behind thermal runaway.

Current research shows that lithium ions from the cathode

weave between the layers of graphite particles in the anode when the battery is charged slowly. In contrast, when the battery is charged rapidly, the lithium ions tend to plate on the surface of the graphite as lithium metal.

Experiments by Berkeley Labs have shown that these deposits can cast a lithiation shadow on the graphite anode. That is to say, in the areas beneath the plated deposit, poor lithiation of graphite electrodes occurs. At rest, there is a potential difference between the plated lithium metal and the under-lithiated particles that can drive local ionic currents.

A reliable method to measure currents inside a resting battery has not been developed to determine why some batteries go into thermal runaway (A.S.Ho and N.P.Balsara (UCBerkeley and Berkeley Lab), 2023) (H. Zhou, 2024).

Note: The paper's reference for the above did not identify the problem; it has only suggested that this may be a possible answer. Also, the battery chemistry examined has not been detailed. However, as Tesla is a prominent EV manufacturer and uses Lithium Nickel Cobalt Aluminium Oxide (NCA), this may be the battery type tested.

Further research into rapid charging for LFP batteries will be required.

Excessively High Discharge Rate

Discharging the cell or battery below the cell manufacturer-recommended lower voltage threshold multiple times and then charging the cell can lead to thermal runaway.

Overcharging Batteries

For a thermal runaway event by overcharging, the cells' anodes (graphite) must be saturated with lithium ions in an overcharge condition. The remaining lithium ions in the cell, either at

the cathode or in the electrolyte, will accumulate on the surface of the anode.

This accumulation forms a three-dimensional structure (needle-like), producing a large surface area, which can lead to significant heating. As this lithium-ion structure accumulates, it can penetrate the separator, causing a short circuit and cell failure. Significant heating during these events leads to gasification of the electrolyte, with considerable pressure building up that can rupture the cell.

Note: The LFP cell chemistry has a lower cell voltage than other lithium chemistry, which enhances its operational safety, especially in over-discharge conditions. However, graphite is still used as the anode, so overcharging remains a risk in the event of rapid discharge (short circuit) issues and Battery Management System (BMS) failures.

Battery monitoring systems

The current marine standard (AS/NZS3004.2) minimum requirements 2.9.3 Additional requirements for lithium-ion batteries:

- a. Lithium-ion batteries shall be installed in locations that ensure the manufacturer's specified operating temperature limits cannot be exceeded and are appropriate for the battery and its management system's IP rating.
- b. Each lithium-ion battery shall be provided with a battery management safety system (BMS) integrated into a battery pack or as a separate component adjacent to the battery. The BMS shall continuously monitor the voltage and temperature of each cell in the battery.
- c. The BMS shall automatically disconnect all charging sources when the voltage exceeds the

manufacturer's recommended maximum.

- d. The BMS automatically disconnects all connected loads when the voltage exceeds the manufacturer's recommended minimum.
- e. When the temperature exceeds the manufacturer's specified maximum, the BMS shall automatically disconnect the battery from all connected loads and all charging sources.
- f. The BMS shall provide an audible and visual alarm at the normal vessel operating position before a disconnection occurs.
- g. Lithium-ion battery ventilation air flows shall meet the manufacturer's requirements. If specific air flow data is not provided, clauses 2.9.2.2 or 2.9.2.3 requirements shall be applied.

Note: Care must be exercised when disabling charging sources to avoid the risk of elevated voltages that may damage the equipment.

While these current clauses do provide some minimum safety requirements for a BMS, the highlighted clauses above do require further discussion in the following six points.

- The first point is that an enclosure with multiple cells is a module.
- That some modules' internal BMS do not monitor all cells' voltages and temperatures.
- Many modules on the market only have one temperature sensor, which is a single-point failure because it does not monitor the temperature of all the cells in the module.
- Modules that are in series-parallel and if one module BMS shuts down. How does this communicate with the remaining modules and reduce or disconnect loads and charging sources to the other modules if there are no communication ports?

- Modules with internal BMS and no communication ports cannot provide an audible and visual alarm before the module is shut down.
- When the module shuts down and turns off the charging system without warning. How are the subsequently elevated voltages managed when modules with internal BMS and no communication ports have been fitted?

These few points in AS/NZS 3001.2 do not fully identify the requirements for a BMS for a lithium-ion EES (or any other chemistry EES) system. The regulator has proposed that DNV-RU-SHIP Pt.6 Ch.2.Sect.1 – Electrical Energy Storage be used as practical guidelines for EES systems over 30kWh.

Relevant sub-section 4.8 Battery Management System states:

- The battery system shall have an integrated BMS.
- BMS shall provide voltage balancing of the cells and modules.

The following parameters shall be measured:

- cell voltage;
- cell or module temperature; and
- battery string current.

The BMS shall protect the battery system from the following faults by disconnection of the control switchgear in [4.5.2]:

- over-current;
- over-voltage and under-voltage; and
- over-temperature.

The following parameters shall be indicated at local control panels or in remote workstations:

- system voltage;
- maximum, minimum and average cell voltage;
- maximum, minimum and average cell or module temperature; and

- battery string current.

The BMS shall communicate the voltage and current limits and charging and discharging limits to the battery converter.

The following parameters shall be calculated and be available for the energy management system (EMS):

- state of charge of the batteries (SOC); and
- state of health of the batteries (SOH).

Note: Reference to AS/NZS 5139:2019 – Electrical installations – Safety of battery systems for use with power conversion equipment. This standard is a valuable tool for reducing risks associated with EES systems on vessels to a level that is ‘as low as reasonably practicable’ (ALARP).

Alarm monitoring

AS/NZS 3004.2 alarm monitoring requirements are insufficient to monitor an EES system. The DNV rules in subsection 4.9 Battery alarms do provide guidance for minimum standards for alarms:

The abnormal conditions to be alarmed shall, as a minimum, include:

- high cell or module temperature;
- over- and under-voltage;
- battery system disconnection;
- tripping of battery breakers / contactor;
- communication alarm;
- cooling failure;
- liquid cooling leakage;
- low insulation level;
- other safety protection functions; and
- unbalanced cell voltage for battery systems is designed with independent overcharge protection based on module voltage monitoring.

Note: Reference to AS/NZS 5139:2019 – Electrical

installations – Safety of battery systems for use with power conversion equipment. This standard is a valuable tool for reducing risks associated with EES systems on vessels to a level that is ‘as low as reasonably practicable’ (ALARP).

Fire monitoring and extinguishing

Fire monitoring

There is an emphasis on flammable gas detection, such as hydrogen, which leads many systems designs to omit early intervention electrolyte vapour detection within DNV-RU-SHIP Pt.6 Ch.2.Sect.1. Reviewing the DNV-GL publication “MARITIME BATTERY SAFETY JOINT DEVELOPMENT PROJECT.” ‘Technical Reference for Li-ion Battery Explosion Risk and Fire Suppression’ further evaluates fire and suppression risks. Section 3.5 of this paper concludes for BATTERY OFFGAS CONTENTS AND DETECTION states that “solely relying on Lower Explosion Limit sensor(s) and cell voltage levels to detect early stages of a thermal runaway event is insufficient”. It is suggested that a Li-ion Tamer[®] sensor and smoke detector, to be placed close to or inside the affected module, are reliable means of a pre-thermal runaway warning.

Extinguishing

A gaseous and freshwater-based water spray system may protect the EES space. The systems shall be separated into independent components.

The traditional solution has been to use CO₂ as the suppression agent. However, aerosol fire suppression systems that extinguish fire-like gaseous suppression agents should be considered. Like CO₂, they suppress fire by “flooding” the protected area with billions of tiny airborne particles of extinguishing agents. This creates

an atmosphere where fire cannot exist, as the airborne particles prevent the “free radicals” from burning.

DNV recommends that a freshwater-based water spray system be capable of supplying fresh water through its nozzles for 30 minutes. If the water tank is shared with other systems, a low-level alarm will be fitted when the water level drops below the 30-minute capacity. The flow at the spray nozzles shall supply 5.0 litres per minute per square metre for the space. An alternative system of total space flooding via spray nozzles can be used.

Note: Total flooding should not be considered due to the increased risk of cells short-circuiting.

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Facts on professional indemnity insurance

IN a recent webinar hosted by AIMS, Matt Kuc of Austbrokers Countrywide Insurance Brokers provided an insight into the importance of professional indemnity (PI) insurance for marine surveyors.

Below is a snapshot of some key headline points Matt covered in his session. The webinar delved into the essentials of PI insurance, its benefits and how it safeguards marine surveyors.

Why professional indemnity?

PI insurance is crucial for several reasons.

It provides personal protection against claims, assists with AMSA accreditation and meets contractual requirements. It also demonstrates a commitment to professional standards and accountability.

It upholds the standards and reputation of the marine surveying industry, protects your clients, and demonstrates your professionalism and that of the Association.

What is PI insurance?

PI insurance is a third-party liability policy that covers professional services. It is an indemnity contract that includes defence and investigation costs.

The insurer indemnifies the insured against civil liability for compensation and claimant's costs and expenses for any claim made and notified during the insurance period. This coverage applies to acts, errors, or omissions occurring after the retroactive date.

PI insurance covers various aspects, including negligence, breach of contract or statute, misstatement or misrepresentation, breach of an implied warranty and official investigations. From a practical perspective, this may

include calculation errors, towing or moving failures, pre-purchase inspections (including omissions) and AMSA complaints.

“Claims-made” cover

PI insurance is known as a “claims-made” policy coverage. This means that claims can only be notified and accepted by the insurer on a current and active policy. In more simple terms, the policy covers the incident at report date of incident, not at the incident date. So, if your policy expired yesterday but you are notified tomorrow of an incident that occurred six months ago, your policy that was active six months ago will not cover the incident.

You must have a current policy. This circumstance is crucially important for consultants who retire or cease operations. In these cases, you are advised to obtain “run-off” cover for a period of time to protect you in the event that an incident is reported; say, two years after you cease practicing.

Notifications and claims

Marine surveyors must be aware of potential claims and notifiable circumstances. These do not necessarily require court papers but can include any written demand for compensation due to loss or damage or adverse outcomes from tests, launches or sales. They also may result from inquiries and official investigations.

Common sources of claims include:

- tow failure;
- moving a vessel;
- calculation errors (eg, cost estimates of rectification);
- pre-purchase inspections (including omissions);
- overloaded or contaminated cargo; and

general damages.

Notably, pre-purchase inspections account for 50 per cent of notified matters and 85 per cent of paid claims.

Risk management tips

To manage risks effectively, some suggestions include incorporating the following into a marine surveyors practice. (1) utilise AIMS templates and disclaimers, (2) utilise engagement letters, that clearly state the scope of works, including and excluding specific functions, (3) do not admit liability, while still acknowledging an issue, (4) gather comprehensive information, including images, written documentation, evidence, file notes, and timelines. (5) best to notify your broker/insurer early of any possible incident. If in doubt, notify, and (6) remember, you don't have to be at fault for a client to instigate an action against you which will require defending and incur costs. Costs covered by your PI insurance.

Austbrokers Countrywide

Countrywide Insurance Group Pty Ltd ABN 49 625 733 539 AFSL 511363. This advice is general in nature and does not take into account your personal circumstances. Please contact us for further information and the PDS before making any decision

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