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Maritime Engineering Journal

Canada's Naval Technical Forum

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Spring 2026

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CNTHA News Inside!

Canada

Photo courtesy Jonathan Soper

Canadian Forces Auxiliary Vessel *Canso* approaching a jetty at HMC Dockyard Halifax for final acceptance

See page 15

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Maritime Engineering Journal

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Commodore's Corner

Introducing the *Halifax*-class Life-Extension Initiative
by Commodore Michel Thibault 2

Forum

A Legacy of Steel and Spirit: Honouring CPO1 (Ret'd) Dion Randell
by CPO2 Tyler MacFarlane and CPO2 Chris Trainor 4

Opinion Piece: MOTS and Institutional Discipline
by Capt(N) Patrick Larose 6

Feature Articles

Implementation of the New Marine Systems Occupations
by CPO1 Christopher Magee 8

From Manual to Digital: A Co-op Built Solution
by Lt(N) Makayla Cunha 13

Naval Large Tugs Update
by Noah Church and Jonathan Soper 15

Personal Listening and Reading Recommendations
Featuring: Capt(N) Patrick Larose 20

News Briefs

Naval Technical Team Takes the Challenge Cup 3

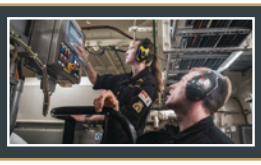
Quart Club Makes Donation in Support of Veterans 14

Missile Re-arm Shows CAF Logistical Reach in the Indo-Pacific 21

Awards 22

CNTHA NEWS

Lessons Learned: A Naval Engineer's Gulf War Experience
by Cdr (Ret'd) Joe Murphy 23



Marine Technicians conduct proficiency training during engineering drills from HMCS *William Hall*'s (AOPV 433) main machinery room, June 2025.

Canadian Armed Forces Imagery Technician

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COMMODORE'S CORNER

Introducing the *Halifax*-class Life-Extension Initiative

By Commodore Michel Thibault, CD

Photo courtesy Sean Barrette

Dear members of the Naval Engineering and Maintenance (NEM) Enterprise,

It has been an exciting year filled with profound changes affecting defence procurement driven by the need to ensure the RCN stands "Ready to Help, Ready to Lead and Ready to Fight" in this ever more complex and challenging world. In the wake of the government's commitment to spend two percent of its gross domestic product towards defence, the Enterprise pivoted quickly and responded positively to the demand signal to provide quick relief to long standing sustainment shortcomings. Amongst my priorities this year was the renewal of my personal commitment to an existing initiative called the Canada-Industry Integrated Project Team (CI-IPT).

This current construct was established in 2023 to gather the main Government and Industry stakeholders involved in the sustainment activities of the *Halifax*-class Ships (HCS) and execution of the Docking Work Periods (DWPs), into one working body. Its objective was to collaboratively identify innovative solutions to help solve issues associated with the ever more challenging execution of the HCS DWPs. The CI-IPT has been successful to date and has led to the implementation of solutions such as: the Global Steel Replacement Strategy, wherein large sections of hull are replaced in known problem areas instead of the piecemeal approach of progressively stripping-out and inspecting; a piping renewal strategy; the increased use of engineering models and Computer Assisted Design (CAD) tools; and implementation of pilot projects with the shipyards to enable uninterrupted work and efficient adoption of newly arising scope when necessary.

However, the initial schedule assumptions related to the transition between HCS and River-class Destroyers (RCD) have changed, and the condition of the ships continue to deteriorate, forcing the need to remobilize the Team to take stock of our current situation and update the problem statement. On 2 Dec 2025, the CI-IPT was re-invigorated and re-branded as the *Halifax*-class Life-Extension Initiative (HCLI).

HCLI now includes upwards of 15 stakeholder organizations from the Government and our industry partners, working collaboratively and firmly committed to maintaining the HCS as a relevant and ready surface combatant beyond 2040. To be successful, we will need to collectively address obsolescence more proactively, implement more effective ship repair practices, and maintain material stocks to an adequate level, all of which are executed in a way that reduces the duration of the DWPs to achieve a minimum of 60% class availability as early as 2028. Sounds impossible? Not to the HCLI Team! With some of the initiatives being implemented now in HMCS *Montréal* (FFH 336), *Fredericton* (FFH 337) and *Winnipeg*'s (FFH 338) DWPs, there's room for optimism. Fundamentally, this requires a complete shift from ship repair and contractual practices and processes established over 30 years ago to effectively deal with the challenge and reality faced today. Simply put, we are pivoting away from the traditional "strip and inspect" towards incorporating more technologies and procedures associated with a new build program.

Time isn't on our side as the HCS grow older and the world becomes a more dangerous place each day. However, we have all the necessary ingredients assembled to be successful: highly engaged leadership at the top levels, a firm commitment and clear mandate from the government, more resources being brought to bear, a clear vision to enable bolder solutions, and of course a great team in place to help execute! We've got a great opportunity to collectively ensure the HCS remains a relevant and ready surface combatant beyond 2040.

Finally, as the Government's financial year draws to an end, I wish to extend my appreciation to all our partners who supported us in initiating some of the reforms and changes required to adapt the NEM Enterprise and help deliver increased readiness for the RCN. There remains much to be done to internalize many of our new policies and strategies to sustain the momentum we gained this year, but with your support I am confident we will get there.

News Briefs

Naval Technical Team Takes the Challenge Cup

The RCN's Naval Technical and Naval Warfare communities went head-to-head in the seventh annual Vice-Admiral Murray Challenge Cup hockey game at the Bell Sensplex in Kanata. **Commodores Jason Armstrong** and **Michel Thibault** faced off for the ceremonial puck drop by **Vice-Admiral Angus Topshee**, Commander of the Royal Canadian Navy, and Honorary Royal Canadian Legion Grand President **Vice-Admiral (Ret'd) Larry Murray**. This year the Naval Technical team were triumphant with a 7-2 win.

Naval Technical Team with the VAdm Murray Cup

Naval Warfare Team

Photos by Jordan Ladisa, RCN Public Affairs

FORUM

A Legacy of Steel and Spirit: Honouring CPO1 (Ret'd) Dion Randell, MMM, CD

By CPO2 Tyler MacFarlane, CD and CPO2 Chris Trainor, CD with contributions by Dion's many friends and colleagues

Canada's Naval Technical community is deeply saddened by the passing of Chief Petty Officer 1st Class Dion Sandy Randell on September 22, 2025, at Hospice Halifax, surrounded by his loving family and friends. He was just one week shy of his 55th birthday. Dion joined the RCN in March of 1989 in Corner Brook, NL. After a pleasant stay at Cornwallis, Dion was posted to HMCS *Protecteur* (AOR 509) where he began his career as a Stoker. Dion moved to *Halifax*-class vessels in July of 1993 when he was posted to HMCS *Regina* (FFH 334) for commissioning. He served on the following ships throughout his career, HMCS *Fredericton* (FFH 337), *St. John's* (FFH 340), *Toronto* (FFH 333), *Montréal* (FFH 336), and *Ville De Québec* (FFH 332). He was the Chief Engineer of HMCS *Toronto* in 2012 and the Chief Engineer for Sea Training Atlantic in 2014 before being appointed the Fleet Chief Engineer in 2014. Dion retired from the RCN in 2018 and started another career with Naval Engineering Test Establishment (NETE) supporting ship repair quality assurance at Halifax Shipyard (Irving). Dion's passion and dedication continued to help the RCN up until his passing.

In the world of naval engineering, where precision meets perseverance, few names resonate with the same reverence as Dion Randell. His passing left a void not only in the Royal Canadian Navy but in the hearts of countless sailors, engineers, and leaders who had the privilege of serving alongside him.

Dion was more than a Chief Petty Officer. He was a force of nature—a mentor, a fixer, and a leader whose influence extended far beyond machinery spaces and technical manuals. He was the kind of sailor who could walk into a broken-down engine room and, with little more than a flashlight and a quiet nod, bring it back to life. His technical mastery was legendary, but it was his unwavering commitment to people that truly defined him.

Throughout his 29-year career, Dion championed the principles of mentorship, integrity, and service before self. He believed leadership wasn't about rank—it was about responsibility. He invested deeply in junior sailors, not just teaching them how to troubleshoot a diesel engine or calibrate a system, but how to carry themselves with

RCN photo

confidence, resilience, and pride. He built leaders, not just technicians. During Certificate 3 qualification boards, Dion was known for asking the questions that truly mattered. The questions that ensured the members standing in front of him knew what they were talking about and would make a great Engineering Officer of the Watch. His presence and knowledge in boards helped shape the Stoker community.

His influence wasn't confined to the engineering branch. Dion's presence strengthened the culture of excellence across the fleet and ashore. Whether serving at sea or supporting

operations from land, his impact was felt in every corner of the RCN. He was the kind of leader who made you want to be better—because he believed you could be.

This didn't stop when he retired. Even after hanging up his uniform, Dion remained a pillar of the community. He continued to mentor, advise, and support, always with the same quiet strength and humility that defined his career. His battle with cancer was fought with the same courage and dignity he showed in service. He never complained. He never slowed down. He simply kept giving.

There's a story—one of many—that captures Dion's spirit perfectly. While deployed overseas, in a country where logistics were more hope than certainty, Dion was seen walking through the streets with a pocket full of cash, trying to buy diesel generator sets for the Navy. Not parts. Not paperwork. Generators. He was determined to get the job done, and if that meant navigating foreign markets and negotiating deals in a language he didn't speak, so be it. Dion could fix anything—whether it was a broken generator, a stalled operation, or a morale issue. He was the guy you called when things went sideways. And he always answered (*MEJ* 65).

Another shining example is a particularly heroic effort to repair one of the ship's diesel generators while deployed overseas as Chief Engineer of HMCS *Toronto*. After an inadvertent closure of the air flaps caused oil to be drawn up through the engine's air intake manifold while it was running, Dion worked tirelessly alongside a team of technicians – senior and junior alike – to boroscope the engine, replace all the injectors, and retime the engine to bring it back online before a critically needed replenishment-at-sea (RAS) scheduled for the next morning. For Dion, anything short of working non-stop through the night to restore the engine to service would have been inconceivable. This supreme dedication and grit influenced many a Stoker mentored by Dion and left a lasting impression on those lucky enough to serve with him.

Dion Family archives

Beyond his naval service, Dion was deeply committed to his family and his values. A proud Mason, he was an active member of Ashlar Lodge No. 107 and Ad Astra Lodge No. 130. His generosity of spirit extended far beyond the workplace—he was always ready to lend a helping hand, whether fixing cars, building cabins, or sharing his knowledge.

Dion's life was one of service, laughter, and unwavering devotion to family and friends. Dion is survived by his one true love, Joanne. He is lovingly remembered by his children, Matthew, Jenna (Tristan), Amy, Michael, and Mark, each of whom he was immensely proud of. Known as Poppy, he is survived by his grandchildren, Audrey, Amelia, Odin, Sadie, and Brooklyn. He will be dearly missed by his parents, Clem and Doris, his sister, Cherry-Ann (Will), his brother, Dale (Grace), along with his nieces, Shaelynn (Rob), Isabella, Victoria, and Katie-Lynn, and nephew, William. He is survived by his in-laws, Wally and Audrey, to whom he was like a son, and his sister-in-law, Stephanie (Eric). He will be remembered always for his love, his loyalty, and his kindness.

Rest easy, shipmate. Your watch is complete. We have the watch now.

Submissions to the *Journal*

The ***Journal*** **welcomes unclassified submissions in English or French. To avoid duplication of effort and ensure suitability of subject matter, contributors are asked to first contact the production editor at MEJ.Submissions@gmail.com.**

FORUM

Opinion Piece: MOTS and Institutional Discipline

By Capt(N) Patrick Larose, CD, P.Eng. MSustMgt, MSysEng, MDS

Photo by Corporal Connor Bennett, Canadian Armed Forces

S1 David Fitzpatrick, a marine technician onboard HMCS *Margaret Brooke* (AOPV 431), participates in engineering drills during Operation PROJECTION 25-01.

We are embarking on a new submarine adventure in Canada and will soon be selecting a partner. That platform will be a Military-Off-The-Shelf (MOTS) procurement, and that brings with it, a need for discipline. Do we have the institutional resolve to stay the course and minimize all or most requested changes, or, will we compromise to make a multitude of stakeholders happy by integrating those changes?

What is MOTS anyway? Well, it's the concept of procuring existing, commercially available, equipment and designs, rather than developing or modifying one. That last one is tough, the urge to modify ranges depending on the complexity and cost of the asset, and so the bigger and more complex an asset is, the bigger the budget and bigger the urge to modify it. That is where discipline becomes essential.

You don't have to look far to see projects where navies sought MOTS solutions, but then, slowly but surely, modified it to a point where the MOTS was in fact a completely different design – causing significant delays. In some cases, those delays are tolerable, in other cases such as the United States Navy *Constellation*-class, they lead to project closure and an arguably better direction. Managing these competing pressures is a delicate balancing act.

However, we must prepare for that delicate balancing act to prevent delays and maintain scope. Some changes are inevitable; any large and complex project will have obsolescence issues by the time it's in implementation. That applies to gas turbine power plants, vehicle production runs and warships alike. Any large project, especially associated with the government, will also have other stakeholders and pressures from outside the project. And finally, there will be the initial changes required to ensure the capability works and is ready for our sailors in our specific context.

When you buy MOTS, it comes with some things that are probably easy to change like the language on the sign over a valve, ok, but do you change the language in the

source code comments of the software? The coding is in English, but the comments are in another language. The system comes with a material assurance program, do you just translate it and run with it, or do you modify it, so it fits your own assurance program? The capability comes with a different communications system; do you modify your own capability requirements and forego the comms we are normally used to? These decisions underscore why institutional discipline is essential.

In practice there are almost no truly large scope MOTS solutions. Most capabilities and systems will require some minor modifications, and the institutional discipline is what prevents a set of minor modifications from becoming multiple sets of minor modifications, or multiple sets of minor and major modifications. We must live within a change and risk budget of sorts, and not allow undisciplined actors from generating changes and allocating that risk budget to things which aren't truly important and necessary critical changes. We will inevitably deploy the capabilities with some risk or missing some feature, but historically, we've been able to address those problems with our teams and their strengths.

Photo by Corporal Connor Bennett, Canadian Armed Forces

S2 Naveed Rehman, a marine technician onboard HMCS *Margaret Brooke* (AOPV 431), conducts engineering drills within the ship during Operation PROJECTION 25-01.

The reality is this, the strength of the RCN comes from our small size, innovative spirit and ability to move and pivot… not from pursuing changes to capabilities because someone thought it was the most important thing at that moment, in that context. We are experts at using what we had without modifications and playing the hand we were dealt. We landed helicopters on ships when it was considered impossible, and we sent coastal defence vessels to Africa. That agility and innovative spirit comes from making do and expanding that capability once we have it. It's more important to get the 80% solution now so we can begin innovating and using the capability, rather than receive the 90% solution later.

As a concrete example, both countries which could provide the new submarine run on 220 volts. Do we modify the system to be 110v, thinking "don't worry, it's easy, just a small modification" or do we prevent the change and use a 220v blender and different plugs for the laptops? Which one would you prefer?

We, as the Navy, are on an adventure and that adventure will require focus and discipline on a handful of small changes so we can get that capability now and begin using it. Then as we stabilize into a rhythm, and clear a bunch of that risk, we can then embark on the next set of changes for stakeholders, again aiming for the next 80% solution. By the time the last submarines are out, we will have grown and used the capability, cleared risks and discovered new ones, all the while making an increasing number of stakeholders happy. If we don't have that discipline, attempting to satisfy a variety of stakeholders might make them happy in the short term, but jeopardizes the schedule and ultimately the capability and thus increase risks to all of our stakeholders.

Our innovative spirit and institutional discipline will be required to make active and important decisions vice, backing into decisions by accident to appease stakeholders in the short term. It won't be easy, but success depends on our discipline, and I am confident our stakeholders will be happy because of that discipline.

Capt(N) Patrick Larose is the Senior Editor for the Maritime Engineering Journal *and Director Maritime Equipment Program Management (Submarines).*

FEATURE ARTICLE

Implementation of the New Marine Systems Occupations

By CPO1 Christopher Magee, CD

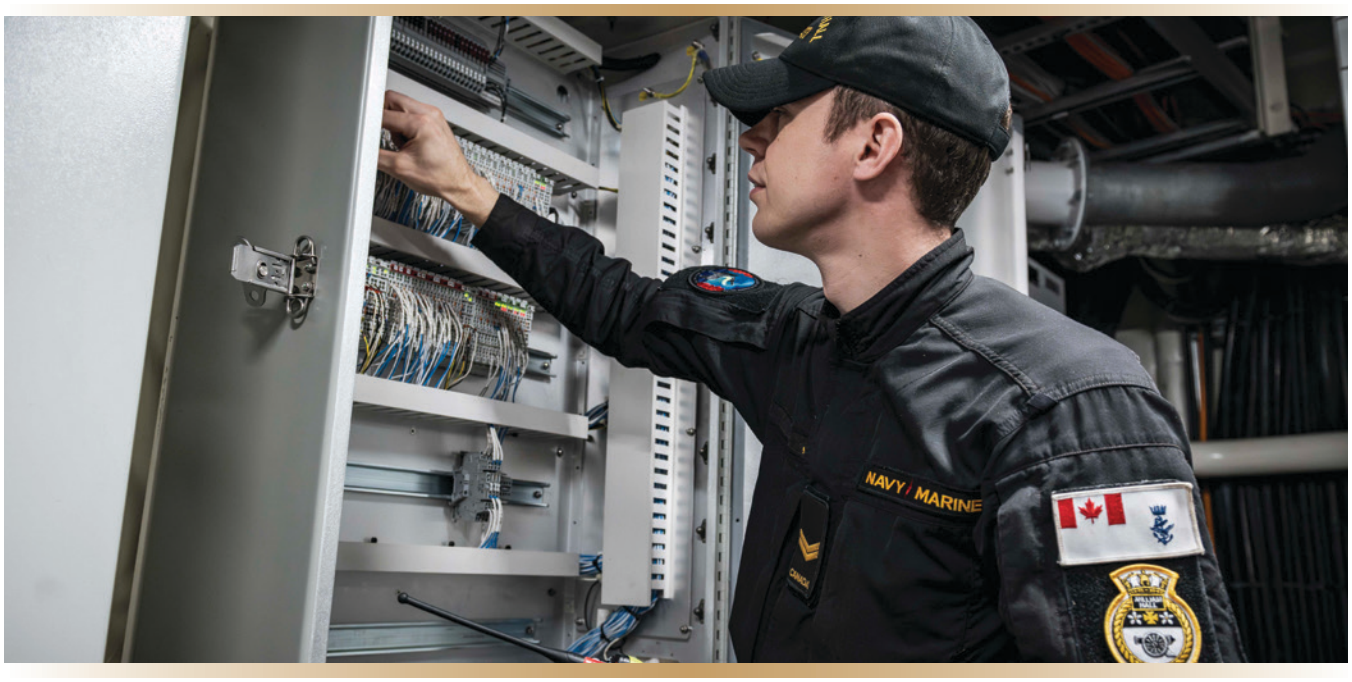


Photo by Canadian Armed Forces Imagery Technician

A Marine Technician conducts inspections of the main machinery rooms onboard HMCS *William Hall* (AOPV 433) May 2025.

Introduction

The Royal Canadian Navy (RCN) is implementing a pivotal transformation of its engineering occupation, intended to clarify identity, support recruiting, accelerate training, strengthen watchkeeping, and most importantly, reinforce shipboard self-sufficiency in maintenance and repair. This change continues a journey that began with the Marine Technician (MAR TECH) concept and now evolves into two distinct and specialized occupations: Marine Systems Electrical Technician (MSET) and Marine Systems Mechanical Technician (MSMT) which will be implemented in 2026.

This article outlines the background and rationale, the concrete changes underway, risk management, as well as the path ahead, so that sailors, supervisors, and stakeholders can understand how the new structure will work on the deckplates and across the fleet.

Marine Technician Action Team (MTAT) Report — June 2022

In 2017, the Marine Technician occupation was implemented to replace the legacy trades of Marine Engineer, Naval Electrician, and Hull Technician, as well as incorporating shipboard tasks from the Fire Fighter occupation. The MAR TECH concept attempted to solve several problems:

Address the shortage of personnel for watchkeeping – a broader, operator/generalist model was expected to ease staffing pressures by creating a larger pool of watchkeepers to work in critical at-sea watchkeeping positions;

Prepare for a future fleet with leaner crews – anticipating more automation and integrated systems, the new occupations aimed to staff ships with fewer cross-trained sailors;

Accommodate upcoming shifts in technology – the convergence of mechanical and electrical control, propulsion systems and the development of comprehensive in-service support contracts for new ship classes suggested a single occupation could manage both domains at the first-line maintenance level;

Move toward an operator/generalist skill set – the vision emphasized breadth rather than depth, with sailors capable of operating and monitoring systems across engineering disciplines;

However, five years after the implementation of the new MAR TECH trade, it was clear that a single occupation could not provide the support required. A number of issues needed to be addressed:

Training was not fully developed – the engineering school curricula and shipboard On-the-Job Performance Record (OJPR) lagged behind the ambition, leaving gaps between expectations and actual competencies. Thus, training times lengthened with sailors required to acquire a greater depth of knowledge on a wider range of systems;

Aging ships demanded deeper technical knowledge – legacy platforms and complex life-extension work continued to require specialized mechanical and electrical expertise for maintenance and repair;

The RCN's requirement for organic repair did not change – regardless of modernization, ships must remain capable of diagnosing and fixing systems at sea; generalists alone could not deliver this reliably.

Marine Technician Action Team (MTAT) Direction and Guidance

To address these gaps, in March 2021 under the direction of Commander of the RCN, the Marine Systems community was ordered to stand up the Marine Technician Action Team (MTAT) with the direction:

1. All HMC Ships shall have organic capability to repair systems, as self-sufficiency at sea is a non-negotible operational requirement.
2. Minimize watchkeeping where possible. Where safe and practical, redesign watch structures to reduce burden, leverage automation, and improve procedures.
3. Maintain an early knowledge overlap between electrical and mechanical technicians as common foundations remain essential. Formal specialization begins at the Sailor 2nd Class (S2) to build mastery while preserving shared understanding.
4. Emphasize On-the-Job Training (OJT) and experiential consolidation as fundamental to training. Authentic shipboard tasks and assessments underpin competence; OJT must be embedded in qualification pathways.
5. Develop an RCN technical standard tailored to our needs, informed by industry. Standards should reflect RCN realities while leveraging best practices for consistency and credibility.
6. Investigate incentives for achieving the standard. Recognition, credentialing, progression, and pay should encourage sailors to attain and sustain the standard.

Photo by Aviator Gregory Cole, Canadian Armed Forces

A Marine Technician performs maintenance on HMCS *Charlottetown*'s (FFH 339) Hammerhead remote-control targets September 2024.

Following a thorough review of the issues plaguing the MAR TECH occupation, the realities of the fleet, along with the above direction, the recommendation of the June 2022 MTAT report resulted in an occupation analysis. That deeper analysis of the MAR TECH occupation resulted in the recommendation to split the trade once more. NAVGEN 25/23 stated that MAR TECH will split into Marine Systems Electrical Technician (MSET) and Marine Systems Mechanical Technician (MSMT). An initial concept of a single common Chief Petty Officer 2nd class (CPO2) stream was superseded with each occupation retaining its own progression to CPO2 rank. The Reserve will mirror the Regular Force transformation, establishing distinct MSET and MSMT components.

Marine Systems Technical Occupations

The move to MSET and MSMT was driven by practical outcomes. Feedback from new recruits and recruiters indicated that the job description for MAR TECH was too broad and did not allow an applicant the opportunity to choose their career. The two new occupations are now more closely aligned with civilian/private sector trades and separating the occupations allows candidates to choose their career paths upon recruitment. Feedback from junior MAR TECHs was that they spent too much time at the school and were not getting the specialised training until too far in their careers. Therefore, part of the implementation was to review and update all the training material. The update of junior level training material will be completed with the implementation of the new occupations. Each having its own maintainer level residential and OJPR training material should reduce training time and allow for earlier specialization.

(Continues next page...)

Occupation identity

A survey was sent to all MAR TECHS asking them what they wanted as a trade badge and the results of the survey indicated that they wanted to return to the legacy badges.

MSET
legacy Electrical
Technician badge

MSMT
legacy Marine
Engineer Technician badge

Occupation Terminology

Junior MSMT and MSET members will be identified as apprentices to align with civilian trades. Watchkeeping duties will describe the level of responsibility of each position. The Sailor 3rd Class (S3) of both occupations will receive the same training and be expected to complete roundsperson OJPR onboard the ship they are posted to. The difference for the S3 is that they will be employed as either a mechanic or electrician from the start of their career allowing them to develop their specialised knowledge from the beginning.

The first occupation specific training a member will receive is at the S2 level with the Rank Qualification (RQ) Sailor 1st class (S1) Mechanical Maintainer or these RQS1 Electrical Maintainer course. The goal of these RQS1 courses is to make the member a substantive S1, develop their maintainer skills and prepare them for the mechanical or electrical technical courses. Included in training at this level for MSMT is official training as Upper Deck Engineer and for the MSET is official training as Electrical Technician of the Watch (ETOW). This training will be part of OJPR maintainer training package.

To clearly establish the responsibility for the safe operation of the machinery plant and to align closer with civilian naming conventions, there will be a change in watchkeeping nomenclature. On the *Halifax, Victoria,* and *Protecteur*-classes the Senior Engineering Watchkeeper (SEWK) becomes Engineer of the Watch (EoW) and the Engineering Watchkeeper (EWK) becomes the Assistant Engineer of the Watch (A/EoW). Only MSMTs will be required to achieve the EoW qualification. On the *Harry DeWolf*-class the EWK becomes the Junior Engineer of the Watch (Jr/EoW). To align with the CAF leadership guidelines and allow the S1 technician to occupy the trainee position, the Jr/EoW will be up ranked to Master Sailor (MS). On the *Harry DeWolf*-class both MSET and MSMT will be expected to achieve the Jr/EoW qualification due to the small crew size.

There are also key skills/knowledge that have been identified for each MSET and MSMT occupation that will effect promotion requirements.

A MSMT must hold a machinery console operator (A/EoW or Jr/EoW) qualification from any ship class to be eligible for promotion to Master Sailor and a MSET must hold the Controls and Instrumentation qualification to be eligible for Petty Officer Second Class (PO2).

One Occupation Manager will be responsible for both occupations and the Career Managers (CM) will continue to operate as they do today. To assist in developing the identity of each occupation they will each have their own Coastal Advisor and Training Manager. To allow flexibility for the CM, some senior positions can be filled by either occupation. For example, half of the ships CPO2 positions will be MSMT billets, and the other half will be MSET, though for operational reasons a MSMT CPO2 could fill MSET billet and vice versa. However, any billet that requires specialist knowledge will only be filled by its required occupation.

The overall work requirement remains unchanged, and tasks will be performed by each occupation supporting the other according to specialization. The MAR TECH occupation is currently below 70%, and the split will not immediately remedy the shortage. Implementation must protect operational delivery while recruiting and training are scaled up.

As required for all new occupations, Treasury Board (TB) will conduct a pay review. Aligning compensation to specialization, responsibility, and safety/critical skills helps attract and retain talent, while signaling the value of advanced qualifications.

Risk and Mitigation Strategy

As with any transformational change there carries a chance of risk and therefore successful implementation will be dependant on proactive mitigation.

Recruitment of new personnel

- Risk: Recruiters and applicants may not understand the new occupations.
- Mitigation: Provide recruiters with concise occupation briefs; update recruiting websites and materials; conduct outreach at bases, schools, and career fairs; refresh imagery and testimonials to communicate occupation identity; and expand eligible entry programs. For example Non-Commissioned Members Subsidized Training and Education Plan (NCMSTEP).

Training development

- Risk: Although training for junior members is already developed, technical and senior level training curricula may not be fully developed or resourced at implementation.
- Mitigation: Increase development resources, phase launches, validate OJPR task lists shipboard and run pilot cohorts.

Pay review timing

- Risk: Treasury Board pay review may not conclude prior to implementation, creating uncertainty for technicians and potential new members.
- Mitigation: Ensure submissions are comprehensive and timely; maintain transparent communication with occupations on status; and prepare interim guidance as required.

Disjointed implementation

- Risk: The rollout stalls or becomes inconsistent between fleets, schools, and units.
- Mitigation: Establish clear governance, milestones, and responsibilities; provide regular stakeholder updates; secure command support; use project management tools to track tasks and dependencies; liaise regularly with D MIL C career managers to solidify decisions through centrally managed posting actions.

Future Changes

Part of the occupation analysis was the discussion for the MSMT occupation also having the required specialization skills/knowledge for: damage control, structural and stability, and material fabrication. Due to time constraints for implementation and training development this was not included in the initial implementation of MSMT. In summer 2026 there will be a Working Group (WG) to define the scope, prerequisites, training pathways, qualifications standards, and employment standards. A key element of this WG is to ensure that functional mechanical and watch competencies precede specialized structural work. This means that the structural sub-occupation will branch from MSMT after the A/EoW qualification.

Photo by Corporal Alisa Strelley, Canadian Armed Forces

Sailor First Class (S1) Daze, Marine Technician, works in the forward engine room in HMCS *Vancouver* (FFH 331) during Operation NEON in the East China Sea on 26 September 2023.

Future analysis will ensure the MSET/MSMT framework remains aligned with forthcoming platforms and missions:

- Watchkeeping requirements for the future River-class Destroyers (RCD) and Continental Coastal Corvettes will be reviewed in detail.
- Any required updates will be made to the:
  - Work Requirements Table (WRT)
  - Occupation Structure
  - Occupation Specification
  - Reserve employment model

This forward look is essential to synchronize training with shipbuilding timelines, capability introductions, and operational concepts.

Practical Implications for the Fleet

The implications of this roll-out is multifaceted:

New recruits and junior sailors will select electrical or mechanical pathways at entry, experience more focused in-class instruction, and complete OJT tasks that map clearly to your qualification milestones. Expect earlier exposure to the systems one will "own" as a specialist.

(Continues next page...)

Photo by Cpl Noé Marchon, Canadian Armed Forces

Sailor First Class Nicholas Foulon, Marine Technician aboard HMCS *Fredericton* (FFH 337), changes a gasket on an air vent line from one of the ship's gas turbine engines during Operation REASSURANCE in the Mediterranean Sea on 24 May 2023.

For engineering departments: role titles across *Halifax*, *Victoria*, and *Protecteur*-classes will shift to A/EoW and EoW. On the *Harry DeWolf*-class, Jr/EoW up-ranks to MS, clarifying responsibility and aligning with CAF leadership doctrine. Watch rotations will be reviewed to support future requirements for fewer watchkeepers in ships and reflect automation of watchkeeping tasks in new platforms.

For training authorities: the RQS1 split requires careful scheduling and instructor alignment. OJPR content must be realistic, measurable, and tied to qualification gates. Ship school coordination will be essential to ensure meaningful, timely tasking.

For occupation leadership: dual Coastal Advisors and Occupation Training Managers will strengthen identity and ownership. A single Occupation Manager preserves coherence and standards, while cross fillable senior billets maintain flexibility without diluting specialization.

For Reserve employment: mirroring the Regular Force at junior levels ensures interoperable training and clearer trade identity thereby simplifying integration on mixed crews and deployments.

For retention and morale: legacy badges paired with modern specialization foster pride, while transparent promotion prerequisites and the TB pay review align incentives with responsibility and risk.

Conclusion

The transition from MAR TECH to MSET and MSMT is a carefully considered modernization designed to strengthen the RCN's marine engineering capability at sea. It restores specialization at S2, prioritizes OJT and occupation specific OJPR, clarifies watchkeeping nomenclature and responsibility, and preserves trade identity through legacy badges.

Crucially, the change honours an enduring truth: HMC Ships must maintain organic mechanical and electrical repair capability. While our platforms evolve and our crews adapt, engineering excellence will build on deep technical mastery, disciplined watchkeeping, and shipboard self-sufficiency which remains at the heart of naval readiness.

We are clear-eyed about the challenges: recruiting, training development, pay alignment, and the risk of uneven rollout. With strong governance, sustained command support, and open communication, these risks can be managed. The proposed structural sub-occupation and the next occupation analysis will be focused on future platforms such as the River-class Destroyers and Continental Coastal Corvettes and will ensure the new framework remains agile and relevant.

Ultimately, MSETs and MSMTs will carry forward the RCN's tradition of engineering professionalism which include competent and confident sailors ready to keep ships mission ready, safe, and effective. As implementation proceeds, feedback from the deckplates will be vital. Together, we will refine the details, maintain momentum, and ensure this evolution delivers the capability Canada needs at sea for today and for the fleet of tomorrow.

CPO1 Christopher Magee is currently the Marine Technician (MAR TECH) Occupation Manager at Director Naval Personnel 3-2-2 (DNP) in the National Capital Region.

FEATURE ARTICLE

From Manual to Digital: A Co-op-Built Solution

By Lt(N) Makayla Cunha

Innovation in Maritime Engineering — Led by Co-op Students

Innovation in maritime engineering does not always come from major system overhauls or external contractors. Sometimes it comes from looking at an existing process, recognizing an inefficiency, and deciding how it can be improved.

That is the case with the Engineering Logistics Automation Support Tracking (ELASTRA) tool. Developed for the Engineering Logistics Management Support and Services (ELMS)2 contract, ELASTRA was created to address long-standing issues with how Statements of Work (SOWs) for tasks under the contract are drafted, reviewed, and tracked. What makes this solution especially notable is that the tool was largely designed and built by co-op students.

A Process That Relied Too Heavily on Manual Work

Before ELASTRA, task creation was a very manual process. SOWs were drafted individually, often revised multiple times, and tracked through email. Version control was inconsistent, and knowing where a task was in the approval process often required follow-ups and cross-checking documents.

Photo by Lt(N) Makayla Cunha

Co-op student Stefan Boudriau.

While this approach worked, it was cumbersome and added unnecessary administrative effort. Task Authorities (TAs) and Project Managers (PMs) were required to spend significant time on document management rather than focusing on project delivery. Over time, it became clear that the process was inefficient, even if it was familiar.

A Practical Digital Solution

ELASTRA was designed to simplify this workflow from start to finish. The focus was not on adding complexity, but on reducing it. The tool introduces a structured, digital approach which includes:

- Pre-built SOW templates aligned to project and activity types, which guide TAs in creating specific, measurable, achievable, relevant, and time-bound (SMART) deliverables to improve clarity and scope of outcomes.
- Automatic version control to ensure documents remain current.
- Automated notifications to reviewers and approval authorities.
- A centralized dashboard showing task status from creation to final approval.

These features reduce manual follow-ups, improve consistency across SOWs, and provide better visibility into the approval process. The result is a workflow that is easier to manage and easier to understand.

Built by Co-op Students

One of the strongest aspects of ELASTRA is the team behind it. **Dhruv Rajesh** (Carleton University electrical engineering), **Sabrina Seto** (University of Ottawa software engineering), **Julia Hanlon** (Carleton University software engineering) and **Stefan Boudriau** (Carleton University/Algonquin College internet technology), all co-op students at Director Maritime Management and Support (DMMS), led the design and development of the tool. Together they brought strong technical skills in automation, data modelling, and user interface design, as well as a practical, user-focused mindset. They worked closely with stakeholders, gathered feedback, and adjusted the tool based on real operational needs.

(Continues next page...)

Photo by Lt(N) Makayla Cunha

Co-op students Dhruv Rajesh, Julia Hanlon, Sabrina Seto.

The final product reflects this approach. ELASTRA is not a conceptual prototype or student exercise. It is a functional, scalable tool that is ready for operational use.

Early Results and Next Steps

ELASTRA has been made available for Task Authorities to begin using. Early testing and demonstrations, with some slight adjustments, have shown positive results. The workflow functions as intended, automations trigger correctly, and the interface is straightforward to navigate.

It officially launched January 2026 and is currently being used for task renewals. There is another update planned for April which will include further functionalities. Once in use, the tool is expected to reduce drafting and administrative time by up to 50%. A formal assessment will be conducted in the next fiscal year to evaluate its impact on efficiency, approval timelines, and documentation consistency.

Why This Matters

Beyond the tool itself, ELASTRA highlights the value of involving co-op students in meaningful work. By giving students real responsibility and ownership, the organization benefited from fresh perspectives and practical solutions to existing challenges.

ELASTRA is not just a system improvement. It shows what is possible when innovation is encouraged and emerging talent is trusted to contribute.

Closing Thoughts

ELASTRA demonstrates that process improvements do not need to be grand or complex to be effective. By modernizing a single workflow, the tool improves efficiency, strengthens governance, and reduces administrative burden.

Just as important, it demonstrates how co-op students can make real, lasting contributions when given the opportunity. Supporting such initiatives will continue to strengthen both operational performance and the future of maritime engineering.

Lt(N) Makayla Cunha is the Project Manager for the Maritime Engineering Journal *at Director Maritime Management and Support (Fleet Management), Director General Maritime Equipment Program Management in the National Capital Region.*

News Briefs

Quart Club Makes Donation in Support of Veterans

On Nov. 27, 2025, the Royal Canadian Naval Engineers Quart Club (RCNEQC) met with **Danielle McCarthy**, Administrative and Stewardship Coordinator at Perley Health Foundation to present their annual donation to Ottawa's Perley Health Foundation, supporting seniors and veterans. Once again, the RCNEQC made a new record high donation, amounting to over $7,700.

Photo by Peter Joyce

FEATURE ARTICLE

Naval Large Tugs Update

By Noah Church and Jonathan Soper

Since last time

It has been a busy four and a half years since the Maritime Engineering Journal featured an article about the Naval Large Tug (NLT) Project (*MEJ* 97). Back in 2021 the then Project Manager, **Norma O'Rielly**, wrote about the project's modest beginnings: the justifications for the project, the options analysis, the procurement strategy and the challenges during the early stages of construction such as the COVID pandemic. Since then, the project has hit its stride: delivering three vessels, overcoming technical challenges and burgeoning with increased expectations.

In August 2024, the NLT Project Team accepted the first two vessels of the *Haro*-class, Canadian Forces Auxiliary Vessels *Haro* (YTB 650) and *Barkerville* (YTB 651), into service for King's Harbour Master (KHM) Pacific (*MEJ* 110). The vessels were delivered from L'Isle-aux-Coudres, QC to Esquimalt, BC via heavy-lift ship, a voyage which took them through the Panama Canal and lasted approximately five weeks. Since delivery, KHM Pacific has progressively transitioned from the legacy *Glen*-class to the *Haro*-class for harbour-berthing, coastal towing, and other support duties.

In December 2025, the third *Haro*-class vessel, Canadian Forces Auxiliary Vessel (CFAV) *Canso*, transited from L'Isle-aux-Coudres, QC, to Halifax, NS under power; a voyage of approximately 1,000 nautical miles over five days. CFAV *Canso* was accepted shortly thereafter. The fourth vessel, CFAV *Stella Maris*, is expected to be accepted in the fall of 2026.

These vessels provide a significant increase in capability over the legacy *Glen*-class tugs, tripling the available towing force at 60 tonnes bollard pull, and by providing American Bureau of Shipping (ABS) approved fire-fighting capabilities, which will allow the *Haro*-class tugs to also replace the legacy *Fire*-class fireboats[1].

Technical Challenges

Voith Schneider Propulsion to Azimuth Stern Drive

The new *Haro*-class vessels employ an Azimuth Stern Drive (ASD) system, by German manufacturer Schottel GmbH.

Photo by Capt(N) (Ret'd) Stéphane Ouellet

KHM Pacific crew, DND Project Team, and Industries Ocean representatives at CFAV *Haro*'s final acceptance.

This system, also known as Z-Drive propulsion, couples the ship's engines through a set of bevel gears to a fixed-pitch propeller which can be rotated in azimuth 360 degrees below the hull. This differs from the vertical rotating blades of a Voith Schneider Propulsion (VSP) of the original *Glen*-class tugs but similarly allows for thrust to be delivered in any direction. With the ASD system, thrust must generally be modulated through increasing or decreasing the engine revolutions per minute (RPM), however, at low speeds it is possible to employ a slipping clutch function so that the engine can remain at its idle speed, and the propeller can be regulated to significantly lower RPM to allow for precise power control. Each propulsor in the ASD system is controlled through a joystick which allows the operator independent thrust control. Advantages of ASD over VSP include reduced maintenance costs and increased fuel efficiency at cruising speed.

Both propulsion systems have similarities in that thrust can be delivered in any direction and at varying force. However, there are significant differences in the control and response of an ASD system compared to a VSP system.

1. CFAV *Firebrand* (YTR 562) in Esquimalt and CFAV *Firebird* (YTR 561) in Halifax.

(Continues next page...)

Whereas VSP tugs have very rapid changes to thrust force and vectoring by feathering the vertical blades, the ASD system has a longer response time in terms of thrust levels and directional control. This has required specialized conversion training for the ship's crew, many of whom have been working with VSP systems for a significant portion of their careers. As such, the change to ASD has not been without challenges.

Additional technical differences between the new *Haro*-class and *Glen*-class are found in the fendering and winch arrangements. For harbour berthing, the *Glens* use their aft winch to secure themselves by the stern to the assisted vessel. The *Haro*-class tugs are designed to secure themselves to the assisted vessel via the forward winch. The two classes of vessels have substantial fendering where they intend on making contact with their tows: on the stern of the *Glens* and the bow of the *Haros*. This presents another challenge for operators when transitioning from VSP to ASD as they must adjust their longstanding procedures accordingly.

In addition to the forward winch, the new *Haro*-class tugs feature an aft winch fitted with 750m of 35mm diameter steel wire rope. It is intended to be used when conducting medium to long distance tows.

Challenges with "Commercial-Off-The-Shelf" Specifications

As described in the article "RCN Auxiliary Vessels — Replacing the Legacy Large Tug Fleet" found in the Summer 2021 issue of the *MEJ*, the NLT Project was directed to deliver four tugs with firefighting capability built to a commercial off-the-shelf (COTS) design. To do so, the Project, in collaboration with the RCN, identified a list of essential technical criteria necessary to meet the operational profile of the new navy tugs while leaving the remaining specifications to commercial tug standards. This meant that bidders would only need to identify a commercial tug design that met approximately 300 technical requirements, rather than thousands. This procurement strategy not only increased the likelihood of a successful procurement process but intended to lower costs and risks while also ensuring the commercial tug design met RCN operational requirements. This approach was determined to be the best option at the onset of the Project, but now that the first two *Haro*-class tugs have been in-service for a year, this procurement strategy can be credited for unforeseen "commercial consequences".

The most glaring "commercial consequence" was the material used for the seawater cooling (SWC) system piping. The *Haro*-class SWC system uses galvanized carbon steel piping; a material that is cheap to purchase and easy to replace but has a much shorter lifespan than alternative materials such as stainless steel or copper nickel (CuNi).

Photo by Jonathan Soper

Haro-class ASD controls.

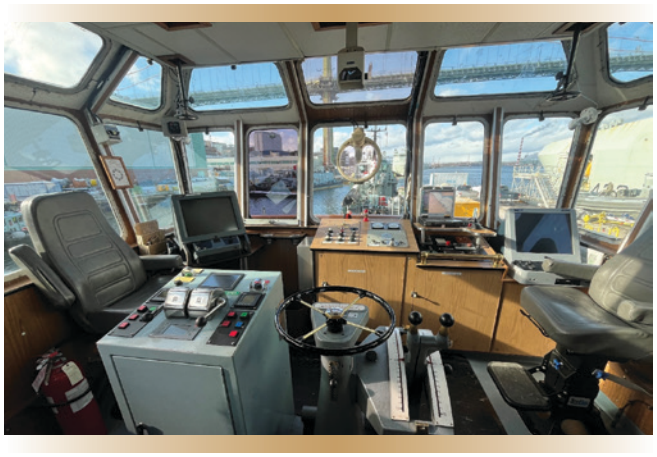


Photo by Jonathan Soper

Legacy *Glen*-class Voith Schneider controls.

Galvanized carbon steel piping has a much lower initial cost and is much less resistant to corrosion and biofouling than the alternatives. Galvanized carbon steel pipes are typically used until failure and replaced as necessary (every three to five years). On the other hand, CuNi and stainless-steel pipes have a much higher implementation cost but, due to their corrosion-resistant properties, have a lower life cycle cost as they will only need to be replaced once or twice during the 40 plus year life of an RCN vessel. Because the piping material was not specified in the essential requirements as described above, it was up to the ship-

Photo by Caleb Lethbridge

CFAV *Canso* during the launch and tow to Québec City from Industries Océan's shipyard in L'Isle-aux-Coudres.

builder to decide what material was used. As expected for a competitive firm fixed price contract, they chose a commercially acceptable material with a low initial cost.

The SWC systems on *Haro* and *Barkerville* were commissioned approximately 24 and 12 months before they were accepted by DND, respectively, and were well into their expected lifespans at acceptance. This, with help from some dissimilar metals within the system, led to significant corrosion and multiple failures in these systems early in their in-service lives. The failed sections of piping were replaced with stainless steel piping and the dissimilar metals were properly isolated through the contract's warranty, but the lasting impact of this will be felt by the auxiliary vessel Class Program Manager who will have to either manage repetitive pipe replacements or invest in higher quality and more durable pipes.

Photo by Jonathan Soper

Bollard pull trial on CFAV *Canso*.

Another "commercial consequence" is that some of the delivered safety equipment, such as the liferafts, do not adhere to DND certification policies or processes. The *Haro*-class is delivered with the International Convention for the Safety of Life at Sea (SOLAS) – approved six-person liferafts, which meet international statutory regulations for the vessel's crew size. However, the certification of DND liferafts is done in-house, and this certification system does not have the capability or authorization to certify six-person liferafts. The auxiliary vessel Class Program Manager decided to have the delivered liferafts replaced with 10-person rafts common to other vessels in the RCN fleet which DND is authorized to certify, rather than contract the certification of the *Haro*-Class liferafts to a third party.

Lastly, the commercial selection of equipment resulted in some equipment that is "capable" (meets the requirements of the contract) but does not perform to the quality or speed that was expected by operators. For example, the compressed air system onboard the *Haro*-class is used to power pneumatic pumps, but the capacity of the compressed air tank was not specified in the essential requirements, and therefore, the *Haro*-class is fitted with a relatively

(Continues next page...)

small compressed air tank which results in the pumps only functioning for a short period before waiting for the compressor to refill with air. These issues are not critical but have led to frustration amongst operators. It is unclear if these pieces of equipment will be upgraded by the Class Program Manager.

These examples show that while a COTS procurement can reduce acquisition costs, any realized savings may be outweighed by increased through-life costs. DND and RCN must consider these impacts when deciding whether COTS procurements are the best for vessel availability, capability, and financial stewardship.

More Tugs are on the Way

In 2007, the RCN determined that a minimum of six large tugboats were required to meet the future demand of the increased number and tonnage of the RCN fleet. This was one of the many options assessed during the Project's options analysis in 2016.

The options analysis determined that although a fleet of six tugs was the preferred option to satisfy operational requirements, it was not the optimal option due to higher acquisition and operational costs (affordability). Thus, with the assumed support of commercial tug services, a fleet of four was determined to be capable of meeting the minimum operational requirements at a lower cost. Building and acquiring four new Near Coastal Voyage Class 2 vessels was the scope implemented into the contract ultimately awarded to Industries Océan Inc. in 2019.

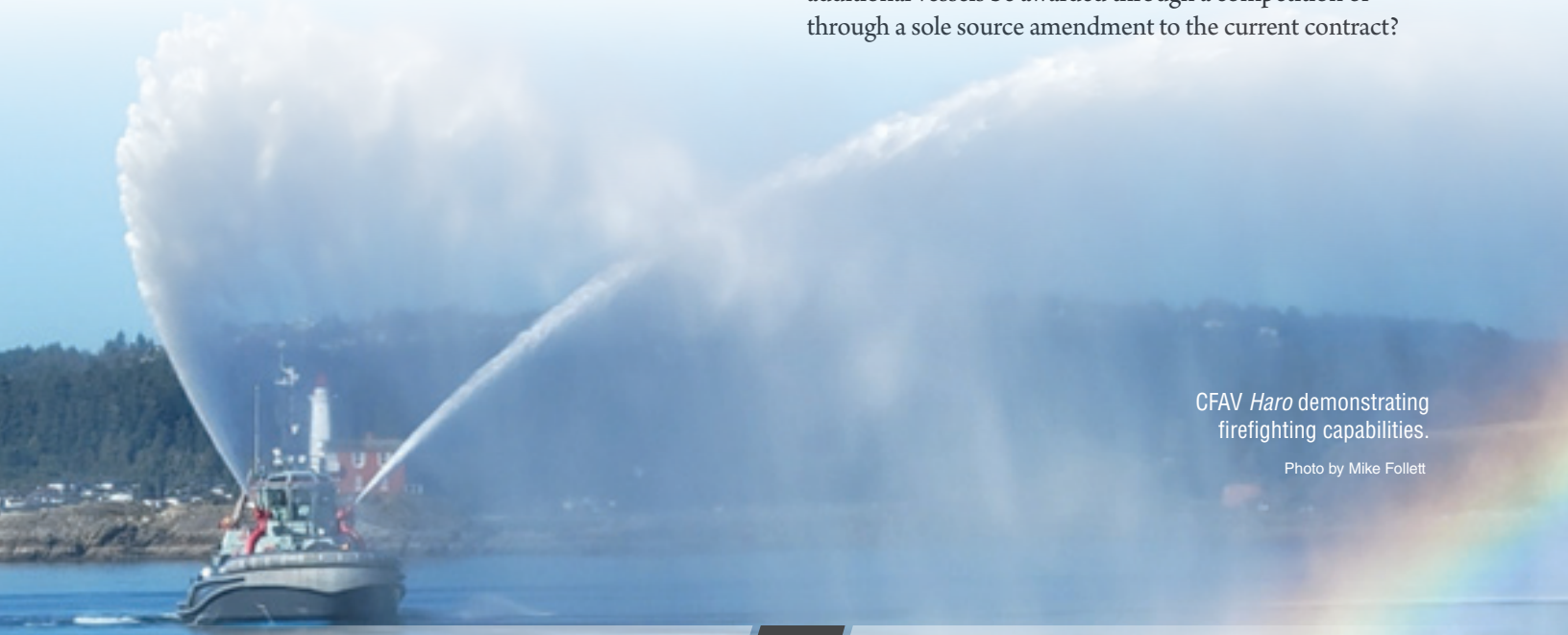
With a fleet of only four tugs, if one vessel is out for maintenance or an unexpected repair, naval operations become more vulnerable to delays and disruptions. This lack of redundancy puts pressure on scheduling and can leave key vessels waiting for assistance. As the RCN expands with new Arctic and Offshore Patrol Vessels (AOPV), Joint Support Ships (JSS), future River-class destroyers (RCD), Canadian Patrol Submarines (CPS) and Continental Defence Corvettes, the demand for reliable towing capacity will only increase.

Since fiscal year 24/25, with new found knowledge of limited available commercial tug services, and to prepare for the future state of the RCN fleet, the RCN has prioritized the expansion of the NLT Project scope to deliver the complete requirement of six Naval Large Tugs (three each on the East and West coasts) as determined by the RCN in 2007.

Adding two more *Haro*-class tugs will provide the flexibility needed to manage maintenance schedules without compromising readiness. It will ensure that even when a tug is out of service, tug operations can continue without interruptions. More importantly, it future-proofs the fleet, giving the RCN the capacity to support a growing navy while maintaining the high operational standards required for both routine and high-tempo missions.

Additionally, now that the Canadian Coast Guard (CCG) has been transferred to the authority of DND, there is an opportunity to increase the workload and importance of the *Haro*-class by performing harbour moves of CCG Vessels while they are in Halifax or Victoria harbours.

To implement such an initiative, the RCN, DND and PSPC collaborated to identify the best procurement strategy for the expanded scope. Should the contract for the two additional vessels be awarded through a competition or through a sole source amendment to the current contract?



CFAV *Haro* demonstrating firefighting capabilities.

Photo by Mike Follett

After much deliberation, the decision was made to sole source the contract to the current shipyard, Industries Océan Inc., as a competition carried too much risk with respect to delivery schedules and platform commonality.

Competing this procurement would introduce significant delays and added costs which would not provide the best value to Canada. Awarding the contract alone could take 12 to 18 months. Additionally, a new shipyard would have to start from scratch, completing a new production design, setting up production lines, establishing supply chains, and going through design reviews and engineering validations. These factors would push the timeline for the two additional vessels out by several years.

With the looming delivery of the first and second Joint Support Ships (JSS) in 2026/27 and 2027/28, respectively, the need for robust and redundant towing capabilities is approaching quickly. This does not afford the RCN time to carry out a traditional procurement process.

Lastly, the additional vessels should match the first four *Haro*-class tugs in systems, components, and operational procedures to ensure seamless integration and operational know-how. Awarding a sole-source amendment to the current contract would mitigate the risk of dissimilarities between the first four and final two *Haro*-class tugs.

If a new contract was awarded to build the fifth and sixth vessels, the new shipyard could meet the contract's technical requirements with different components and systems, which could create operational and maintenance challenges. Crews would require further operational and maintenance training to become familiar with all systems across the *Haro*-class. Additionally, maintenance protocols would differ, requiring a broader spare parts inventory and increased maintenance costs, leading to further inefficiencies.

Continuing with the current contractor ensures consistency across all six vessels, reducing in-service costs and simplifying fleet operations during the lifecycle of the *Haro*-class.

In December 2025, PSPC amended the current contract with Industries Océan Inc. to increase the number of delivered tugboats to Canada from four to six. The fifth and sixth *Haro*-class tugs will be named *Sansum* and *Belle Isle* and are expected to be delivered in Summer 2028 and Winter 2028 respectively.

Photo by Capt(N) (Ret'd) Doug Young

CFAV *Barkerville* assisting the Armada de México *Benito Juárez* (POLA-101).

Notable Achievements

Since delivery, the *Haro*-class tugs on the West coast have been integrated into the KHM fleet. They have assisted in the move of the Armada de México *Benito Juárez* (POLA-101) and have performed cold moves of *Halifax*-class frigates, Arctic and Offshore Patrol Vessels, and other RCN vessels, among other duties. In the decades ahead, the *Haro*-class tugs will be gainfully employed safely assisting in the orchestration of the RCN's growing fleet – JSS, AOPV, RCD, Submarines, and more. The Project Team looks forward to working with the Shipyard, Industries Océan, KHM, and our DND colleagues over the next several years as this construction contract is completed and the *Haro*-class is fully transitioned into service.

Noah Church is the Project Manager of the Naval Large Tug Project and Jonathan Soper is the Deputy Project Manager of the Naval Large Tug Project.

Submissions to the *Journal*

The *Journal* welcomes **unclassified submissions** in English or French. To avoid duplication of effort and ensure suitability of subject matter, contributors are asked to first contact the production editor at MEJ.Submissions@gmail.com.

Personal Listening and Reading Recommendations

Featuring: Capt(N) Patrick Larose

Editor's Note: This new section will feature recommendations from a member of the Naval Technical community for both professional development as well as entertainment. It's a great way to share ideas and perhaps gain a bit of insight into your shipmate! We welcome submissions from the community at large at mejsubmissions@gmail.com

Podcasts or Channels

P.L: I turn these channels on while cooking and cleaning.

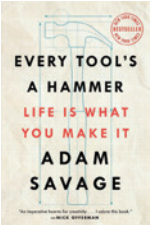
Lines on Maps!: www.youtube.com/@Gametheory101
Great channel on economics and war from a game theory PoV by William Spaniel, an associate professor in the University of Pittsburgh's Department of Political Science.

Binging with Babish: www.youtube.com/bgfilms
Excellent cooking show for the whole family
Channel description: Binging with Babish is the realization of a young(ish) man's dream to combine his love of film and cooking, and to have some fun in the process. Join us each week as we recreate the foods you've always wanted to try in movies and television – and if you're not careful, you just might learn a thing or two.

Veritasium: www.youtube.com/veritasium
Videos about science and education, probably one of the best.
Channel description: An element of truth – videos about science, education, and anything else we find interesting.

Books – Audio and Print

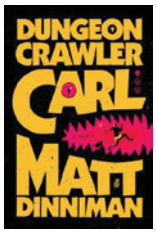
P.L.: These are the books I just finished or are on my "to be read" pile. I like listening to some of these while running and cycling.



Every Tool's a Hammer: Life is What You Make It
By Adam Savage
Published (2020) by Atria Books, a division of Simon & Shuster
ISBN13: 9781982113483
320 pages

Every Tool's a Hammer: Life Is What You Make It
An exploration of making by Adam Savage. Audio download.
Photograph by Michael Shindler

Simon & Shuster: For fans of Mythbusters (so everyone), there is finally an Adam Savage book! Chronicling his tale, including all his failures, his successes, and the wisdom he learned along the way, Adam discusses his hopes for "Every Tool's a Hammer". It is instructional, it is inspiring, and it is autobiographical—perfect for any "maker" or those ready to take the leap.



Dungeon Crawler Carl: A science fantasy literary role-playing game (LitRPG) by Matt Dinniman, just a fun easy listen that doesn't take itself too seriously.

Published (2025) by Ace, Penguin Books' Science Fiction and Fantasy Division
ISBN: 9780593820254 (Paperback)
480 pages

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Deepwater Horizon: A Systems Analysis of the Macondo Disaster. A System Engineer Analysis of the Deepwater Horizon Oil Spill
By Earl Boebert and James M. Blossom
Published (2016) by Harvard University Press
ISBN: 9780674545236 (Hardcover)
304 pages

P.L: Should be mandatory reading for every NTO.

Harvard University Press: Senior systems engineers Earl Boebert and James Blossom offer the most comprehensive account to date of BP's Deepwater Horizon oil spill. Rather than focusing on blame, Boebert and Blossom use the complex interactions of technology, people, and procedures involved in the high-consequence enterprise of offshore drilling to illustrate a systems approach which contributes to a better understanding of how similar disasters emerge and how they can be prevented.

Social Media

P.L.: I don't follow any Instragram or TikTok creators…. I know, I'm old.

Capt(N) Patrick Larose, CD, P.Eng, MSustMgt, MSyEng, MDS is the Senior Editor for the Maritime Engineering Journal *and Director Maritime Equipment Program Management (Submarines).*

News Briefs

Missile Re-arm Shows CAF Logistical Reach in the Indo-Pacific

(Courtesy RCN)

By Lt(N) Patricia Summers, Operations Officer CFAD Rocky Point

The Canadian Armed Forces (CAF) demonstrated its ability to project logistical support into the Indo-Pacific with a forward Harpoon missile rearmament of a *Halifax*-class frigate in July.

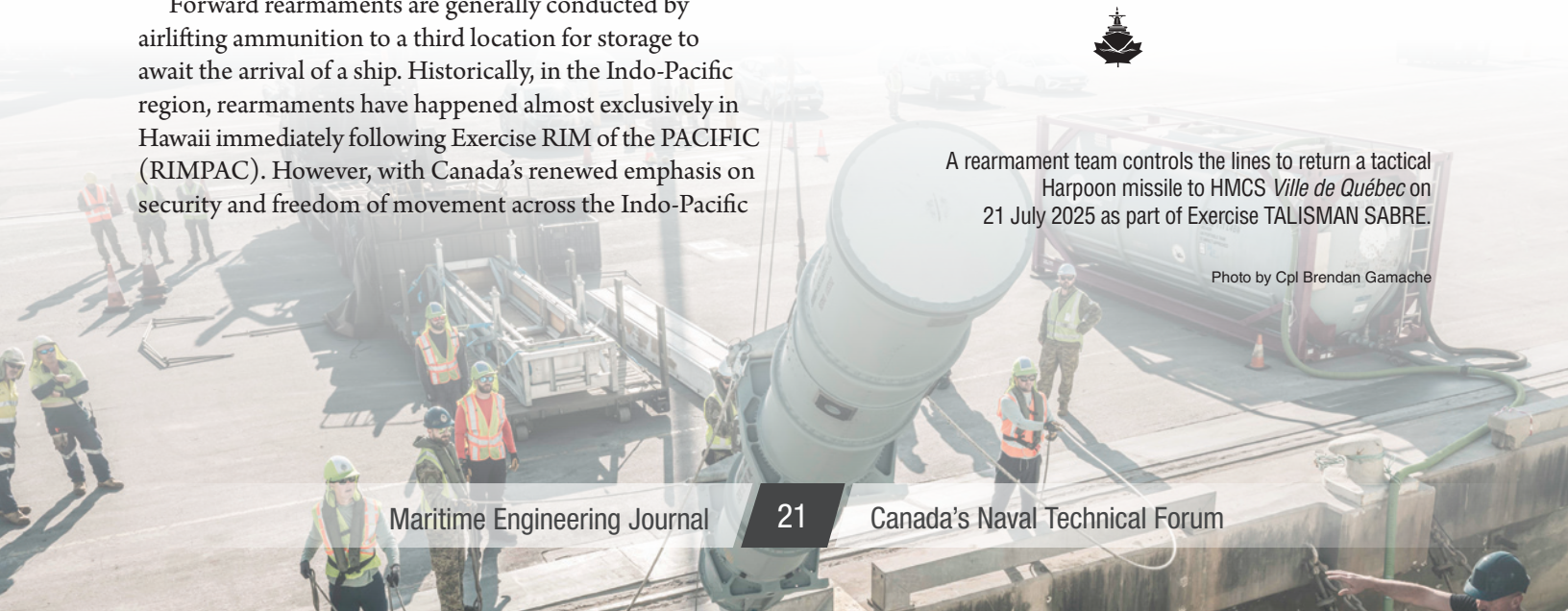
The rearmament took place on HMCS *Ville de Québec* (FFH 332) during Exercise TALISMAN SABRE 2025 as part of a live-fire exercise off the coast of Australia, over 16,000 kilometers away from the ship's home port of Halifax. Such extreme distances drive the need for forward rearmament capabilities.

Forward rearmaments are generally conducted by airlifting ammunition to a third location for storage to await the arrival of a ship. Historically, in the Indo-Pacific region, rearmaments have happened almost exclusively in Hawaii immediately following Exercise RIM of the PACIFIC (RIMPAC). However, with Canada's renewed emphasis on security and freedom of movement across the Indo-Pacific region, there is a necessity for rearmament operations to be conducted in new locations.

Such operations demonstrate the CAF's ability to shorten strategic lines of communication and provide efficient logistic support for distant missions, especially in cases of highly specialized commodities like ammunition.

The rearmament was conducted by the Canadian Material Support Group (CMSG) in coordination with the Canadian Joint Operations Command (CJOC) and the Australian Defence Force (ADF). This operation displayed the CAF's interoperability with the ADF and reinforced our commitment to working with allies in the region.

Forward rearmaments have become the norm for Canadian ships deployed to the Indo-Pacific in recent years and are expected to remain so into the foreseeable future.



A rearmament team controls the lines to return a tactical Harpoon missile to HMCS *Ville de Québec* on 21 July 2025 as part of Exercise TALISMAN SABRE.

Photo by Cpl Brendan Gamache

Awards

Cdr Hyung-Wook (Bob) Kang was presented the King Charles III Coronation Medal. Cdr Kang received this medal having made an outstanding achievement abroad that brought credit to Canada, for his selfless service while employed in Korea.

Cdr Robert Gilpin was recognized for an RCN Commendation as he exemplified outstanding leadership as the Senior Combat Systems Manager for the River-class Destroyer project.

The Petroleum, Oils and Lubricants (POL) Dashboard Team: **Melanie Ndandji Wandji**, **John Edwards**, and **Meagan Bernier** (missing from photo)) was awarded the Innovation Award in Major Surface Combatants. This award was presented to this team for the development of a database and interactive dashboard for all fuels, oils, lubricants used by the RCN. This tool will directly enable formations and ships staff to select alternative options when supply is constrained, ensuring assessments and risks are informed and considered.

The RCN iSTAR Uncrewed Aircraft Systems Team: **Kinh Pham, Andre Paulusz, LCdr Riley Nabigon, George Hammond, Algis Jurenas, Matt Bullock, Cdr Ryan Bell, LCdr Eric Dignard, LCdr Scot Whyte, LCdr Kevin Gagne, Michael Rancourt, Patrick Boucher, Nadine Khaddaj, Katherine Layng, Alexandria Roy, Agassilmo Tolno, LCol Yan Gauthier, Matthew Murchison** was awarded the MEPM Special Recognition Award in Major Surface Combatants. Their efforts culminated in the successful award of two contracts to equip *Halifax*-class ships with cutting-edge Uncrewed Aircraft Systems, significantly enhancing the Navy's surveillance and targeting capabilities.

Photos by Aviator Anne-Julie St. Hilaire Canadian Forces Support Group (Ottawa-Gatineau) Imaging Services

PRESERVING CANADA'S NAVAL TECHNICAL HERITAGE

NEWS (SPRING 2026)

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Lessons Learned: A Naval Engineer's Gulf War Experience

By Cdr (Ret'd) Joseph Murphy

Thirty-five years ago, on April 7, 1991 following a 227-day deployment to the Persian Gulf in support of Operation FRICTION, the destroyers HMCS *Athabaskan* (DDH 282), HMCS *Terra Nova* (IRE 259), and the supply ship HMCS *Protecteur* (AOR 509) returned safely to home port in Halifax, NS. For those of us aboard the ships, along with families and friends awaiting us dockside, it was an emotional homecoming.

Seven-and-a-half months earlier, when our task group sailed to join other coalition forces in the Gulf, all we knew for certain was that it would be a deployment fraught with uncertainty. HMC Dockyard did an outstanding job of refitting the ships with major new armaments and equipment in two weeks (*MEJ* 26), but there were other things we did to prepare ourselves in anticipation of potentially hostile operations overseas.

As the Marine Systems Engineering Officer aboard *Athabaskan*, the task group's command flagship, it fell to my department to ensure we maintained our ability to float, move and fight. I had joined '*Athabee*' in 1989, directly after serving two years as Engineering Officer in HMCS *Nipigon* (DDH 266), and, there is no question that the back-to-back Head of Department (HOD) postings gave me a running start in preparing my engineering team and ship for deployment to a hot zone. In 1990, the stakes were high.

And then the real work began.

Critical Weight Reduction

The emergency refit work of installing a new reverse osmosis distillation (ROD) plant, the Phalanx close-in-weapon-system (CIWS), and mounting two Bofors guns on the boat deck all added weight to the ship. To offset this and keep the ship properly trimmed, we reviewed all of our stores items to ensure we were carrying only what we needed for the deployment. In all, we offloaded 125 tons in eight days.

Photo courtesy Government of Canada

HMCS *Athabaskan* homeward bound from the Persian Gulf in April 1991.

The weight savings increased the ship's range by allowing us to fuel up to 95 percent capacity or better, enough for another full day of sailing between refuellings. This was especially important when operating in a combat zone where our restricted ability to manoeuvre and increased radar profile during replenishment-at-sea (RAS) operations made us vulnerable. Toward the end of a RAS, we would give the tanker a strict five-minute warning that we timed by stopwatch so that they could maintain the maximum pumping rate up to the last possible moment.

Managing the Power and Heat Load

The ambient air and sea temperatures in the Gulf were around 40°C and 33°C, respectively, which limited the ship's power generation capability to the extent that our Solar gas turbines, rated at 750 kW, could only produce 450-500 kW before shutting down on high-temperature alarms[1]. After reviewing our power load-shedding protocol, we decided to include the after air-conditioning (A/C) plant to the list of equipment to be shut down as required to maintain the ship's power generation capability. Load-shedding became an everyday occurrence for us.

Before sailing, we had taken steps to reduce our power consumption and heat load by taking such initiatives as:

- cutting passageway lighting in half by removing every other fluorescent tube from the fixtures;
- painting the upper deck areas white (with the exception of the flight deck) to lower temperatures on deck and inside the ship;

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1. Solar Turbines, a subsidiary of Caterpillar, vice Solar Ship the hybrid aircraft manufacturer.

Replenishment-at-sea (RAS) operations were stressful due to our restricted ability to manoeuvre and the increased radar profile.

- disconnecting the main machinery room (MMR) and auxiliary machinery room (AMR) cooling coils from the A/C system, and reconfiguring the A/C coils to saltwater coils to help cool the spaces;
- rigging high velocity (HV) firefighting nozzles onto the mast to reduce the ship's heat signature without having to use the pre-wet system; and
- using the ship's helicopter to make forward looking infrared (FLIR) camera passes over the ship to identify the heat load on the exterior of the ship.

During action stations in the Gulf, we also shut down systems such as the ROD plants and auxiliary boiler to reduce the number of non-essential alarms we had to react to.

Damage Control – Thinking outside the box!

Before deploying to the Gulf, I reviewed whatever I could find that might give me insight on managing damage control (DC) in a combat area. The incident reports from the 1987 missile attack against the *USS Stark* (FFG-31) made it abundantly clear that maintaining firefighting equipment levels would be critical. *Stark* ran out of chemox canisters twice, which forced the firefighting teams to back off until additional canisters could be supplied, allowing the fires to spread.

While in Halifax, I was able to scrounge an additional 1,200 chemox canisters from naval stores and other ships, and also loaded up on extra fire hoses. We equipped every hose-saddle in the ship with two of the standard 50-foot lengths that they normally held, and installed smoke curtains on every door along the two main decks.

Since it wasn't known if Iraq had chemical weapons, we took extra care to verify the integrity of the ship's gas-tight citadel[2]. We got creative, and had rolls of plastic wrap on standby in the forward and after section bases to cover the heads throughout the ship during condition Zulu Alpha; otherwise, the build-up of air pressure would force the water in the heads overboard, thereby reducing the pressure in the citadel. To test the system, we closed down to condition ZA, then had people smoke cheap cigars around the perimeter to see if we could detect any air leaks.

We did our best to ensure that both the forward and after section base teams were balanced not only in numbers of personnel, but in terms of occupations, talent and leadership. We made sure everyone knew what to do for the different damage control conditions so as to reduce the time it took to close the ship down. We also assigned a PO2 engineer to Section Base 3 to provide the Air Detachment further insight into ship systems to minimize radio communications during emergency stations. A Section Base 4 was added to the bridge to cut down the damage control response time for the bridge, ops room, and upper deck areas.

During our transit to the Gulf, we conducted daily engineering drills and DC exercises. Having the senior hull technician from Sea Training staff on board with us as far as Gibraltar was a huge help in ensuring we were ready for any and all damage control situations.

Aftermath

Fortunately, we encountered no direct attacks, and survived navigating the mine fields without mishap. On the trip home, I made note of some of the specifics mentioned in this article, along with what I considered to be the major takeaways from our engineering experience in the Persian Gulf:

1. **Think/act operationally and creatively.** A warship can be sent into harm's way at any moment. While Sea Training conducts workups to validate a ship's ability to operate efficiently under any circumstances, it is up to ship's staff to ensure personnel and systems are working at the highest level. Anticipate situations. Conducting regular engineering and damage control drills will keep your team focused, boost confidence, and better prepare members who are looking to progress their watchkeeping certification qualifications.
2. **Know your department.** Make the best use of people's strengths and work on individual weaknesses. Encourage more experienced team members to teach their skills to others in the department and help progress certification qualifications.
3. **Know your machinery and systems.** Ensure all planned maintenance is up to date prior to a major deployment. Have each piece of equipment assigned to a primary crew member for conducting maintenance or emergency repairs and assign a backup. More frequent hot-section inspections of the propulsion gas turbines helped extend their running time. There is no substitute for vibration analysis when troubleshooting or conducting maintenance.
4. **Learn all you can from other people's experience.** In addition to what we had been taught at Damage Control School, the lessons we took away from studying incidents in other ships greatly informed how we went about preparing our own ship for operations in a combat zone.

Overall, *Athabaskan*'s engineering department did an outstanding job of getting our ship ready to go overseas and doing whatever it took to keep our machinery and hull systems operating at peak efficiency throughout the deployment. We did what we could to maximize our ship's effectiveness within the coalition task group, and our chances for a safe return.

Joe Murphy served as the MSE head of department in three ships, the last being HMCS Iroquois, and ashore as Commandant of the Naval Engineering School in Halifax. He retired in 2005.

2. Part of Chemical, Biological, Radiological, and Nuclear (CBRN) defence.