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Cold-weather Trials, Frobisher Bay, Nunavut

Increasing the RCN's capabilities in the North is one of the key features of the *Harry DeWolf*-class Arctic and Offshore Patrol Vessels. HMCS *Harry DeWolf* (AOPV-430) and its sister ships will be at the core of an enhanced Canadian Arctic presence over the coming years. The thick-hulled ships can sail in up to 120 centimetres of first-year sea ice, and come with ample space for helicopters, small vehicles and cargo containers, which are particularly useful when operating in remote regions. The ships will also be available to support other government agencies like the Canadian Coast Guard.

(From RCN Navy News. Photo by Cpl David Veldman)

See page 19.

Director General Maritime Equipment Program Management

Cmdre Lou Carosielli, CD

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Maritime Engineering Journal

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Fleet Maintenance Facility Cape Scott welder Michael Jessome works on fire-hose racks for HMCS *Fredericton* using the tungsten inert gas (TIG) arc-welding process.
(Photo by Evan De Silva)

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COMMODORE'S CORNER

The Fleet Maintenance Facilities are at the heart of the naval materiel enterprise

By Commodore Lou Carosielli, CD

The Royal Canadian Navy (RCN) has been tested time and again in its ability to deploy naval assets to support Canadian interests at home and abroad, and this past year has been no different — apart from the notable addition of the many challenges brought upon us, individually and collectively, by the COVID-19 pandemic.

Despite the increased burden that this continues to have on every facet of our business, from maintenance delivery to new acquisition and supply chain management, the RCN has been successful in meeting its operational commitments: Deploying our *Halifax*-class frigates to the Hawaiian Islands, the Asia-Pacific region, the Mediterranean, Scotland and northern Europe; our *Kingston*-class coastal defence vessels to West Africa, the Caribbean basin and the eastern Pacific Ocean; HMCS *Victoria* (SSK-876) to sea trials following a lengthy and comprehensive submarine maintenance program; and our newest acquisition — HMCS *Harry DeWolf* (AOPV-430) — to Newfoundland and Labrador, and the Arctic, on first-of-class sea trials under RCN command for the first time.

The RCN's success is operationally enabled by the naval materiel enterprise, which is powered by a sophisticated network of Assistant Deputy Minister (Materiel) and RCN organizations whose incredibly committed and professional teams work hard to assure the RCN's enduring materiel readiness. At the heart of this enterprise are the Fleet Maintenance Facilities (FMFs) that turn a quarter-of-a-century old this year. Established in 1996 out of the integration of several maintenance and engineering units on each coast, FMF Cape Breton in Esquimalt, British Columbia, and FMF Cape Scott in Halifax, Nova Scotia have been consistently delivering materially ready ships and submarines to the RCN through their state-of-the-art industrial facilities, highly competent workforces, and dedicated industry partners.

In addition to their primary mandate of supporting ships, submarines and other naval vessels, the FMFs are relied upon as indispensable partners for work sponsored by the Director General Maritime Equipment Program Management (DGMEPM) and several other organizations. The DGMEPM/FMF relationship that enables this work — which includes repairs and overhauls, engineering changes, and specifications for work periods, to name just a few — is so fundamental to the success of the naval materiel enterprise that it has long-since been enshrined in service-level agreements.

But this relationship stretches far beyond the transactional nature of service delivery. The DGMEPM team and the coastal Naval Engineering and Maintenance (NEM) organizations — with the FMFs at their core — are in constant discussion over planning and priorities, challenges to overcome, and initiatives to pursue, all in the name of ensuring safe and mission-capable fleets today and into the future. These long-lasting and successful relationships also bridge the private sector. Indeed, the success of the RCN depends on the FMFs working seamlessly with a large group of industry partners, many of whom have emerged out of complex sustainment solutions jointly developed by industry, government partners, and the life-cycle material managers and engineers in DGMEPM.

We know the FMFs and their workforces as flexible, adaptable, highly skilled, and results-driven organizations. Born out of a need to transform, these high-functioning units have continued to evolve through Defence Renewal and the Defence Procurement Strategy, and remain the strategic service providers of the RCN. It is not surprising that the FMFs were designated five years ago as the strategic assets responsible for planning and coordinating all second- and third-level maintenance activities performed by the dockyards. These and other important strategic capabilities maintained by the FMFs in support of our current and future fleets will ensure the RCN remains capable of mission preparation and sustainment, force generation, and naval materiel assurance for years to come.

This year, as we mark 25 years of outstanding service by the talented and creative men and women of the FMFs, we salute them all, past and present.

Bravo Zulu!

FORUM

Remembering the Royal Canadian Navy's Gulf War Contribution 30 Years On

By CPO1 Gerald Doutre, Persian Gulf Veterans of Canada

"At the request of the Government of Kuwait and the Government of Saudi Arabia, the Government of the United States of America has initiated a multinational military effort to deter Iraqi aggression. The Government of Canada has decided, therefore, to dispatch three ships of the Canadian Forces to the Persian Gulf. Our naval forces, in company with those of other nations, will assist in the deterrence of further aggression."

— Prime Minister Brian Mulroney, August 10, 1990

A little more than a week after Iraq invaded Kuwait on August 2, 1990, Canada made the decision to take its place among its allies to liberate the State of Kuwait. I was a 20-year-old Naval Electronic Sensor Operator (NESOP) serving aboard HMCS *Athabaskan* at the time, and what happened next at Ship Repair Unit Atlantic (SRUA) — now Fleet Maintenance Facility Cape Scott — to prepare the three-ship Canadian Task Group to depart Halifax, NS on August 24 of that year still amazes me to this day.

In a period of just two weeks, HMC ships *Athabaskan* (DDH-282), *Terra Nova* (IRE-259) and *Protecteur* (AOR-509) were retrofitted with modern weaponry from the Canadian Patrol Frigate Program. Iraq was not a submarine nation, and because of the threat of mines and modern missiles (such as Exocet), the anti-submarine weapons were removed to make room for the modern equipment required to combat the new threat our ships could encounter in the Persian Gulf.

One of the main reasons that SRUA was able to get the ships ready to sail inside of two weeks was the cooperation the Royal Canadian Navy (RCN) received from the workers and their unions. The rules governing the division of work among the various trades were tossed aside, as everyone pitched in to get this massive task done. The result was about 100,000 person-hours of work that was completed in the time normally spent on a six-month refit. Workers, organized into three shifts, toiled around the clock. In the first four days alone, more than 500 workers had logged over 5,000 hours of overtime — an effort that would reach 40,000 person-hours of overtime by the end of the two weeks.

Gulf War veteran CPO1 Gerry Doutre.

Industry also pitched in with more than 10,000 person-hours devoted to readying the ships.

Capt(N) Roger Chiasson, the newly appointed Commanding Officer at the SRU, said he had never seen such unflagging dedication and national pride by the workers. "People were walking around with Canadian flags on their hardhats, and were basically ready to work until they dropped."

Speed was of the essence for these "dockyard mateys" of the time, and the men and women of the SRU rose to the occasion.

(Continues next page...)

Listed here are just some of the weapons/systems that were trucked down to Halifax from the CPF program stores at Saint John, NB, and installed onboard the three Persian Gulf-bound warships:

HMCS *Athabaskan*

- ALR-76 EW Threat Warner (used on the USN's S3 Viking aircraft)
- Joint Operational Tactical System (JOTS)
- International Maritime Satellite (INMARSAT)
- SHIELD II chaff/decoy system
- CIWS 20-mm Phalanx Block 1
- Mine counter-measures equipment

In addition to new weapons and sensors, *Athabaskan* was fitted with new engines. Three of her four engines were changed to increase as much as possible the time before the next required maintenance. *Athabaskan* also conducted a complete surface-to-air missile swap-out just days before the Gulf War went hot on January 16-17, 1991.

HMCS *Terra Nova*

- DLF-2 floating decoy
- CIWS 20-mm Phalanx Block1
- Mine countermeasures equipment
- ASROC was removed and replaced with the McDonnell Douglas Block 1C Harpoon surface-to-surface missiles.

HMCS *Protecteur*

- British Kestrel EW system
- AN/SPS 502 radar
- CIWS 20-mm Phalanx Block 1
- SHIELD II chaff/decoy system
- Twin-mount 3"/50-calibre gun (reinstalled, after having been removed from the class years earlier).

Gerald Doutre as a leading seaman aboard HMCS *Athabaskan* in 1990.

Perhaps the most "controversial" equipment upgrade involved the two 40-mm Bofors anti-aircraft guns that were installed on each of the three ships. There was a popular misconception at the time that these guns had been scavenged from museums, but they were in fact modern versions of the same gun destined for the Maritime Coastal Defence Vessels.

For additional air defence, the three ships carried a total of 32 members of the 119th Air Defence Battery out of Chatham, NB. These Canadian Army soldiers were equipped with the shoulder-launched Blowpipe, an optically guided short-range missile system that was upgraded in-theatre to the newer Javelin missiles. Five rapidly upgraded CH-124 Sea King helicopters that embarked with us from 423 Maritime Helicopter Squadron at 12 Wing Shearwater, NS would provide us with critical support during operations, while CF-18 Hornet fighters conducted combat air patrols for our ships in the Gulf.

As a member of *Athabaskan*'s ship's company, I flew to the IBM factory in Owego, NY to train on the new ALR-76 EW Threat Warner system just days before our deployment to the Persian Gulf. I celebrated my 21st birthday not long after we sailed, and received an advanced promotion to leading seaman on November 12, 1990 while on station in

the Gulf. I was one of more than 4,000 members of the Canadian Armed Forces who would eventually serve in the Gulf War, with a peak of about 2,700 personnel serving in the region at any one time. The conflict also marked the first time that female CAF members performed combat duties in-theatre.

With a joint headquarters established in Manama, Bahrain, Canada played a major role in the Gulf War as Commander of the Combat Logistics Force in the Persian Gulf, in charge of supplying all nations' ships with food, fuel and ammunition — the only country other than the United States to be given a command function. Among other contributions, Canada also built a field hospital in Al Qaysumah, Saudi Arabia, near the Kuwait border in February 1991. Its 530 personnel cared for both Coalition and Iraqi wounded.

On February 18, 1991 the cruiser USS *Princeton* struck a bottom influence mine off the coast of Iraq. *Athabaskan* was ordered to escort a civilian tug through the mine field to extract the crippled US warship and get her safely back to port. Needless to say, our ship sent over a pallet of beer after the rescue to cheer them on.

During the ground war phase of the Gulf War, *Athabaskan* was stationed off the coast of Kuwait with the American hospital ship USNS *Comfort*. As a fire-control aimer positioned on the bridge top of our Tribal-class destroyer, I, along with my shipmates, was only allowed 20-minute shifts outside the protected interior of the ship due to heavy smoke from the oil fires set by the Iraqi forces as they retreated. The smoke from more than 600 oil fires was so thick it blocked out the sun. Not seeing the sun for days and breathing that air were bad enough, but the black rain was the worst.

February 28, 2021 marked the 30th anniversary of the Liberation of Kuwait, and to this day the Gulf War deployment remains the highlight of my career. Helping to liberate another country as part of Canada's fighting force is an accomplishment I will never forget.

Notes

Some of the details mentioned here have come from, "The Persian Excursion: The Canadian Navy in the Gulf War," by Commodore Duncan (Dusty) E. Miller and Sharon Hobson. I highly recommend this first-hand account of the Canadian Navy's action in the Gulf War.

The *Maritime Engineering Journal* issues 26 and 27 also contain comprehensive coverage of the engineering, technical and logistics work involved with readying Canadian naval units for deployment to the Persian Gulf in support of Operation Friction in 1990 and 1991, and can be found in the *Journal*'s complete archive at: https://www.cntha.ca/publications/m-e-j/

CPO1 Doutre is on the executive for the Persian Gulf Veterans of Canada (PGVC), an advocacy and support association for Persian Gulf veterans and their families. For more information, please visit: https://persiangulfveteranscanada.ca/

UPDATE!

Chief Petty Officer 1st Class Gerald Doutre (right) has been appointed Group Chief for the ADM (Materiel) Group in Ottawa, taking up the baton from CWO (Ret'd) Mario Bizier (seated at far left). Chief of Staff (Materiel) RAdm Chris Earl officiated at the January 30 ceremony, witnessed by Mr. Troy Crosby, the Assistant Deputy Minister (Materiel). *Bravo Zulu Chief Doutre!*

Photo by Dan Connolly

FEATURE ARTICLE

The Fleet Maintenance Facilities at 25!

By Ashley Evans

April 1, 2021 marks the 25th anniversary of the stand-up of the Royal Canadian Navy's hard-working dockyard Fleet Maintenance Facilities — FMF Cape Scott (FMFCS) in Halifax, Nova Scotia, and FMF Cape Breton (FMFCB) in Esquimalt, British Columbia. For the past quarter-century, the teams of civilian and military engineers, tradespersons, project planners and other workers who operate these world-class ship repair facilities have delivered on their mandate to serve the technical needs of the RCN fleet through a spirit of collaboration and commitment to excellence that is second to none.

As strategic naval assets, the FMFs provide a full range of naval engineering, maintenance and repair services to support the operational availability of the Navy's warships and submarines, auxiliary vessels, and other Formation units. While most services are conducted from their dockyard facilities, mobile repair parties extend the capabilities of the FMFs by meeting up with deployed RCN units wherever they may be operating around the world [see MEJ 87, page 8].

The foundational roots of this highly capable and responsive FMF organizational structure goes back to when the Navy's various maintenance and engineering services were handled by three separate repair, engineering and maintenance units on each coast: Ship Repair Units Atlantic/Pacific (SRUA/P), Naval Engineering Units Atlantic/Pacific (NEUA/P), and Fleet Maintenance Groups Atlantic/Pacific (FMGA/P). The decision to consolidate the services of these units into a unified core facility on April 1, 1996 stemmed from the Naval Engineering and Maintenance System Functional Review, a two-year study of the overall workforce, management, and union structure [see MEJ 42, page 14]. The goal was to reduce overhead by 20 percent, while reallocating resources between Maritime Forces Atlantic (MARLANT) and Maritime Forces Pacific (MARPAC).

In an interesting bit of history, the Fleet Maintenance Facilities take their current unit names from the two FMGs that were actually former fleet escort maintenance ships — HMCS *Cape Scott* (ARE-101), and HMCS *Cape Breton* (ARE-100). In the 1970s, the two ships were permanently berthed alongside as dockyard maintenance and repair facilities, and it just happened that these namesakes of Cape Scott on the northwest tip of Vancouver Island, and Cape Breton on Nova Scotia's eastern extremity, ended up on the "wrong" coast when they were retired from sea service. The FMGs were later moved into shore facilities, but the names remained.

DND photo

The vast FMF Cape Breton complex in the Esquimalt naval dockyard comprises a secure Ship Repair Zone offering a full range of modern ship repair and engineering services.

Photo by LCdr Cindy Hawkins

HMCS *Windsor* (SSK-877) exits the FMF Cape Scott Submarine Repair Shelter prior to its August 2020 undocking in the Halifax naval dockyard.

Over the past 25 years, both FMFs have evolved. On the East Coast, this has seen the construction of several purpose-built structures including the main D247 building, the Weapons and Electronics building, and the Submarine Repair Shelter. The design for D247 was developed in 2000, and the building was completed in 2002. The Submarine Repair Shelter, a climate-controlled building, allows for hull maintenance, repairs, and upgrades to both submarines and various surface ships, and was completed in 2012 after three years of construction. These two purpose-built facilities brought the total building count at FMFCS to 13, with an overall footprint of more than 81,000 square metres (871,929 square feet).

On the West Coast, a consolidated Ship Repair Zone (SRZ) has been created through the FMFCB modernization project (C4360) that included the construction of D250 — at 48,000 m^2 (516,667 sq. ft.), one of the largest buildings by volume on the West Coast of North America — and the adjacent facilities in buildings D252 and D302.

The FMFCB modernization project wrapped up in 2020, and involved the move of various FMF trades shops and departments from numerous widely spaced and antiquated buildings into a single state-of-the-art facility (D250). This new capability was supported by the careful planning of work spaces to maximize production and efficiency, while allowing FMFCB shops and departments to work together in a streamlined fashion, transforming the culture from one of separation to one of cohesion. With this also came the construction of the 2,300-m^2 (24,700 sq. ft.) Central Storage Facility that officially opened in 2018, and serves as the primary receiving and shipping location for all FMFCB material requirements (with the exception of HAZMAT and metals that are managed elsewhere).

Each of the two FMFs is made up of seven departments — Operations, Engineering, Production, Unit Support, Finance, Strategy, and Process Integration, with the latter two shared between both FMFs. FMF Production departments boast more than 70 different shops and work centres, with capabilities including:

- Command and Control Systems;
- Communication Systems;
- Above Water and Under Water Weapons Systems such as guns, missiles, fire-control and torpedo systems;
- Hydraulic Systems;
- Marine Diesel, Gas Turbine, Electrical Propulsion, and Auxiliary Systems;

Photo courtesy Claus Mathes, For Posterity's Sake

RCN photo

HMC ships *Cape Scott* (ARE-101) and *Cape Breton* (ARE-100) were fleet escort maintenance ships before being berthed permanently alongside as Fleet Maintenance Group dockyard maintenance and repair facilities.

RCN photo

Naval apprentices train aboard HMCS *Cape Scott* in the 1960s.

- Electrical Generation and Distribution;
- Hull Maintenance and Fabrication resources;
- Machining; and
- Submarine Systems such as periscope maintenance and weapons certification, among others.

Each facility runs engaging and informative apprenticeship and student programs aimed at building and strengthening a diverse and skilled workforce.

(Continues next page...)


Photo by Ashley Evans

Sheet metal worker Carmen Collins operates the laser printer at FMF Cape Breton.


Photo by Evan De Silva

HMCS *Sackville* inside Fleet Maintenance Facility Cape Scott's Submarine Repair Shelter.


Photo by Evan De Silva

Jacob Blackler from the FMF Cape Scott Pipe Shop works on deck inserts for HMCS *Halifax*.


Photo by Evan De Silva

FMF Cape Scott welder Mitch Sutherland at work on a fire-hose deployment system for HMCS *Fredericton*.


Photo by Evan De Silva

FMF Cape Scott rigger Robert Combden works on creating customized tool bags for trades personnel.


Photo by Evan De Silva

Kelly George, a welder at FMF Cape Scott, hard at work on the hull of the world's last-remaining Flower-class corvette, HMCS *Sackville* (K181).


Photo by Ashley Evans

Larry Fletcher and Steven Faust, both Red Seal Electricians working in shop 144 Electrical of FMF Cape Breton's Cable Repair Facility, handle the electrical shore power requirements for Canadian and visiting foreign ships in the Esquimalt naval dockyard.


Photo by Evan De Silva

HMCS *Windsor* alongside FMF Cape Scott. Teams from FMFCS were hard at work conducting authority for the trial of the underwater weapons handling system.

FMFCS Plater Shop worker Dustin Isenor produced this tray for a TV screen on HMCS *Montreal*. He used the schematic design of the blueprint to develop a pattern on a flat piece of aluminum, cut it out using the laser machine, and then worked the computerized press brake to bend the metal into the correct shape.

John Crocker (inset) from FMF Cape Breton's Naval Architecture team holds his schematic design for HMCS *Regina*'s commemorative Admiralty Paint Scheme to mark the 75th anniversary of the end of the Battle of Atlantic in 2020.

The work executed by the FMFs is vast and dynamic, even for an already unique marine industry, with such wide-ranging capabilities as:

- Maintenance and repair of RCN life rafts;
- Installation of the CEROS 200 fire-control system;
- Design and implementation of the commemorative disruptive paint schemes for HMC ships *Regina* (FFH-334) and *Moncton* (MM-708) for the 75th anniversary of the Battle of the Atlantic; and
- Continuous preservation work devoted to HMCS *Sackville* (K181), the world's last surviving Flower-class corvette from the Second World War.

In addition to day-to-day repairs and maintenance, there have been countless occasions when the FMFs have been presented with particularly difficult technical problems, but each time the teams have gone to work to find solutions and achieve success through their innovation and creativity. While the FMFs continue to maintain and use certain equipment and technology that was in the facilities 25 years ago, the tooling landscape of many shops has changed to keep skillsets on pace with industry demands.

Sailmaker Carly Smethurst at FMF Cape Breton works on a variety of custom items, including bags, weather and sun-protective equipment covers, blackout and fireproof curtains, as well as the Zodiac life rafts. The largest item she works on is the flight-deck awning for the *Halifax*-class frigates.

A case in point is the 3D printing equipment that is currently showcased front and centre in the machine shops of each FMF. This incredible new additive manufacturing capability has presented fantastic learning opportunities for the FMF workforce as they create components that cannot easily be manufactured manually. Strange times call for innovative thinking, and during the present COVID-19 pandemic the machinists at FMFCB used their 3D tools to produce headbands for the face shields used by local CFB Esquimalt Fire Rescue personnel, and to manufacture specialized mask nose pieces to prevent people's eyeglasses from fogging up.

The 3D printing capability continues to grow for the FMFs with the procurement of new 3D metal-producing printers, some of which have arrived at FMFCS, and with others scheduled for delivery to both facilities later into 2022. This amazing cutting-edge technology has the ability to produce metal parts that are both lightweight and structurally sound, and brings with it an effective new capability to the FMF toolbox.

The FMFCB Combat Systems Group was particularly busy in recent years, installing modern new suites of combat system integration components in the RCN's primary fleet under the Halifax Class Modernization/Frigate Life Extension (HCM/FELEX) program. In order to support the operation and maintenance of these systems,

and guided by a detailed assessment using a Maintenance Requirements Review (MRR), a number of new test-bed systems were installed within the FMFs, complemented by training sessions for engineers and tradespersons. The test bed systems, such as that for the SMART-S 3D radar, allow the FMFs to conduct in-depth troubleshooting and verification of ship system components. The resultant test capability significantly enables the FMFs as a strategic provider of both corrective and preventive maintenance support as they continue to provide direct support to the combat systems aboard the frigates.

In the summer of 2020, FMFCS production and engineering personnel went to sea aboard HMCS *Harry DeWolf*, the first-of-class Arctic and Offshore Patrol Vessel delivered by Irving Shipbuilding Inc. in Halifax. During set-to-work, the ship had indicated problems with its external communication systems, and with only limited documentation and training on the systems, the FMFCS seagoing team was able to assist other agencies and stakeholders in troubleshooting the problem. The successful combined efforts of FMFCS, Thales Canada, the Naval Engineering Test Establishment, Lockheed Martin Canada, ship's staff, and other external partners emphasized the importance of having shipbuilding partners who are willing and able to work together.

Undoubtedly, the strength of the Fleet Maintenance Facilities resides in the talents and expertise of the minds and hands at work within these impressive dockyard complexes. Many of the faces have changed (or aged) over the last 25 years, but the same sense of pride in delivering first-class engineering, maintenance and repair services to the Royal Canadian Navy remains as keenly focused as ever. The wide range of skills of the people in the offices and shops continues to be invaluable, especially when the going gets tough and the timelines are tight — when the addition of innovation and creativity can win the day.

With every turn of a wrench, with every engineering change that is designed and implemented, and with every apprentice trained, Fleet Maintenance Facility Cape Scott and Fleet Maintenance Facility Cape Breton reassure the admiral, and the sailors who take the vessels to sea, that the fleet's technical well-being is in very good hands indeed.

Ashley Evans is the Strategic Communications Officer for both Fleet Maintenance Facilities, and works out of FMF Cape Breton at Esquimalt, BC.

The *Maritime Engineering Journal* on Canada.ca — keeping us all in touch during these challenging times

While Canada and the entire world battle to defeat the common enemy COVID-19, the *Maritime Engineering Journal* is still accessible, even to those self-isolating at home.

As we announced in our Spring 2020 issue (MEJ 92), our management team and the people at RCN Public Affairs have worked closely together to present the *Journal* as a fully accessible PDF on an external facing page at: https://www.canada.ca/en/department-national-defence/corporate/reports-publications/maritime-engineering-journal.html

Having the *Journal* available as a fully accessible PDF on the **Canada.ca** website marks a great step forward in ensuring we reach as many people as possible in a format they prefer. While we do not currently have plans to re-code our entire 39-year back catalogue that is available online through the kind cooperation of the all-volunteer Canadian Naval Technical History Association (http://www.cntha.ca/publications/m-e-j/), every effort will be made to keep the *Journal* in step with the formatting requirements of our readers.

Comments, enquiries and offers to write for the *Maritime Engineering Journal* can be sent to **MEJ.Submissions@gmail.com**

FEATURE ARTICLE

From SRUP to FMF Cape Breton — A Complex Transition

By Capt(N) (Ret'd) Bert Blattmann
[Based on the author's 2009 interview with the Canadian Naval Technical History Association.]

I joined Ship Repair Unit Pacific (SRUP) as its last commanding officer in the summer of 1994, at a time when the federal government was instituting huge budget cutbacks. The Department of National Defence (DND) was being severely hit with something like a 15-percent cut, but the government was also looking at contracting work out, and apparently wanted to privatize the two Ship Repair Units (Atlantic and Pacific).

The Navy quickly set up an investigation team called the Naval Engineering and Maintenance System (NEMS) Functional Review that was controlled by the Chief of Staff (Materiel) in Halifax. The goal was to see how we could improve the overall efficiency of the SRUs, Naval Engineering Units (NEUs) and Fleet Maintenance Groups (FMGs) on each coast by integrating them into a super unit that would be eventually called a Fleet Maintenance Facility (FMF). This is a short overview of the complex process I would be involved in over the next two years.

The integration of three units into one certainly created some headaches. The SRUs were made up primarily of civilian DND employees, while the NEUs had a mix of civilian and military employees, engineers, technologists and technicians, and the FMGs were comprised solely of military technical personnel. The civilians in the Ship Repair Units were afraid of having more military coming in, and nobody knew where to place the military technologists and technicians among the civilians, or even how to manage a mixed authority structure. The unions, of course, were worried that the FMFs would create a predominately military versus civilian dockyard navy. These were big concerns, but there was no turning back. The new frigates were coming into service, and the whole fleet structure was changing on both coasts.

There was still a strong push in government to privatize the SRUs under a scheme called Alternate Service Delivery (ASD), but with 80 percent of all our ships being refitted in private shipyards, we were already doing ASD. There was a big debate over this, but the Navy's technical arguments eventually convinced the headquarters staff in Ottawa that ship repairs are critical in any emergency, and that we had the qualified personnel to maintain the ships, especially where the weapon systems were concerned.

The RCN's two Fleet Maintenance Facilities were stood up on April 1, 1996. During the ceremony for the opening of FMF Cape Breton in the naval dockyard at Esquimalt, BC – with RAdm Bruce Johnston (Commander of Maritime Forces Pacific), Wayne Lundren (FMFCB Production Manager), Dan Quigley (Head of the Dockyard Union and Trades), and Capt(N) Bert Blattman (CO of FMFCB) – the crest of the retired escort maintenance ship HMCS *Cape Breton* (ARE-100) was brought back into service with the motto, "We serve the Fleet."

Still, the federal government was pushing hard to contract out non-core functions that any private shipyard could do, such as painting ship, repairing a diesel engine or a valve, and so on, and leave the so-called core functions such as work on the weapon systems, communication systems and Ops Room equipment to the dockyards. So there was another debate over what was core, and what was non-core, and over how we were supposed to handle the Treasury Board regulations on getting competitive bids for the work we issued. Things would get pretty complicated to manage if I had to go to a competition every time I wanted a steering gear compartment painted. And how would we manage having private contractors coming into the dockyard and working alongside our union employees on the same ship? I could see all sorts of problems with this.

(Continues next page...)

The Director General Maritime Engineering and Maintenance in Ottawa controlled all the expenditures for ship repair, including refits in the dockyards and those contracted out to civilian yards, so they always had to plan three or four years ahead to keep the Ship Repair Units busy. Between SRUP and SRUA there was always a major warship in refit in the dockyard, with the rest contracted out under competitive bids, and we had other work going on with the auxiliary tugs and barges, and such. It was a good arrangement that worked well. The SRUs decided which ships we wanted to work on, and these were assigned to us on a non-competitive basis. We were given a budget and a time frame for completing the refit, and were held to this just like a private contractor. With the threat of privatization hanging over us, we had to become more efficient by becoming more business oriented, which was a very difficult concept to introduce to the Navy, but we did it.

We weren't like Industry, however, where we could adjust the size of our workforce to match the amount of work we had going on. When DND decided to contract out all of our work on the naval auxiliary vessels, arguing they were non-core ships, this made us less efficient because we had less work for the same number of employees. We couldn't lay anyone off. When the new Maritime Coastal Defence Vessels came into service, they too were contracted out to a private company for repair and maintenance, and so here again potential work for the naval dockyard was reduced.

Things became extremely difficult for us. I recall on some occasions where all we had for work in the dockyard was one ship in refit, and one ship in a short work period. Well, I couldn't stuff 900 employees into two ships. The efficiency of the naval dockyard had actually gone way down. There just wasn't enough work for all the employees we had in the dockyard, and it created big, big problems. DND's budget cuts and workforce reduction program would soon force us to undertake a massive downsizing that was very painful, and by the time I left in 1997 our civilian workforce had been reduced to about 600 people from the 980 employees I had started with in 1994.

The threat of privatization was always there, though, and the union decided to march in step with us. For 18 months we discussed how to integrate civilian and military workers, and then briefed everyone, so it was well handled on both the civilian side and the military side. We realized that after this integration we would have to work together, and we did. It was an intense period, but it ended up with very good results. The FMFs would operate with a completely integrated engineering and trades structure, with civilian and military staff, and to me it made a lot of sense.

It really was more efficient having these separate units come together. Before, whenever the Ship Repair Units had to do complex repairs, they had to depend on the NEUs to provide what was called "technical guidance," but with the SRUs and NEUs each having their own commanding officer, the priorities didn't always agree. With the FMFs having everyone working under a single CO, the priorities were more easily established. Prior to the integration, the FMGs were doing first-line maintenance only, and would pick and choose which jobs they wanted, and pass the rest on to the SRU. The NEU was floating between all the other units, and now all of a sudden we were all under one command, and all with the same function to repair and maintain the fleet. Overall, we were quite happy. The Fleet Maintenance Facilities seemed to be operating more efficiently than what we had previously, and the civilian shipyards were pretty happy because they were receiving the maximum work that could be contracted out by DND.

As the FMFs were preparing to be formally stood up on the 1st of April 1996, we had to decide what to call these new super units. Many of us in the SRUs didn't like "Fleet Maintenance Facility" as it didn't mention the word "ship," and the people from the NEUs were upset because it didn't include the word "engineering." For a time, we pushed to have them called FEMUs — Fleet Engineering Maintenance Units — but that got shot down, and in the end the two units were named Fleet Maintenance Facility Cape Breton (FMFCB) on the West Coast, and Fleet Maintenance Facility Cape Scott (FMFCS) on the East Coast. The deed was done, and marked the end of a complex period of transition that was both challenging and, I have to say, very exciting.

Here's wishing the FMFs all the best for the next 25 years and beyond.

Capt(N) (Ret'd) Bert Blattmann served in the RCN from 1966 to 2001, and was Commanding Officer of SRUP and FMFCB from 1994 to 1997. He lives in Sidney, BC.

FEATURE ARTICLE

Canadian Surface Combatant Project: The Personnel and Training Program for Canada's Major Warship Replacement

By Cdr Andrew Sargeant, LCdr Yohan Desjardins and Cdr Bradley White

RCN composite image

This is the second in a series of articles on the Canadian Surface Combatant (CSC) Project (see MEJ 93), a series that aims to provide updates on progress, and stimulate conversation within the naval technical community on the challenges and interesting opportunities associated with this complex procurement. This article features a look into the development of the Personnel and Training program for the CSC Project. The CSC will influence a broad spectrum of the Royal Canadian Navy (RCN) and the Naval Materiel Enterprise, in many ways changing both how we operate and maintain our ships, as well as how we *train* our people for these tasks. As the ship's design continues to take shape, attention is turning to the construction and introduction into service of the new fleet. Although still several years off, it is an effort that requires long-term planning and collaboration between the CSC Project Management Office (PMO), the RCN, DGMEPM, and our industry partners. In terms of Personnel and Training, it also calls for close collaboration with the Director of Naval Personnel, and with RCN training authorities such as the Naval Personnel and Training Group (NPTG), and Commander Sea Training Group (CSTG). It is a very complex engineering problem, the nature of which we hope to provide an introduction to here.

The Challenge

A number of ongoing global transformations are expected to have a profound impact on future operations, such as the proliferation of advanced technologies, flexible and rapidly adaptable manufacturing techniques, autonomous systems, and the general shift from a relatively permissive to a generally contested environment. These transformations have a commensurate effect on the required characteristics of any future surface combatant that must achieve operational success in this context.

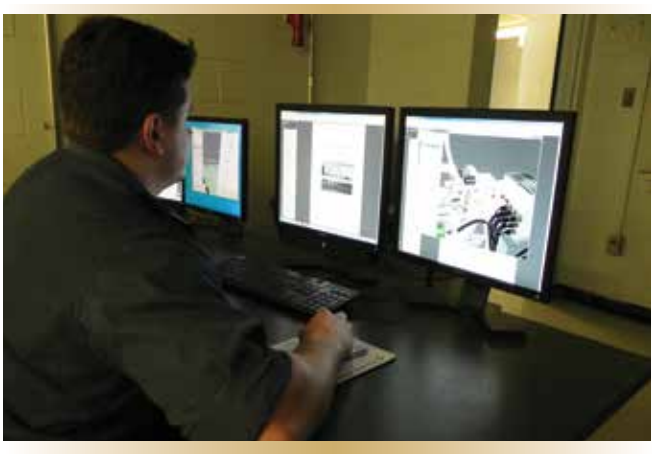
(Continues next page...)

In response to this revolution in operational context, the CSC will bring significantly improved capabilities such as the Aegis Weapon System, the AN/SPY-7 radar, cooperative engagement capability, the SM-2 Blk IIIC dual-mode missile, advanced low- and medium-frequency active sonars, the Tomahawk naval fire-support missile, a 127-mm naval gun capable of delivering guided munitions on target at extended range, advanced electro-optical and infrared systems, and numerous other key systems. The introduction of these modernized and future-proofed capabilities will ensure the RCN remains a globally deployable naval force capable of contributing to the full spectrum of naval operations in support of Canada's interests, and those of our allies.

The CSC is a complex system of hardware, software, and human systems. Humans are an integral part of the equation, and for the CSC to be successful, the human element must be considered in the overall ship design from the beginning. The effects that the CSC will deliver in operations are built on numerous functions and activities, some of which are executed by hull, mechanical, or electrical systems, some by computer and combat systems, and others by human systems. The integration of all of these functions is key in ensuring the overall ship design will produce a ship that meets the needs of the RCN. What makes this more challenging is that the CSC is designed to carry 204 bunks, thereby creating hard human resource constraints that must be considered within the context of the robust systems engineering approach being employed to manage the ship's new and developing technological capabilities.

The solution to this highly complex problem begins with understanding how the RCN intends to operate, fight, and maintain the CSC, and integrating this with the realities, constraints, and opportunities of the CSC design. Through the development of the CSC Concept of Operations, Mission Essential Task Lists, and Logistics Support Analysis, the range of human-centric tasks involved with operating, fighting, and maintaining the CSC can be established. Human systems integration will then optimize the human considerations of the overall system within the context of hardware and software capabilities and constraints. These activities are prerequisites to, and will provide essential data for, the Personnel and Training program development.

The CSC Project is currently in the Preliminary Design phase, and thus the training program is focused on analysis. As the CSC design matures and information about the end state becomes available, the Personnel and Training solution will evolve in parallel, following sound systems

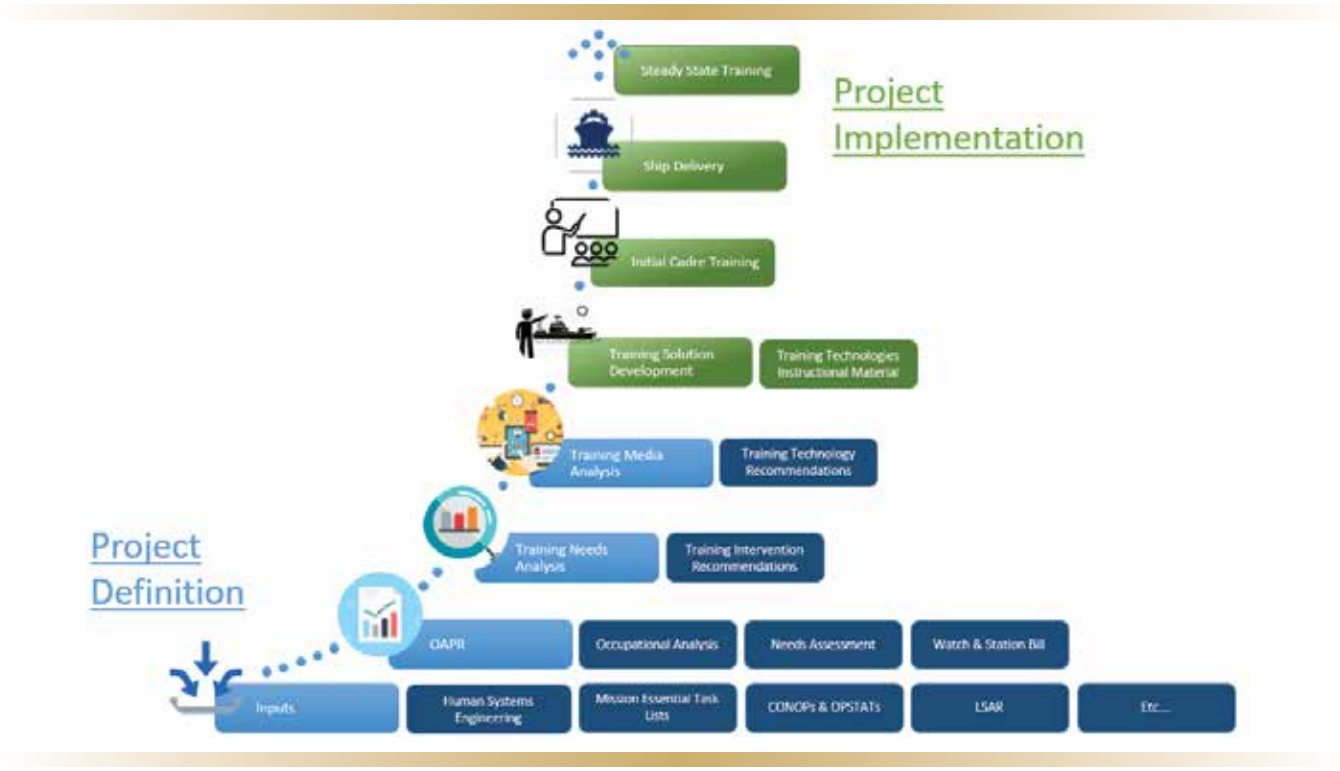


The new operationally-oriented training system will enable training at the point and time of need for individual and collective training requirements.

engineering principles. By the end of Project Definition the CSC crew make-up will have been decided, and the training analysis will then provide recommendations on the types of training required and how they will be delivered during Project Implementation. The prime contractor, Irving Shipbuilding Inc., has been contracted to provide initial cadre training, as well as the training development during Project Definition, while the RCN will develop and deliver the eventual steady state training.

The primary efforts during the analysis phase are the Occupational Analysis and Personnel Requirements (OAPR), the Training Needs Analysis (TNA), and the Training Media Analysis (TMA). The OAPR will result in an occupational analysis, a needs assessment, and a Watch & Station Bill recommendation. The OAPR will measure the gap between tasks performed currently in the RCN and the tasks required for the new capability. This model typically enables the identification of tasks that will require training, and initiates the TNA and TMA.

Notably, and somewhat different from previous ship projects, the CSC approach to training design is based on jobs and tasks, not occupations. As the CSC design evolves, there is a likelihood that occupations will change to meet the operational requirements associated with combating future threats. Adopting a job- and task-based approach mitigates risk otherwise heightened by locking the project into the occupations of today. This approach will provide maximum flexibility in the creation of instructional material that will be developed as modules associated with a system or task that can be combined as necessary to generate a specific course. In other words, training



pathways will be tailored to the sailor's requirement, will employ the most suitable means of training, and will be accessible at the point and time of need. To put it in perspective, this means that the Naval Training System will be able to easily generate adaptable training curricula based on individual and specific requirements of sailors and support personnel, driven by the competencies they must possess for their given jobs.

Naval Training System Transformation

There is no question that training is a key enabler to shipboard capability. Concurrently with CSC training development, the RCN is transforming and modernizing its entire training capability to create the Future Naval Training System (FNTS). The modernization effort is managed by NPTG as the Naval Training System Transformation (NTST) Program. RCN training is resource-heavy, has been slow to adapt to changing requirements, and in some cases is still styled on a 1950s education model. It relies heavily on rigid processes and is primarily instructor-led in brick-and-mortar classrooms. The NTST Program will deliver the FNTS as a sustainable and full-spectrum naval training capability that exploits advanced technologies and methodologies, relying on reduced overall costs through economies of scale, rationalization of training demands and requirements, reduced infrastructure footprint, and staffing efficiencies.

A critical element of the success of the NTST lies in its ability to leverage and integrate deliverables from complementary, but separate, projects such as the CSC, the Arctic and Offshore Patrol Ship (AOPS), and the Joint Support Ship (JSS), as well as the In-Service Support (ISS) projects, of which the CSC represents a large and important component.

The future system will be an agile, dynamic, and technology-enabled system of systems. The new operationally-oriented training system will enable training at the point and time of need for individual and collective training requirements. Sailors will be able to access training from onboard ship, from home, or in a classroom whenever required. The ability to train in a self-paced environment will ensure that sailors who achieve competency at sea need not repeat training ashore. The FNTS will feature a host of new reconfigurable trainers and technologies that make training look and feel more like their jobs in ships. NTST research shows that sailors who experience more realistic training, and who achieve success quicker through their own pacing, become more invested in the content, have better retention of material, and can apply that material in real-world context more appropriately.

The CSC Project will act as both a stepping stone and a catalyst toward an innovative, advanced technology learning system that will revolutionize the way the RCN

(Continues next page...)

conducts training in accordance with FNTS requirements. To this end, the PMO is collaboratively engaged with NTST every step of the way to ensure the prime contractor's design reflects the RCN's vision, and is in line with the evolving FNTS strategy. This collaboration is done through a series of Integrated Product Teams (IPTs) engagements, that both assists and enables Canada and Industry stakeholders to align efforts, reduce shared risks, and build an achievable plan.

Digital and Infrastructure

The importance of the RCN training system and PMO CSC's integration in all activities related to digital systems cannot be understated. Like the CSC, the FNTS will be digitally enabled in all respects. This will ensure that data from operational and technical sources is leveraged in training, and that changes are reflected back into the training in real time. The data and data models, networks, integrated software applications, digital technologies and tools, and interoperability standards employed by the CSC must also be integrated into the FNTS in order to ensure this occurs. To this end, FNTS requirements are being used by the proposed System of Training and Operational Readiness Modernization (STORM) Project, and are intended to build the Digital Framework that will provide for secure integration, sharing, analytic reporting and exchange for the training system.

Like digitalization, the needs of modern infrastructure must also be considered through a collaborative lens. The vision for modern RCN infrastructure aggregates elements of operational and training requirements — both secure and non-secure — into campuses on each coast. The training requirement thus includes the need for both secure and non-secure facilities. In this respect, consideration for the CSC's needs features highly in the overall training vision. As seagoing capabilities become more and more technologically integrated, the secure nature of both operating and maintaining them becomes ever-increasing. The development of competency through training in operations and in technical areas will therefore require enough secure training facilities to accommodate not only secure operational training needs, but also secure maintenance and technical training functions. In addition, the non-secure needs of the FNTS must also be considered, and integrated with the CSC requirements so as to ensure optimization of all infrastructure projects.

Conclusion

As the CSC design evolves and the prospect of orienting the RCN enterprise to new capability becomes a reality, we hope this article has provided awareness on the approach being taken to determine the right crewing and training solution. As the CSC solution is developed, so too will the Future Naval Training System take shape as we focus on aligning and integrating these efforts. Much challenging engineering lies ahead of us as the Navy decides how it will crew, operate, and maintain the new ships — all in the context of optimizing ship capability within the constraints of hardware, software, and human systems.

Acknowledgment

The assistance of Cdr (Ret'd) Travis Blanchett (PMO CSC in Halifax), and LCdr Stephanie Judge (Director Project Management Support Organization in Ottawa) in the preparation of this article is gratefully acknowledged.

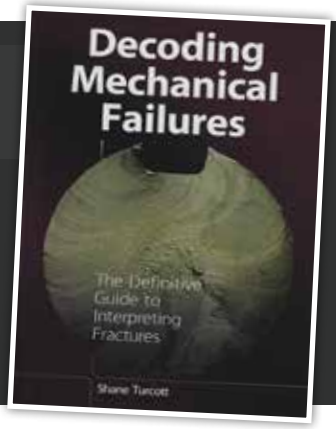
Cdr Andrew Sargeant is the Deputy Project Manager – Halifax, and Detachment Commander for the Canadian Surface Combatant Project in Halifax, NS.

LCdr Yohan Desjardins is the Training Manager for the Canadian Surface Combatant Project Management Office in Ottawa.

Cdr Bradley White is the Deputy Chief of Staff Future Plans, and Program Manager of the Naval Training System Transformation Program with the Naval Personnel and Training Group in Esquimalt, BC.

BOOK REVIEW

Decoding Mechanical Failures — The Definitive Guide to Interpreting Fractures



Reviewed by Brian McCullough

Author: Shane Turcott, P.Eng., M.A.Sc.
Published (2020) by Steel Empire Inc. [www.steelimage.com]
ISBN: 9781777157609
Hard cover, 240 pages, colour photos and illustrations, tables, case studies.

With "Decoding Mechanical Failures — The Definitive Guide to Interpreting Fractures," author Shane Turcott, company owner and principal metallurgist at Steel Image Inc. in Dundas, ON, appears to have added a winning element to his slate of services in failure analysis, field metallography, and related training. It was created in part from the development of the company's on-site "Decoding Failure" course, a hands-on learning experience in examining and diagnosing the different mechanical fracture modes.

Released last year, the book uses numerous examples to demonstrate how to visually diagnose and interpret ductile, brittle and fatigue failures, then explains how each diagnosis can be used to investigate the path back toward the root cause. It is a model of clear writing, supported by superb photos and illustrations that make it easy to follow the logic of fractography — the science of examining metal fractures — at an accessible and useful working level.

"When a metal component fails, its fracture surface is the greatest source of information as to why it failed — it just needs to be decoded," says Turcott, a subject matter expert in failure analysis and field metallography. "This book introduces fractography and how to decode the fracture features of mechanical failures."

This is a handbook that seems to punch well above its weight in presenting a simplified course of study for engineers, technologists, metallurgists, welders, inspectors and reliability professionals — and as a practical reference guide. The first two-thirds of the book cover a smooth progression of information dealing with the three mechanical failure modes, followed by chapters on advanced fatigue of rotating shafts and static fastener failures, and the tools and methods used in the support of failure analysis. His final chapter is a well-presented summary of the information contained in the book, supported by an illustrated quick-reference guide to the distinguishing features of mechanical failures, and a flow chart of the logic sequence for decoding mechanical failures.

The strength of Turcott's approach is that he draws on real-world examples to explain the concepts and show the evidence. The closing appendices describe four such case studies based on actual failure analysis reports returned to clients. Each begins with a comprehensive visual examination of the damage to a particular component, followed by summaries of the various chemical, hardness and tensile analyses of the material, and an explanation of the results. The crystal clear macro- and micrographic images of the fracture surfaces throughout the book make these typical case studies easy to follow.

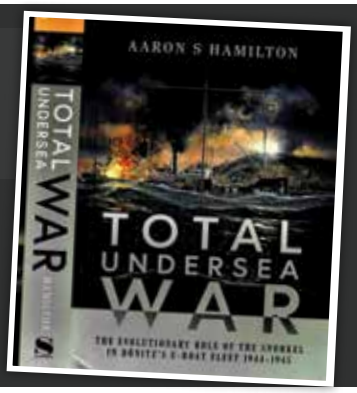
"I'm hoping that people in the maritime industry will see the book's potential in helping to better understand how to examine fracture features on parts that have failed, why a part has failed, and how to prevent future failures," Turcott says. "For engineers at sea, I believe there is great value in being able to examine a broken part, such as a shaft or bolt, and understand why it failed so that corrective action can be taken more quickly."

A teaching scientist at heart, Turcott is also the author of numerous professional development-style "Learning from Failure" articles that are well worth investigating on his LinkedIn site: https://www.linkedin.com/today/author/shane-turcott-3a2ab51b

As he points out, there is no substitute for detailed laboratory analysis completed by experienced failure analysts where the stakes are high, but in "Decoding Mechanical Failures," Turcott shares his two decades of experience in studying and investigating mechanical failures with this definitive guide to interpreting fractures.

BOOK REVIEW

Total Undersea War — The Evolutionary Role of the Snorkel in Dönitz's U-Boat Fleet 1944-1945



Reviewed by Tom Douglas

Author: Aaron S. Hamilton
Published (July 2020) by Seaforth Publishing [www.seaforthpublishing.com]
Hard back, 400 pages, 50 black and white photos and line drawings

In his contribution to the *Journal*'s special section on the 75th anniversary of the end of the Battle of the Atlantic (MEJ 93) Captain Rolfe Monteith, CD, RCN (Ret'd) used the U-boat quote from the British wartime prime minister in his article, "A Young Engineer's Service in the Battle of the Atlantic."

Captain Monteith wrote, in part: "The dangers to Allied shipping were substantially increased with the German invention of the schnorkel (alternate spelling – Ed.), which enabled the U-boats to run semi-submerged on their diesel engines, making them difficult to spot."

Now, author Aaron S. Hamilton, holder of Bachelor's and Master's degrees in History — as well as the Field Historian designator awarded by the US Army's Combat Studies Institute — has produced an exhaustively researched and highly readable book about the crucial breakthrough in undersea superiority for Germany's wartime *Kreigsmarine* with the introduction of the snorkel.

The author builds on the premise that the ability to wage a "Total Undersea War" came about in late 1943 when engineer Dr. Hellmuth Walter proposed to Grand Admiral Karl Dönitz that U-boats be equipped with an "air mast" to allow them to recharge their batteries without having to surface. This ability made the German submarines less conspicuous to Allied radar and aircraft observers, enough so that they could operate relatively unhindered in the shallow coastal waters of the United Kingdom and North America – with devastating results for Allied shipping.

> *"The only thing that ever really frightened me during the war was the U-boat peril."*
> — Winston Churchill (1948)

No one was more pleased by this turn of events than Admiral Dönitz who, in a meeting with his senior operations staff in Berlin on February 24, 1945 (quoted by the author), pointed out that prior to the introduction of the snorkel, the U-boat was "weaker than the enemy... The U-boat can again fight and be successful in the most strongly monitored areas, where for years it could not even survive."

Hamilton mentions that even at war's end the British Royal Navy and US Navy continued to struggle with their inability to effectively track, locate, and destroy U-boats in the age of Total Undersea War. The snorkel's powerful influence during the Battle of the Atlantic is reflected in this riveting book that is filled with action photographs, schematics, and page-turning accounts of the great advantage given to the German navy by this revolutionary piece of equipment.

In the book's Dedication, the author, an amateur maritime archeologist with a focus on submarine history, pays the ultimate tribute to those who served in submersibles in this and other wars: "For submariners the world over. They all face the same enemy … the unyielding pressure of the ocean's depths."

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.

NEWS BRIEFS

The AOPV: A critical part of Canada's answer to Arctic sovereignty

(From Navy News / February 12, 2021)

Designed specifically to operate in northern waters, Canada's new *Harry DeWolf*-class Arctic and Offshore Patrol Vessels (AOPV) will provide the capacity needed to monitor the country's sovereignty, security, economic, and environmental concerns in the North.

This cutting-edge ship – the first of which was delivered to the Royal Canadian Navy (RCN) in July 2020 – will be a critical part of increasing Canadian presence in the Arctic. Canada's coastline is the longest in the world, with the Arctic comprising 70 percent of its 243,000 km.

Although the RCN has deployed ships to the Arctic for years, conventional warships do not typically have ice-breaking hulls, leaving much of the region inaccessible as thick ice can damage hulls and sink ships.

But that is all about to change as the RCN brings the new *Harry DeWolf* class online. These new ships can break through new and first-year ice, and have anti-icing features to protect equipment and personnel in the Arctic environment – a particularly important capability as Arctic waterways continue to open up.

Able to remain at sea for longer periods of time, the AOPVs can carry large water and fuel reserves, and additional rations and supplies. Once reaching its full operational capability, the ship will soon also be able to carry a helicopter and air detachment, increasing its range in an area where fuelling and resupply facilities are limited or non-existent.

The AOPVs will participate in Arctic missions like Operation Nanook that allow sailors to practise the skillsets required to operate in the challenging northern environment, improve coordination with Indigenous and northern partners, and respond effectively to safety and security issues. The ship will conduct underwater surveys using side-scan sonar to help build a more accurate underwater map for the safe transit of vessels in the North.

With the AOPV, the RCN will support other government departments and agencies regularly. The RCN:

- Will support the Canadian Coast Guard (CCG) by taking on more scientific research missions;
- Will, together with the CCG, provide greater search and rescue coverage in the Arctic, where immediate support to a vessel or aircraft in distress is often days away; and
- Will support the Royal Canadian Mounted Police and the Canadian Border Services Agency, which have the authority to control and influence seagoing vessels in Canadian waters, through specific missions or routine domestic sovereignty and enforcement patrols.

Photo by Cpl David Veldman

HMCS *Harry DeWolf* during cold-weather trials in Frobisher Bay, Nunavut.

Proving its multi-role capabilities, the AOPV will participate in international missions like Operation Caribbe, a multinational campaign against illicit drug trafficking in the Caribbean Sea and eastern Pacific Ocean, and Operation Projection, whose aim is to improve peace and stability, and strengthen relationships with other nations around the globe.

With ample space, technology and versatility, as well as vehicle bays, capacity to embark multiple shipping containers, and a large crane, the AOPVs will be able to:

- Provide humanitarian assistance and disaster relief response by transporting essential, life-saving supplies and equipment ashore via helicopter, rescue boats or landing craft;
- Serve as an operations coordination centre for representatives from agencies and forces onboard;
- Conduct aerial surveillance with drones; and
- Provide small all-terrain vehicles to transport personnel on the ground.

In a nutshell, the new *Harry DeWolf*-class AOPVs will provide Canada with the critical infrastructure needed to monitor our Arctic sovereignty, while adding the capabilities of a multi-role patrol vessel.

NEWS BRIEFS

Goodbye and thank you, Simon Page

After nearly 37 years with the Department of National Defence (DND), Simon Page has left the building. He took up new duties as Assistant Deputy Minister, Defence and Marine Procurement at Public Services and Procurement Canada on March 1.

Mr. Page retired in the rank of Rear-Admiral after a 35.5-year career in the Navy. He was Director General Maritime Equipment Program Management (DGMEPM) for three years, and in 2019 became Chief of Staff (Materiel). He was appointed Associate Assistant Deputy Minister (Materiel) in December 2019 after his retirement from the Navy.

Under his leadership, the Group created and implemented governance bodies to manage the increasing and high-visibility demands of horizontal procurement considerations such as indigenous and green procurement within the Department and the Government of Canada.

He led the implementation of the Strategic Partnership Arrangement, a Master Memorandum of Understanding (MoU) between Public Services and Procurement Canada and DND aimed at saving money on dedicated procurement services. The philosophy behind the new MoU is focused on performance, based on trust, and has a novel invoicing framework that will reduce costs.

During his tenure as Associate ADM(Mat), Mr. Page maintained a continuous and strong focus on all aspects of program delivery for the Department, including a very busy agenda related to the Government defence policy, Strong, Secure, Engaged.

But he will be remembered in the Department for more than his professional achievements. He rowed with the Mat Group team in the Vice Chief of the Defence Staff Canoe Race, leading the team to victory year after year. He also initiated the legendary annual hockey game in MEPM, a hard-fought battle between Marine Systems Engineers and Combat Systems Engineers.

In an email sent to staff several weeks ago, ADM(Mat) Troy Crosby said, "It is often difficult to say goodbye, especially to someone who is truly as loved by all as Mr. Page. He has been an inspirational leader and a great colleague. It is not only his commitment to leadership excellence and results-focused action, but anyone who has had the pleasure of working with him can attest that his ability to connect with and inspire others draws out greatness from those around him. We are all fortunate to have counted him as a colleague and leader."

Photo by Brian McCullough

(Courtesy ADM (Mat) Communications)

NEWS BRIEFS

Lt(N) Denise Dickson: An unexpected career

(From Navy News / February 8, 2021)

Lt(N) Denise Dickson, Marine Systems Engineering Officer aboard HMCS *St. John's* (FFH-340), began her career with the Royal Canadian Navy (RCN) almost by accident nearly two decades ago.

"To be honest, in 2003, I didn't even know that Canada had a navy," she said. "I was introduced to the RCN at a Canadian Armed Forces recruiting event at my university, and knew I wanted to get involved. The trade I was interested in had everything I wanted: opportunities to work in an engineering environment, to travel, and to have my education paid for."

For Lt(N) Dickson, colleagues and camaraderie make the RCN an unparalleled environment.

"I know we say that a lot, but it's true. Where else could you meet Canadians from so many different backgrounds, and face so many different challenges together? You can meet professionals who have worked in the same organization for 20 or 30 years. They are amazing, and they have wonderful stories to tell."

Her experiences in uniform have been both varied and surprising.

"My first time at sea on a warship was on my Naval Engineering Indoctrination course. We were supposed to leave Halifax for three weeks and go to St. John's and Corner Brook, NL, but then got reassigned to Operation Chabenal (a drug interception operation). We picked up some RCMP members, left Corner Brook and got back to Halifax two-and-a-half months later. I learned so much on that

RCN photo by Mona Ghiz, Formation Imaging Services

mission — including the importance of packing for three months, even if the trip is only supposed to last a few weeks."

There would be many other memorable experiences, including her time on board the now-decommissioned operational support ship HMCS *Protecteur* (AOR-509) as they joined Combined Task Force 150 in the allied fight against terrorism and piracy in the Gulf of Oman.

"There are so many opportunities in the RCN for professional growth," she said. "My experiences have given me the skills and confidence I need to manage considerable budgets, and face the many challenges inherent to a Navy officer's work."

Bravo Zulu, Lt(N) Dickson!

Canadian Nautical Research Society Virtual Conference (June 10-11, 2021)

Canada's Pacific Gateway – past, present and future

https://cnrs-scrn.org/admin/conferences_e.html

PRESERVING CANADA'S NAVAL TECHNICAL HERITAGE

CNTHA NEWS (SPRING 2021)

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Looking Back:

Ship Repair Unit Atlantic — Changing 200 Years of Naval Dockyard Culture through Total Quality Management

By Capt(N) (Ret'd) Roger Chiasson, CNTHA East Coast Coordinator
(An edited excerpt from *Cape Bretoner at Large* – See MEJ 86, p. 27)

In the summer of 1990, I was posted as Commanding Officer of Ship Repair Unit Atlantic (SRUA) in Halifax, the organization that six years later would absorb Naval Engineering Unit Atlantic (NEUA) and Fleet Maintenance Group Atlantic to become Fleet Maintenance Facility Cape Scott, the largest military industrial facility in Canada. Up to that point I had held many great jobs in the Navy, but this far exceeded anything I had done before. In terms of job satisfaction in the field of naval engineering, commanding an organization of 1500 civilian dockyard workers would turn out to be the highlight of my career.

I have to say that when I was told that I was going to command the dockyard, I had very mixed feelings. Naval dockyards had always had a love-hate relationship with the Navy, something I experienced first-hand during my time as an engineering officer aboard the destroyers. There was no question that they did good work — dockyard workers accumulate their in-depth knowledge and skills through an apprenticeship program and many years as journeymen tradespersons — but they had a reputation for poor productivity. I was also aware of the poor labour-management relations in the dockyards. The management was old-fashioned and autocratic, and the trade unions were militant.

As the date approached for me to assume command, I started thinking about how I might turn things around in an organization that was steeped in a culture created over the more than two centuries since its beginnings as a Royal Navy dockyard in 1759. I knew it would be akin to altering the course of a 500,000-ton oil tanker using a rudder the size of a briefcase, but if successful, the payoff could be huge.

At the time that I assumed command, I had developed a keen interest in a concept called Total Quality Management (TQM). I had been involved for most of my career in some aspect of quality assurance, and naturally gravitated to what seemed to be the latest development in the field of quality. I soon learned that there was a lot more to TQM than quality assurance, and I was taken by an adage that I had heard: "Quality assurance is about the management of quality, while TQM is about the quality of management." In fact, I was about to learn that TQM was more about leadership than management, and about more than product quality.

(Above and right) Halifax Naval Dockyard in the 1960s.

The first thing on the agenda after I arrived in the unit was to get to know the members of my staff and take stock of how the dockyard worked. The idea was to take the pulse of the

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organization and to start thinking about whether or not a TQM initiative was a viable undertaking in an organization that had built up so much inertia in the way it had conducted its business for over 200 years. As I settled into the job, I made the decision that the last thing they needed from me was any guidance or instruction on how to repair ships. Their professionalism was not in question. I did conclude, however, that what the place needed was new vitality. I couldn't quite put my finger on what was needed, but I felt an urge to light a flame under the organization to move it to greater things.

About three weeks in, as I was pondering what to do to kickstart things, Maritime Command was urgently tasked to deploy three ships to assist in the United Nations blockade of Iraq following that country's invasion of Kuwait in August of 1990. The Canadian task group would consist of the Improved Restigouche-class destroyer escort HMCS *Terra Nova* (DDE-259), the Tribal-class destroyer HMCS *Athabaskan* (DDH-282), and the naval resupply vessel HMCS *Protecteur* (AOR-509). These ships were getting on in years, but a decision was taken to outfit them with some of the modern war-fighting equipment that was lying in warehouses and waiting to be installed in the new Canadian Patrol Frigates that were under construction. It was a bold, risky plan, especially as we were given what seemed like the impossible task of having to accomplish six months' worth of work in just two weeks.

What followed was a frenetic level of round-the-clock activity within the NEU — an internal naval engineering consulting organization — and the SRU. Formality was thrown out the window, but safety and quality were never compromised. Engineers from the NEU were on board talking to tradesmen, and sketching instructions by hand on scraps of paper. Cranes and welding torches worked 24 hours a day until the ships were ready. My supply officer in the SRU slept in his office most nights, and supervised the arrival and distribution of tons of materiel that was arriving at all hours of the day and night. Meetings were held several times a day to plan, set priorities and review progress. When we finally watched the ships sail out of Halifax Harbour on August 24, we realized just how brilliant this bold endeavour had been.

Things soon returned to normal, and part of my strategy as I contemplated the way ahead for the SRU was to keep alive the obvious sense of pride that I had seen in the dockyard workers during those remarkable two weeks. In addition to the pride for country and pride of workmanship, I knew that the process of getting the ships ready on such short notice had given the workers a taste for freedom from the bureaucracy and antiquated management practices that had prevailed until then.

One day, while I was discussing TQM with my QA manager, he mentioned that his staff had all taken a course a few years before from the Juran Institute. He showed me the course material, which looked like it might be useful, but he said that nothing had ever come out of the knowledge that the QA staff had garnered during the course. I concluded from my brief exchange with him that significant change had to be directed from the leadership of the organization, and that getting one small part of the organization fired up with new ideas was doomed to failure without that leadership and commitment. In this case the leadership had approved the expenditure for the training, but had not "bought into" what the course could do for the organization as a whole.

The discussion I had with the QA manager planted a seed. I looked into the Juran Institute and was impressed with what they had to offer. The company was named after and headed by Joseph Juran, one of the US post-WWII pioneers who, along with W. Edwards Deming, introduced Japan to the principles of quality assurance and continuous improvement.

The first step in our journey was to ask the Juran Institute to run one of its "Making Quality Happen" seminars in Halifax. The seminar was conducted over three days in a downtown hotel. My senior staff and I attended, along with a few candidates from other local organizations. My motive for inviting others was a selfish one. I was hoping that we might ignite a flame under other bureaucracies to change the way they conducted their business, and to generate a multiplying effect in whatever it was we were embarking on in the dockyard.

That seminar changed my life. I was impressed with the way in which the Juran Institute structured the seminar. Prior to the formal classroom sessions the Juran consultant met with each candidate and asked a few key questions: What is your definition of quality? What do you hope to gain from the seminar? and, What is your definition of leadership? The consultant had been a key player in the Ford Motor Company's "Quality is Job 1" initiative, and was therefore very knowledgeable, and had the necessary credibility to preach the virtues of TQM. The combination of the seminar and the incredible job the dockyard had done for the Gulf War literally fired up our dockyard leadership team with not only new ideas, but also with the tools with which to transform our organization.

Our senior leadership team was made up of the Production Commander and the Planning Officer (both naval commanders), the three senior civilians, each in charge of one of the sections of the Production Department, and a civilian Administration Officer. This group had always met on Friday mornings for a staff meeting, but we now had a renewed sense of purpose. We formed a Continuous Improvement Council (CIC), made up of the same individuals, whose agenda was to lead the TQM initiative. At first our Friday meetings alternated between the staff meeting and the CIC agendas, but eventually the two agendas melded into one.

It was important that we not rush into TQM. We had learned that organizational transformations take time, and that one of the greatest hurdles to overcome is the fear of change. Also, TQM had developed a bad reputation as another term for layoffs, or what had become

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known as "downsizing." Although we were well aware that the dockyard was inefficient, our goal was not to lay people off. Rather, we wanted to be able to do more work for the naval fleet, since the demands on our resources were always greater than our capacity.

The CIC deliberated for over six months before we formally launched a dockyard-wide TQM initiative. Those months were spent strategizing and planning our implementation. We examined a number of options for additional training that we knew would be required for a disciplined approach. Although we had chosen the Juran Institute for our initial senior leadership training, we shopped around to see what other companies were offering. In the end, we decided to continue with the Juran philosophy, and used their guidance and their tools for kick-starting the overall project.

One of the first challenges was to identify the "wastage" in the organization. Juran had a very clever way of emphasizing that every organization produced waste, which was a measure of the inefficiencies inherent in the way it operated. One of the graphics they used to illustrate the idea was a large picture of a factory, with a smaller picture of the "waste factory" beside it, implying that inefficiencies were similar to setting up separate facilities to consume resources without doing any useful work.

The problem we faced was that our currency in the dockyard was the man-hour, and not the dollar. Our output was approximately one million man-hours per year, and although we knew what the salary expense was for the unit, we had no idea how efficient or how productive we were. In fact, there had never been any emphasis on productivity, even though our customers always thought we should be more responsive to their needs. Everyone assumed that there were simply not enough resources to satisfy the demand, and that there was nothing anyone could do to improve the situation, except perhaps throw more people and money at the problem.

Juran's emphasis on the team approach and project discipline was based on the concept that changing the leadership and management process leads to a change in attitudes, which in turn leads to culture change. The new culture embraces change, empowers workers to do the right thing because it is the right thing to do, and instills responsibility and accountability in each individual, as opposed to just the supervisors and managers.

But culture change does not occur overnight. The CIC was well aware that all TQM initiatives are a shock to organizational culture, and thus prone to failure since most people are resistant to change, even when the change is well-intended. To overcome this organizational inertia, it was recommended that a few "starter" and "winner" projects be selected before attacking any major quality issues. Selecting small, easily-solved problems acted as the ideal training vehicle for us, and created a level of confidence in our project teams and in the rest of the organization.

One of the most striking signs of culture change was the decline in union grievances, from about 400 annually to approximately one per month over the four-year period I commanded the dockyard. Another sign that the culture had turned the corner came one day as I was rushing through the dockyard from one meeting to another. I was hurrying along a jetty where a submarine was completing refit when a "matey" called out to me, "Captain, keep up the good work!" I stopped to ask what he meant, and he said that he had been working on submarine refits for decades, and that every shop would point fingers at every other shop for the inevitable delays that occurred, but this one had been different. This time, he said, the shops had worked together, and the refit would end on budget and on schedule. "Whatever it is you're doing, it's working," he said.

It takes time to turn an organization like the Halifax dockyard around, but eventually the lumbering tanker starts to change direction. That conversation I had with the dockyard worker on the jetty was a sure indication that the effect of the small rudder movement we had started three years before had taken hold, and there would be no turning back.

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Two Oberon-class submarines alongside in Halifax in 1996.

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