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81

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HMCS *Winnipeg* Structural Repairs Following an Allision in Home Port

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Canada

Congratulations to Fleet Maintenance Facilities Cape Scott and Cape Breton on 20 years of exemplary service to the Royal Canadian Navy!

Photo by MCpl Chris Ward

Photo by 12 Wing Shearwater

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Maritime Engineering Journal

(Established 1982)
Fall 2016

Director General Maritime Equipment Program Management

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A sight no mariner ever wants to see. HMCS *Winnipeg* was just out of mid-life refit when the unthinkable happened.

Photo by Cpl Charles Stephen, MARPAC Imaging Services

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Commodore's Corner

By Commodore Simon Page, OMM, CD

A well-deserved salute to our Fleet Maintenance Facilities

Even after more than 32 years of service I am still always thrilled and energized to watch so many Canadian Armed Forces assets deploy for RIMPAC (Rim of the Pacific), the largest international maritime exercise in the world. This deployment which occurs every two years brings together nations from around the globe to deliver core mission elements in the ever-so-important Asia Pacific region. Specifically, with respect to Canadian sea power projection, this year's maritime component was comprised of four ships (HMCS *Calgary*, HMCS *Vancouver*, HMCS *Saskatoon* and HMCS *Yellowknife*), a Royal Canadian Navy (RCN) team of clearance divers, and a forward logistics team. During the same time period, on the East Coast, HMCS *Windsor* participated in Dynamic Mongoose, an important NATO-led anti-submarine event held in the waters of the Norwegian Sea. Such activities keep me encouraged by the quality and efficiency of our naval materiel management enterprise.

At the heart of this enterprise resides our Fleet Maintenance Facilities (FMFs). Following an organizational transformation, FMF Cape Scott in Halifax and FMF Cape Breton in Esquimalt were both formally stood up in 1996 and have been delivering materially ready ships and submarines to the RCN and the Government of Canada ever since. As this issue of the *Maritime Engineering Journal* acknowledges the 20th anniversary of both organizations and the remarkable progress of the Naval Engineering and Maintenance Strategic Initiative (NEM SI), I am delighted to pause and recognize the clear link between excellence at sea in events such as RIMPAC and Dynamic Mongoose, and the high quality of the output delivered by our FMFs year after year, challenge after challenge.

The FMFs embody key and necessary attributes of the naval materiel management apparatus with regard to flexibility, adaptability, quality, and effectiveness. I recall my many phone conversations with Capt(N) Stéphane Lafond and Capt(N) Chris Earl, the current commanding officers of our FMFs, as they adjusted priorities, juggled resources, and motivated teams to ensure timely delivery of assets for their respective coastal demands. The intricacies and convolutions of managing operations, engineering, production, and liaison with industrial partners in a coherent manner on a daily basis are too often taken for granted. The 20th anniversary of our FMFs is a superb occasion to pause and reflect on this thought. Our front cover story about the extraordinary effort made to repair HMCS *Winnipeg* following an allision in 2013 can undoubtedly assist us in this regard, as authors Cdr Ryan Solomon, Lt Cdr James Ashcroft and Lt(N) Antony Carter succinctly noted in their conclusion that the overall repair effort "was an impressive testament to the collective technical strength and professionalism resident in MARPAC and its West Coast industry partnerships."

Of significant importance in our effort to continue to evolve and improve the naval in-service support framework, the deputy commander of the RCN and I earlier this summer co-signed a letter confirming the status of the FMF entity as not only the RCN's strategic asset responsible for the planning and coordination of all second- and third-line activities within Her Majesty's Canadian Dockyards, but also as a strategic NEM service provider. This document represents a key piece of the naval materiel management enterprise foundation that is necessary to deliver sophisticated in-service support and naval materiel assurance to our current and future fleets. It will also drive other decisions, with respect to roles, responsibilities, authorities, and organizational structures within the enterprise, as novel ways of executing the in-service support business are implemented.

Whenever I hear about RCN assets being deployed at sea and delivering operational effect on behalf of the Government of Canada, I always find myself going back to the core of the industrial gears of our in-service support system – a core so clearly reflected in the actions of the personnel of our Fleet Maintenance Facilities who work on the RCN's assets on a daily basis with the utmost professionalism and with such bold commitment. Today, as we recognize 20 years of their outstanding service, we salute them all.

FORUM

Probabilistic Cost Estimation Using Epistemic and Aleatory Risk Factors

By Capt(N) Jacques P. Olivier, CD, BEng, MSc, MBA, P.Eng, PMP

As we strive to exercise greater financial scrutiny in pursuit of the betterment of our naval materiel management enterprise, under the auspices of the Financial Administration Act, it follows that we must continue to adopt predictive analytics methods that ensure achievement of measurable and meaningful business results. To that end, simple rules must be considered when contemplating the plethora of predictive analytics tools and models available. Such models must, of course, be reliable, repeatable, and defensible, but also be relatable in order for the data to be understood, accepted, and convincingly applied by the community of practice.

Accurately estimating the cost in the early phases of the procurement process is very challenging. The typically long duration of capital equipment and major project acquisition, and the uncertainties that accompany them, can have drastic effects on budget planning and allocation. One key shortcoming with existing parametric cost models is that they estimate a deterministic cost that often does not account for the variability of certain cost factors over time. These models lack the flexibility that managers need to make periodic adjustments as the project matures to hedge against uncertainties that are not under the program's control. [1]

Background

Typically, a portion of the total project cost of capital equipment projects is allocated to the contingency amount to represent an estimate of the potential cost associated with uncertainties. Historical data, however, shows that many capital equipment projects used only a small portion, or no portion at all, of their approved contingency funding. This led to significant difficulty in accurately forecasting overall contingency requirements, and resulted in investment cash going unused, and the associated accrual space being lost to the Department.

As a mitigating measure within the Materiel Group, concepts such as the Three Point Estimate process were introduced to standardize capital equipment project forecasting and reporting (N.B. does not apply to infrastructure and information technology, and is specific to the cash and accrual corporate accounts). Arguably, this method may bear resemblance to the Program Evaluation and Review Technique (PERT) that fixes the most likely estimate (M) to weigh four times more than the optimistic (O) and pessimistic (P) estimates in the well-known formula:

$$\textit{Mean (expected value)} = \frac{O + 4M + P}{6}$$

The Three Point Estimate process is intended to factor schedule risk into the financial forecasts, better inform risk decisions with a view of reducing chronic slippage, improve stewardship of financial resources, improve the exploitation of the Defence Resource Management Information System financial structure, and set the foundation for the use of advanced business intelligence tools. The process includes several steps, starting with grouping project milestones and activities based on their risk or likelihood to be spent as shown in the example nomenclature in Figure 1.

When this step is repeated, the information could be tabulated to produce a trending spectrum of probability costs with the associated scenario bands of the likelihood of spending the total cost of the project as depicted in Figure 2. The high estimate (HE) and low estimate (LE), the upper and lower boundaries, could be mathematically calculated, whereas the most likely estimate (MLE) could subjectively be selected based on the manager's judgement for each instantiation. This is neither a financial nor an accounting step. The manager's understanding and awareness of all the elements impacting the outcomes, and

Likelihood	Risk	Probability of funding being spent
Very Likely	Very Low	More than 80%
Likely	Low	From 60% to 80%
Moderate	Medium	From 40% to 60%
Unlikely	High	From 20% to 40%
Very Unlikely	Very High	Less than 20%

Figure 1. Nomenclature for likelihood and risk of spending funding.

knowledge of the major risk factors affecting program execution, are to be used to determine the overall level of spending. The corollary remains to better forecast demand and report cost over time, and alleviate the burden of setting contingency funding prematurely.

Problem Formulation

Although these measures are great steps toward improving cost predictability, an area for further improvement is the ability to dynamically assess the variability of the total cost as a function of the uncertainties modeled. For instance, an aspect of cost estimation that is usually not well mitigated is escalation that refers to fluctuations in the costs of specific goods or services in a given economy over time. Such parameters are difficult to forecast, have a significant cost impact, and are symptomatic of the problematic challenge of operating in a rapidly changing world where volatility, uncertainty, complexity, and ambiguity ("VUCA") often reign above stability and coherence.

As we embrace the ideas pioneered by the "Deliverology[2]" approach to reform initiatives, and now the Departmental Results Framework, we acknowledge that, now more than ever, the government must deliver, track, and report results on its commitments and priorities in an open and transparent, but also consistent and standardized manner, while ensuring citizens' tax money is spent efficiently and effectively. This tenet manifests itself across our procurement processes vehemently, and indeed, in our ability to credibly and accurately forecast demand. A probabilistic approach can provide critical information about the impact that uncertainties have on the total cost and thus what the budget should realistically represent. Understanding and accounting for these uncertainties can enable program managers to better reconcile the project management constraints of scope, cost, and time, as well as risk, quality, and resources.[3]

Probabilistic Cost Estimation

Probabilistic or stochastic cost estimation methods provide decision-makers with the ability to model deterministic cost inputs with a distribution or a range of values. The first step in performing a stochastic cost analysis is to understand how sensitive the total project cost is to a large set of cost inputs. The result is typically shown on a tornado plot that ranks the cost inputs from most to least significant. The user can select the top inputs that have the most impact and focus on defining their uncertainties. The remainder of the inputs may be fixed to a given lower value.

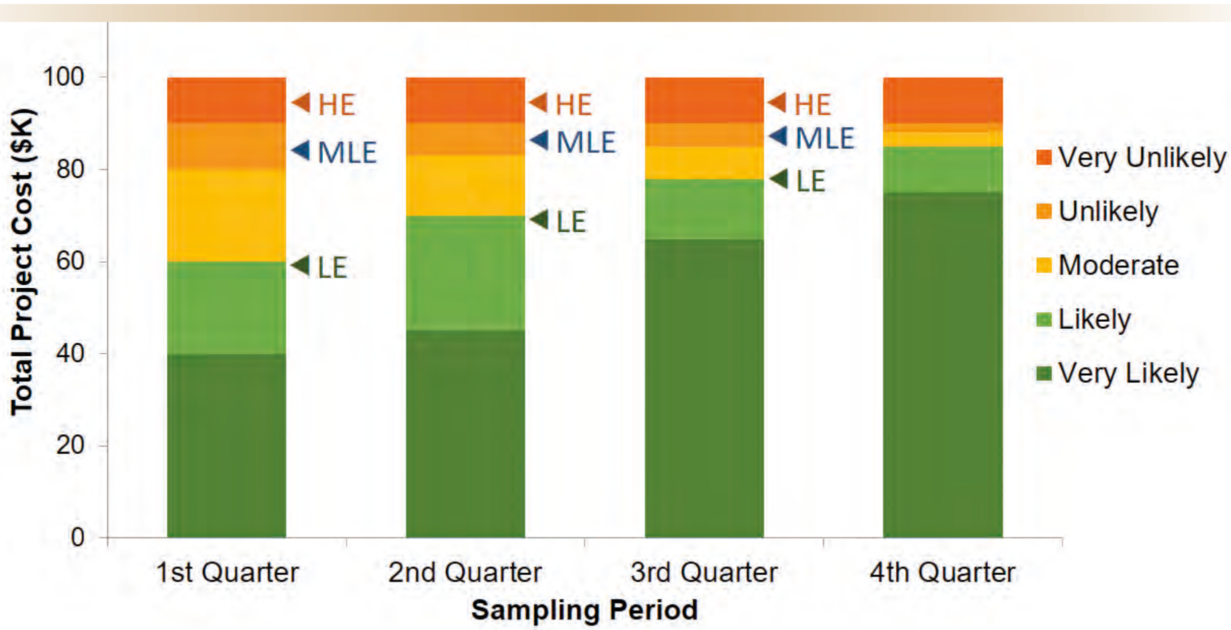

Figure 2. Three Point Estimates over probability spectrum for sampling period

The assumed variability in the cost inputs may be represented, for example, by either a normal, triangular, or uniform distribution with supporting statistical parameters such as the standard deviation and mean. These distributions are determined using subject matter expert knowledge about how that cost parameter might fluctuate over time. There are two types of cost inputs, or uncertainties, associated with capital equipment projects: the epistemic and the aleatory uncertainties.

The epistemic uncertainties stem from the lack of knowledge or data. The reduction of epistemic uncertainty can be achieved by obtaining more information or introducing advanced methods to better estimate the cost of the product or service to be acquired. In addition to epistemic uncertainties associated with the deliverables of the project, there are other risk factors that are not inherent to the project but nonetheless have a direct and substantial impact on the project cost. How much the material cost will likely fluctuate over the course of the project, how uncertain the future foreign exchange rates can be, and how escalation can inflate the total cost of the project over time are considered aleatory uncertainties because of the randomness associated with these cost elements. Figure 3 shows assumed cost variability (%) for typical epistemic and aleatory factors.

It is implied that factors such as material cost and foreign exchange cannot be predicted precisely but instead are assumed to vary in the future following a distribution. After the user has assigned an uncertainty distribution to the epistemic and aleatory risk factors, a Monte Carlo simulation can be performed to assess how the project cost will vary.

Monte Carlo Method

The Monte Carlo method is a useful technique that performs simulations by randomly sampling distributions for each cost input, and computing a total project cost. This calculation can be repeated thousands of times, and the list of total project cost is used to generate a histogram of the project cost. This frequency plot identifies the mean of the project cost and its variability. Figure 4 shows the probability density function (PDF) histograms for aleatory and epistemic cost uncertainties, and how these cost inputs may affect the variability of the project cost.

The cumulative density function (CDF) is however a more practical way of describing the probability that the project cost will be less than or equal to a specific value. The CDF represents the cumulative effect of adding the histogram frequencies. The aleatory and epistemic histograms are combined into a joint histogram that is then

Figure 3. Example of cost variability for epistemic and aleatory cost factors.

converted into the CDF curve shown in Figure 5, often referred to as the cost "s-curve." For example, following the Pareto principle, the user can determine that the total project cost will be $90K or less with an 80% level of confidence, or likelihood. This estimate is directly linked to the cost input distributions and the assumptions used to establish them. If the project budget is insufficient, either a new demand or a more accurate contingency may be applied to achieve that level of confidence to ensure project delivery and success.

A probabilistic cost estimation approach using the cumulative density function provides an integrated solution to cost and risk management. A risk rebalancing effort is achieved by first identifying which key risk factors are contributing to the project cost and what variability they might exhibit. Then a probabilistic analysis using a stochastic technique is performed to generate PDF and CDF estimates. Finally, a scenario-based budget analysis is performed that identifies which cost inputs have the most

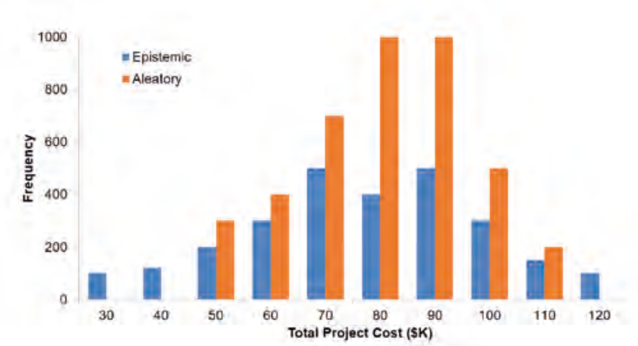

Figure 4. Epistemic and aleatory probability density functions of total project cost ($K)

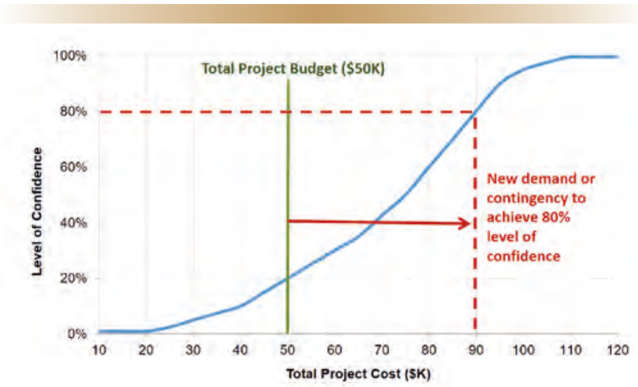

Figure 5. Cumulative Density Function of total project cost with uncertainty ($K).

impact on the variability of the project cost. Risk can be re-assigned to where it is most cost-efficient to manage. Moreover, risk management with probabilistic modeling can be used to reduce empirical, parametric, or guesstimate project contingency to a quantitatively determined lesser and realistic amount.

Conclusion

The naval materiel management enterprise, including its naval in-service support framework, continues to undergo transformational change in response to an avalanche of key drivers such as the Defence Renewal, Defence Procurement Strategy, Defence Policy Review, and Project Approval Process Renewal. As such, adopting the key sustainment principles of performance, flexibility, socio-economic benefits and value for money – and exploiting predictive analytics methods such as probabilistic cost estimation – will enhance our ability to financially sustain materiel that is fit for purpose, safe, and environmentally compliant. Ultimately, our core responsibility remains to ensure maritime materiel is suitable, available, and serviceable in the right quantity, mix, and condition to meet the requirements of a multi-purpose military force.

Capt(N) Jacques P. Olivier was the MEPM Strategic Initiatives (MSI) program manager from April 2013 to May 2016, and is now the Chief of Staff for the Major Project Delivery (Sea) division of ADM(Mat).

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FEATURE ARTICLE

HMCS *Winnipeg* Structural Repairs Following an Allision in Home Port

By Cdr R.C. Solomon, Lt Cdr (RCNC) J.A. Ashcroft, Lt(N) A.W. Carter
Detail photos by Paul Ouellette and Brad Batson, FMF Cape Breton Engineering

Photo by Cpl Charles Stephen, MARPAC Imaging Services

American Dynasty embedded into the bow of HMCS *Winnipeg* in Esquimalt Dockyard.

That is correct. Your eyes have not deceived you. The word is *allision*, not collision. On April 23, 2013 in Esquimalt Harbour, the American Seafoods Group catcher-processor vessel, the 272-foot *American Dynasty,* broke away from two tugboats and crashed into HMCS *Winnipeg*. At that moment the term allision, which in maritime law refers to one moving maritime vessel running into a stationary one, became embedded in our vocabulary. The allision saw the docked *Winnipeg* struck on the port forward side by *American Dynasty*, with the subsequent force pushing *Winnipeg*'s starboard side back and up against C3 Jetty. The result was significant damage to both vessels and the jetty itself, luckily with only minor personnel injuries.

This incident could not have happened at a more critical time for HMCS *Winnipeg*; the ship had just completed its multi-million-dollar, year-long mid-life refit at Victoria Shipyards Limited (VSL), and had just been returned to the Royal Canadian Navy (RCN) to complete its post-modernization phase and commence the tiered readiness program.

Extensive repairs were required to return the ship to its previous structurally sound and mission-capable condition. The primary concern was the projected recovery timeline. An extended period of reconstruction posed a serious threat to the success of *Winnipeg*'s upcoming program, and increased the potential impact to MARPAC's ability to fulfill committed future operations. For all aspects of the renewal effort – from the initial damage assessments, through the planning and final production work – it was extremely important to maintain schedule.

The Damage Assessment

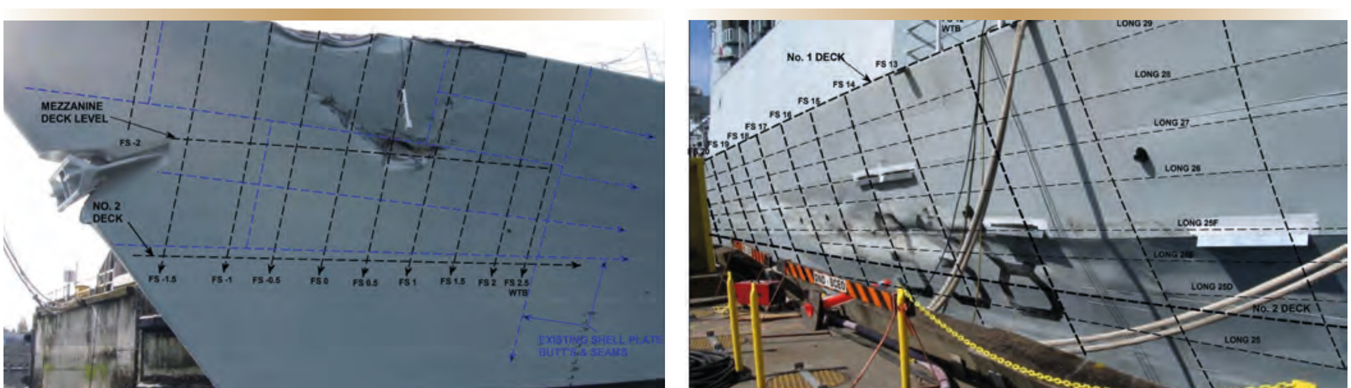
The total damage needed first to be properly assessed, then specifications created to support estimation and planning, and finally the execution of the replacement work had to take place – all to be done in conjunction with the ongoing modernization plans to maximize schedule efficiency. The immediate priority for those tasked with responding to the emergency was to ensure that the ship be deemed "safe alongside," which determined that no further issues posed a risk to the vessel and permitted the continuation of Fleet Maintenance Facility Cape Breton (FMF CB) and contractor efforts on board. The larger task then ensued: determination of the full extent of the damage; analysis of the wreckage to define the implications for the vessel; and the development of repair specifications. HMCS *Winnipeg*'s bright new coat of exterior paint seemed to naturally highlight the damaged areas: the port bow, the starboard side hull in the vicinity of the operations room, the starboard transom, and the recently-installed stern flap at the waterline. The damage included hull breaches, as well as damaged shell plate, transverse frames and longitudinal stiffeners, broken stanchions and wrecked bollards – all of which represented a significant unplanned recovery effort. The engineering community subsequently launched into action stations!

With the structural damage to the exterior areas clearly visible, an interior assessment was also required. To do so, FMF CB hull surveyors had to first identify what interference items, laggings, and linings needed to be removed to begin the systematic and diligent inspection and recording task. A phased approach was adopted that included a photographic survey followed by a detailed survey report to record the size and severity of damage to individual sections of plate, frames, and other structural members. The information gathered during these surveys was used to support the final phase of developing detailed repair specifications for the necessary reconstruction to return *Winnipeg* to its original structural condition.

In conjunction with the FMF-led surveys, *Winnipeg*'s crew conducted a thorough inspection and executed a functional test regime of shock-mounted equipment throughout the ship. Although warship systems are rated to high accelerations associated with explosive load cases, engineering practices dictate that a full verification of shock-mount performance should be carried out. This provided the necessary assurance that internal systems had not been damaged by the allision, regardless of the extent of shock qualification.

Concerns over shock loading also necessitated a collision analysis using the existing structural computer models developed for the Department of National Defence (DND). Of particular concern due to the impact force – first, that of *American Dynasty* against *Winnipeg*, followed by *Winnipeg* against C3 Jetty – were the masts. The loads, accelerations, and contact durations for the analysis were developed based on vessel displacements and a video of the allision, among other variables. The unknowns of exact vessel speed, energy in the collision (the technical term, not the legal one) and the contact duration meant that the analysts had to run various starting conditions on the simulation and find which conditions caused the model to respond similarly to the reaction seen in the video. This preliminary analysis, combined with visual surveys of the masts, provided assurance that the ship's structure had likely not exceeded yield stress in locations other than the areas of primary damage.

There was an additional concern that the bulbous bow of *American Dynasty* had struck the underwater hull of *Winnipeg*, and that the force of the allision had driven the propellers, shafts, and rudder into the jetty. As a precaution, an underwater hull survey was completed by Fleet Diving Unit (FDU) Pacific. No damage was visually sighted in



Damage sustained to HMCS *Winnipeg*'s bow (left); Starboard midship damage caused by *Winnipeg* coming into contact with the jetty (right). Lines denote location of transverse and longitudinal frames.

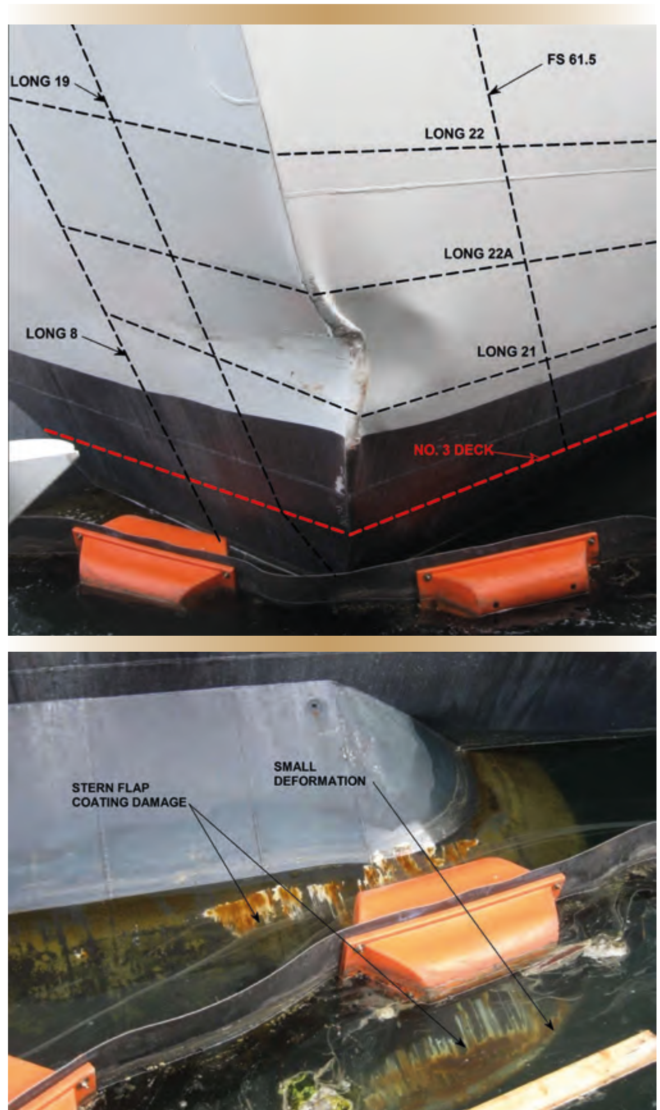
the survey, and the testing of the main propulsion system confirmed that *Winnipeg*'s wounds did not extend to the underwater hull and appendages.

Based on this work, the ship's program was reshuffled to create an amended deadline that would ensure *Winnipeg* would be ready to complete assigned missions for Canada. With limited resource pools and a demanding timeline, it was clear that a partnership with industry, along with continued deconflicted plans to finalize modernization efforts were necessary to reach this target.

The Repair Effort

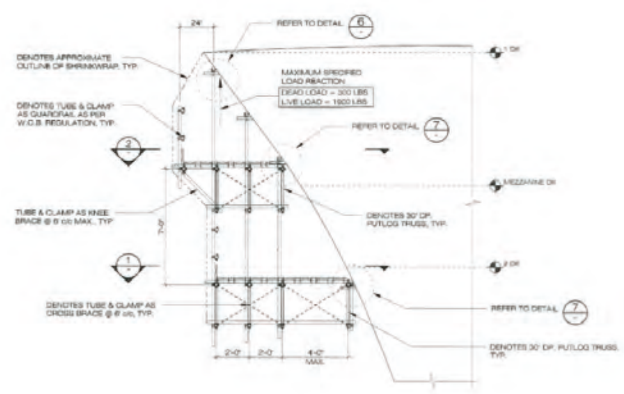
The recovery plan was divided into three primary components to maximize schedule-saving benefits. FMF CB was assigned to repair the bow section and the transom, while VSL undertook the repairs to the starboard midship section. The strong industrial partnership established between the two organizations through the Halifax Class Modernization (HCM) program allowed both organizations to overlap activity, which included Lockheed Martin Canada's (LMC) integration efforts for the modernization. This maximized the available labour pool, which ensured support to other MARPAC platform priorities was continued.

Two options were available to effect the repairs: either dock *Winnipeg*, or conduct the repairs in the water. Docking seemed to be the most sensible option, particularly when initial assessments determined that an in-water repair would take twice as long to conduct. However, in-water repairs would facilitate concurrent activity such as the continuation of many scheduled harbour acceptance trials and combat system integration efforts, some of which would require seawater cooling. The advantages of docking would be the lack of dynamic vessel movement, thereby



Damage to the transom (top) and stern flap (bottom) caused by *Winnipeg* striking the jetty as a result of the allision with *American Dynasty*.

Damage in the immediate aftermath of the allision (left); internal view of bow damage with insulation removed (right).



Drawing depicting the staging design as developed by FMF Cape Breton shipwrights (Suspended Access Scaffold Plan & Profile", Job No. 13636, aDB Engineering).

allowing for staging to be erected that would shelter tradespersons and the work areas. Environmental contaminants could also be easily contained, and working from a static platform would simplify the alignment of structural components. Finally, in consideration of the ship's entire program, a balance was struck that saw the bow and the transom repairs progressed in the water, while the starboard midship section and stern flap were completed in dock. This minimized the impact to the HCM tiered readiness program schedule, and ensured that all damage was appropriately and fully repaired to design standard. The repair path, with diligent planning, saved the program approximately six months over the original projections.

The Bow Repair

Although each section of repair proved to be a technical challenge, perhaps the most complex was that of the bow repair. The initial surveys revealed that the damage suffered in this region was quite substantial; numerous frames had been tripped, shell plating punctured, and the deck plating had buckled. As well, the port side bollard had been completely severed, and numerous guardrail stanchions had been sheared off their foundations. This section was the point of impact between the two vessels.

Unlike the HMCS *Kootenay* collision in 1989 (See MEJ Issue no. 21 January/April 1990), no "donor" bow was available to replace the damaged bow. A full rebuild would be necessary. The boilermakers at FMF CB pressed ahead with this task, fabricating new T-bar frames, cutting plating, and manufacturing new deck fittings. In total, three longitudinal stiffeners, four transverse frames, one bulkhead, over 11 m^2 of deck and 16 m^2 of shell plating had to be removed and replaced.

With the decision made to conduct the bow section repairs in the water, FMF CB shipwrights had to develop an innovative means of staging the ship to permit the boilermakers to safely remove the damaged structure and replace it with new steel. Industry partnership again proved critical in ensuring timely development of the staging as FMF CB designed and built the staging while structural engineers from aDB Engineering verified the design. In undertaking this repair there were a number of challenges facing the team: the relative movement between the ship and the jetty due to tides, currents, and winds; prevention of environmental containments and tools from falling into the water; compliance with WorkSafeBC and federal regulations on safely working over the side of the ship; and setting up conditions to permit safe working, welding, and paint curing despite the weather.

To complete the bow repair the shipwrights developed a unique staging system that hung over the port bow and encapsulated the weather deck. Using pre-existing 40-foot-long trusses, two tiers of planked scaffold platform were created on which tradespersons could perform their tasks. These platforms had continuous side kick boards to catch materials and any tools that might roll off the edge. The bottom level was placed in close proximity to *Winnipeg*'s hull to create a sealed barrier that would stop environmental contaminants falling into the harbour. The upper level was held slightly away from the hull to allow material to be passed up and down unimpeded using overhead cranes. The strength of the trusses allowed this gap by enabling the weight of the arrangement to be supported by being welded to the hull at the ends only.

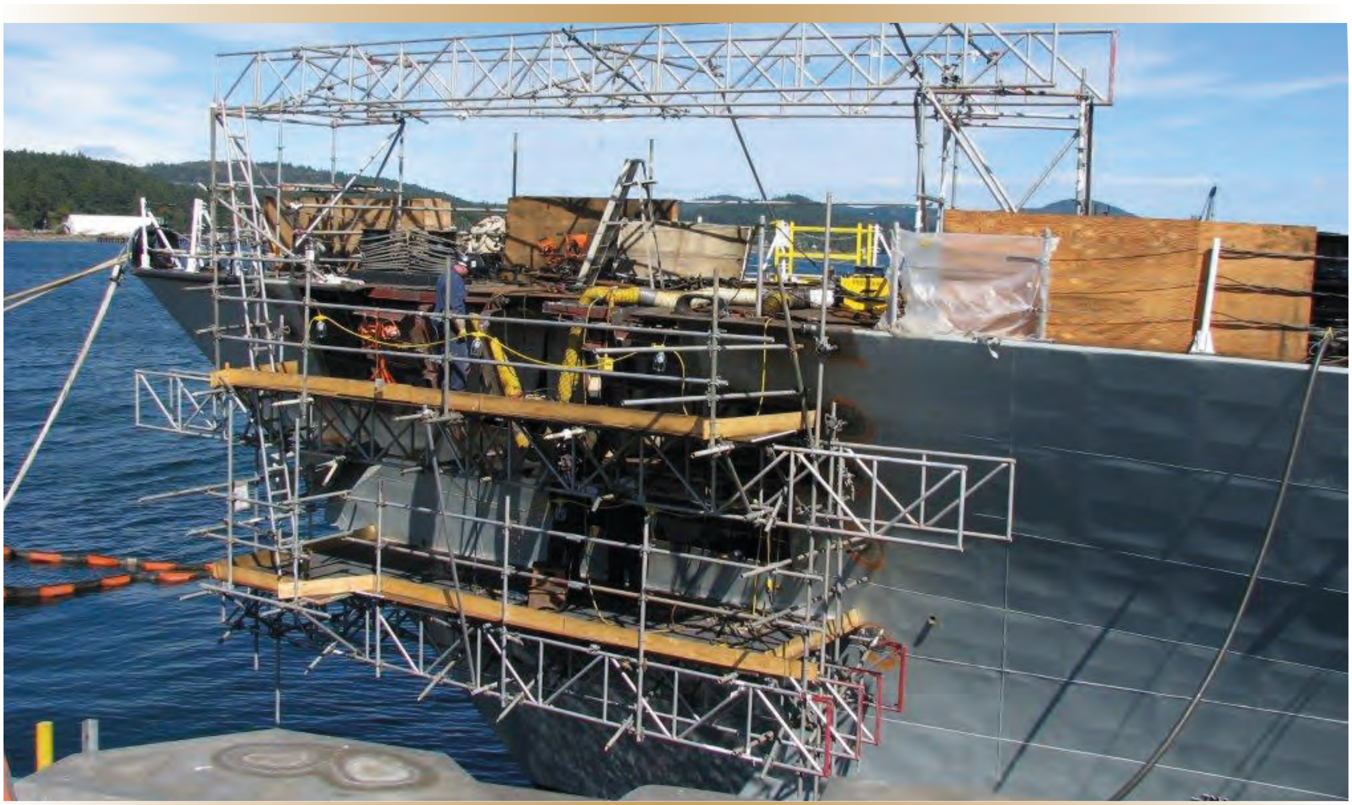
In order to shelter workers, protect the gas shielding required for welding from the elements, and allow climate control, a non-flammable shrink wrap covering was added around the staging. Rollers and clamps installed on the staging ensured that the covering remained taut in windy conditions. Guardrails were installed around the staging so that workers remained safe without the need for harnesses. And finally, services were piped into the shroud to allow control over temperature and humidity, thus ensuring maximum chance of successful welds and quick paint curing still in accordance with industrial standards.

This innovative staging permitted concurrent activity on board *Winnipeg* to be carried out, ensuring maximum schedule efficiency while maintaining the Navy's stance as champions of workplace safety and stewards of the environment. All told, the bow repairs were completed on schedule within 18 weeks, including development and construction of staging.

Conclusion

On October 25, 2013 *Winnipeg* entered the dockyard graving dock for the final repairs of the starboard side by VSL. On November 28, after a heavy investment in new materials, several thousand unforecasted hours of assessments, specification development, site planning and production work, HMCS *Winnipeg* emerged from the dock structurally poised to commence the sea trial segments on the way to operations. The process and repair techniques, such as those of the bow repair, were not typical events for the Formation; however, the communal technical expertise, a dedicated workforce, and the corporate knowledge gained from bygone days of conducting refits all contributed directly to this success. The collective partnership between FMF CB, VSL and LMC, in addition to outstanding flexibility, guaranteed that the necessary resources were available to not only ensure continued support to other MARPAC operations, but also to ensure that maximum schedule efficiency could be achieved. It was an impressive testament to the collective technical strength and professionalism resident in MARPAC and its West Coast industry partnerships.

Cdr Ryan Solomon is Operations Manager at FMF CB. During these events, Lt Cdr (RCNC) James Ashcroft was the FMF CB Naval Architect Officer, and Lt(N) Antony Carter was FMF CB's Deputy Naval Architect.



Staging hanging from the port bow of HMCS *Winnipeg* without the protective non-flammable shrink wrap fitted.

FEATURE ARTICLE

NEM Strategic Initiative: Future Strategic Capabilities of the Fleet Maintenance Facilities

By Capt(N) Chris Earl, Capt(N) Stéphane Lafond, and Mr. Simon Dubois

In the past the Royal Canadian Navy (RCN) has been able to fully meet the Government of Canada's strategic requirements. This achievement has been assured by the critical materiel support provided by the experienced and dedicated workforce of the Maritime Forces Atlantic and Pacific Naval Engineering Maintenance (NEM) organizations, which include at their cores Fleet Maintenance Facilities (FMF) Cape Scott and Cape Breton.

The coastal NEM organizations are also part of the overall ADM(Mat)/RCN Naval Materiel Enterprise, whose purpose is to provide technically ready, mission capable, and sustainable fleets for today and tomorrow. Notwithstanding great successes in the past, the upcoming fleet recapitalization and the introduction of new technologies will most likely require new skillsets, new concepts of fleet support and strategic partnering with industry to address increased complexity and demand, as well as integrated support solutions on the waterfront and in-theatre. All of these factors will require the Naval Materiel Enterprise to evolve and adapt to a new environment.

To meet these challenges, a Naval Engineering and Maintenance Strategic Initiative (NEM SI) was stood up in 2012 to transform NEM into a schedule and output-focused management system. Embedded within this will be broad capabilities critical to the effective delivery of the NEM program, and the authorities, responsibilities, and competencies critical to the oversight required for Naval Materiel Assurance. This initiative was designed to examine all aspects of how we maintain our fleet – from training sailors to materiel certification – so as to find vulnerabilities, efficiencies, and process improvements across all dimensions of the NEM organization. As expected, NEM SI is a complex undertaking and is composed of a number of key thrusts (see sidebar).

Furthermore, the NEM SI activities are being used to meet the Defence Renewal objective of improving maintenance execution. Through this complementary initiative, the NEM team has been working with KPMG professional services to find opportunities to improve maintenance effectiveness (i.e. "wrench time"), maintenance completion rates, and, finally, equipment availability rates. This extensive review of the RCN's first- and second-line maintenance execution processes took place in 2015, and the final report indicates that our NEM organizations are mature, integrated, and operationally focused entities that are operating in a coordinated and effective way. This independent observation and analysis process has reinforced many aspects of the broader NEM SI work, and provided additional opportunities for reinvestment directly back into RCN priorities in order to improve the overall readiness of the RCN fleet.

PO1 Dwayne Morris, Regulating Petty Officer, FMF Cape Scott

It takes specialized teamwork to manage the complexities of the NEM Strategic Initiative. A case in point is the NEM Human Resources Strategy core project team of (left to right) ***Ian Mitchell***, FMFCS Production Manager and NEM Strategy Thrust Leader; ***Lorna Flemming***, FMFCS Unit Support Manager and NEM Strategy Thrust Champion; ***Randy Wyatt***, NEM SI Project Facilitator and NEM HR Strategy Process Architect; and ***Simon Dubois***, NEM Strategic Initiative and DR 1.3a Project Manager.

The NEM SI project has been very successful to date. A key achievement has been the development of a strategic resource planning process that will be used to identify the capabilities and capacities required to support the current and future fleet. Significant efforts were spent on the development of this process, where each FMF output by naval system was assessed against criteria related to three RCN risk areas – operational effect, program control, and finally, assured NEM response. Of note, an independent third-party review of our methodology concluded that "the approach and methodology was well structured, clear, objective, and fit-for-purpose."

All of these efforts resulted in an extremely important release of a strategic capability statement by the Deputy Commander of the Navy and the Director General Maritime Equipment Program Management, which in essence:

- Endorses four maintenance models that provide a range of risk-based options, and a foundation for sound in-service support decisions relative to various platform types, systems, and equipment;
- Formally designates the FMFs as the RCN's strategic assets responsible for the planning and coordination of all second- and third-level activities performed in the dockyards;
- Recognizes the FMFs as strategic NEM service providers; and
- Directs the FMFs to retain key strategic capabilities to ensure the RCN remains capable of mission preparation and sustainment, force generation, and naval materiel assurance of all units in custody.

Given the complex nature of future in-service maintenance, ADM(Mat) is also looking at evolving by reviewing all aspects of naval in-service support. It is important to recognize that in-service support programs are driven by the Defence Procurement Strategy (DPS) that envisions greater opportunity for industry to leverage defence procurement investment to create innovation, growth, and long-term sustainment of the defence sector. While a significant amount of work remains to be done, the recent release of a letter that provides high-level direction to MEPM, major capital projects, and the Formation NEMs represents an important milestone that is expected to result in a coherent, optimized, and integrated approach to future in-service support. The six guiding principles that will affect the entire Naval Materiel Enterprise are:

- Recognition that the FMFs will retain strategic capability for all future classes of ships;
- Acknowledgment that industry is expected to play a greater role in the delivery of in-service support, and will be co-located within the naval dockyard to improve effectiveness;
- General agreement that duplication of support infrastructure and associated tools is undesirable;
- An understanding that program management of FMF services and coordination of contractor activities within the dockyard will remain the responsibility of the commanding officer of each respective FMF as per current practices;
- A necessity to define and maintain clear roles, responsibilities and accountabilities to preserve the integrity of contract arrangements; and
- Requirement for a robust contract governance framework to facilitate sustained coordination, optimization, and innovation to ensure the naval support enterprise remains effective.

Key Thrusts of the NEM Strategic Initiative

1. Establish a strategic planning process;
2. Naval Material Assurance: Develop Formation processes to implement the MEPM NMA program framework;
3. Naval Transformation: Align NEM changes with broader RCN intent;
4. Financial Resource Management alignment;
5. Fleet Material State Management to ensure effective management of maintenance execution in the fleet;
6. Tech Support Plan: Develop a schedule management process to ensure available technical resources are used in the most efficient and effective manner;
7. Human Resource Strategy: Develop a methodology to shape human resource decision-making to meet future fleet needs;
8. Performance Measurement: Implement relevant, DRMIS-based, performance measures;
9. NEM Core Service Delivery: Adopt common, lean, and effective processes to execute work; and
10. NEM Management: Improve NEM oversight and alignment with relevant ADM(Mat) activities.

In conclusion, it is felt that all these converging improvement activities and a more thorough definition of the key strategic roles of the FMFs will set the conditions for success, thus ensuring that the RCN retains operational flexibility and remains organically capable of force generation and mission sustainment. To ensure the Navy's future success, the FMFs will evolve with the changing fleet and geopolitical environment, and their strategic capabilities will be aligned to provide effective, assured support to high-risk/high-value systems across all classes of ships and submarines while offering contingency response commensurate with risk exposure across all levels of maintenance. Finally, the FMFs will provide "point of delivery" oversight, thus enabling an effective and coordinated delivery of maintenance activities that we believe will optimize the "whole enterprise" in-service support system for the next 20 years.

Capt(N) Chris Earl is the lead for NEM SI and Defence Renewal in the RCN. Capt(N) Stéphane Lafond is the Assistant Chief of Staff for NEM in Maritime Forces Atlantic, Halifax. Mr. Simon Dubois, is Project Manager for NEM SI and Defence Renewal.

News Briefs

"*Kootenays*" remembered at Brookwood Cemetery

Photos courtesy Canadian Defence Liaison Staff London

The Canadian Armed Forces Combat Shooting Team laid a wreath in June on behalf of the surviving crew of HMCS *Kootenay* to honour four of their nine shipmates who died in a tragic incident more than 45 years ago. They are buried at England's Brookwood Military Cemetery in a small Canadian section with other RCN dead.

In a quiet corner of England's Brookwood Military Cemetery southwest of London, England are the headstones commemorating the last of Canada's overseas military burials. Four of these are for the men referred to as the "*Kootenays*," remembered every year by the crew who were on board ship with them the day they died.

On the morning of October 23, 1969, HMCS *Kootenay* commenced a set of full-power trials about 200 nautical miles off Plymouth, England. The starboard gearbox temperature went critical, and at 0821, the gearbox exploded. The next few hours saw the crew of *Kootenay* fight not just for their ship, but their lives. In total, nine men died with four being buried at sea, four buried at Brookwood, and one who succumbed to his injuries during the transit back to Canada buried at Halifax.

On June 23 the "*Kootenays*" were visited by the Canadian Armed Forces Combat Shooting Team. Brookwood Military Cemetery is just minutes down the road from Bisley Camp where the team was taking part in the British Army Operational Shooting Competition. The visit was coordinated with the Canadian Defence Liaison Staff in London, and Cdr Lawrence Trim, the Naval Liaison Officer

at CDLS(L), arranged for a bugler to be present for a short service. A wreath brought from Halifax was laid on behalf of the surviving crew of the ship.

The tragic loss of these lives over 45 years ago continues to have a lasting impact on the Royal Canadian Navy. The lessons learned are still taught today at the Damage Control Training Facility (DCTF) in Halifax, named, most aptly, for HMCS *Kootenay*.

– **CPO2 Bradley Browne**

CPO2 Browne is the former Senior HAZMAT Instructor at DCTF Kootenay *in Halifax.*

News Briefs (continued)

LCdr Omar Masood officiates at World Military Games in Rennes, France

Photos by MCpl/Referee Shane Winsser – Netherlands Armed Forces – Public Affairs Branch

LCdr Omar Masood had better than a ringside seat at the 2016 Conseil International du Sport Militaire (CISM) World Women's Military Football Cup in Rennes, France this spring.

The DGMEPM Naval Materiel Supportability Manager in the Directorate of Naval Platform Systems (DNPS 8-3) represented Canada, the Canadian Armed Forces, and the Maritime Equipment Program Management (MEPM) division at the tournament as a referee, working with world-class Fédération Internationale de Football Association (FIFA) officials from around the world.

While the CAF women's team was eliminated early in the tournament, staged between May 24 and June 6, LCdr Masood's impressive officiating in the round robin matches saw him selected to be part of the referee squad for the final tussle between Brazil and France. He was the only Provincial level referee on a squad of FIFA referees.

"It was the experience of a lifetime getting to work with world-class FIFA referees from countries such as the United States, France, South Korea, Brazil and Cameroon," said LCdr Masood. "I refereed a critical match between Germany and South Korea that decided which team would advance to the semi-finals."

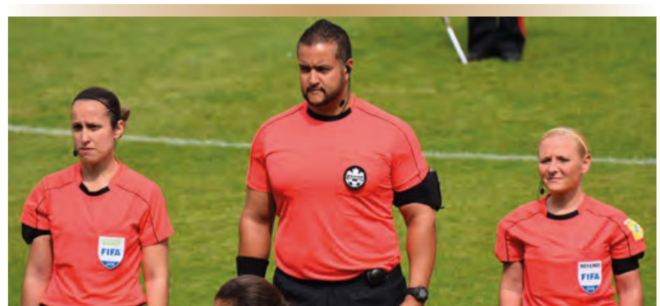
But his greatest thrill was getting tapped to participate in the final match: "Being selected to be a part of the referee team in the game between Brazil and France is an achievement that I will forever cherish."

CISM's aim in staging the event was to promote sports activity and physical education between armed forces as a means to foster world peace.

LCdr Masood's history as a referee goes back almost 25 years when, as an 11-year-old, he began refereeing and playing soccer concurrently. Through the years he advanced through the various district referee levels, upgraded to regional level in Ontario in 2009, and upgraded to Provincial level in BC in 2013.

"Being in the military has allowed me to referee all across Canada and even in the USA and other countries while deployed," LCdr Masood said. "If it were not for the amazing CAF soccer referee mentorship program that exists, I would never have advanced as far as I have. Every year, I have been given the opportunity to hone my referee skills at CAF Men's and Women's Regional and National soccer tournaments, the latter of which are attended by top level referee assessors in Canada who assist us in improving our skills. After every match, we are assessed on performance and provided feedback on how to evolve/modify as referees based on FIFA level guidance."

LCdr Omar Masood referees a game between Germany and South Korea during the spring CISM World Women's Military Football Cup games in Rennes, France.



LCdr Omar Masood was thrilled to be part of the refereeing team for the final match of the CISM World Women's Military Football Cup games in Rennes, France this past spring. He was the only Provincial level referee on a squad of FIFA referees.

Leading up to his selection to attend the 2016 WMG, and due to his appointment as the referee for the 2015 Men's Quebec Regional final in Bagotville, the 2015 Women's National final in Borden, and countless university and college level matches, LCdr Masood was awarded the CFSU(Ottawa) Official of the Year award in May 2016.

– Tom Douglas, Associate Editor

News Briefs (continued)

Niobe Day honours the arrival of the RCN's first warship

© Canadian War Museum

HMCS *Niobe*, Stern View (CWM 20030174-045), George Metcalf Archival Collection.

Two historic naval moments that occurred 105 years apart are now commemorated every October 21 by the Royal Canadian Navy: *Niobe* Day, instituted in 2014 to mark the arrival in 1910 in Halifax of Canada's first warship; and Trafalgar Day, to commemorate the Battle of Trafalgar in 1805. The October 21st arrival of HMCS *Niobe* in 1910 had been carefully timed to coincide with the anniversary of Vice-Admiral Horatio Nelson's victory over the combined French and Spanish fleets off Cape Trafalgar, Spain 105 years earlier.

Niobe, along with the former HMS *Rainbow*, had been purchased from the Royal Navy as the first two ships of the newly-formed Naval Service of Canada. Although *Rainbow* was purchased first, the ship did not reach Canadian waters until it arrived in Esquimalt, British Columbia on Nov. 7, 1910. With the opening of the Panama Canal still four years off, *Rainbow* had had to sail around Cape Horn and up the Pacific coast of the Americas to reach the naval dockyard on Vancouver Island.

Upon the outbreak of the First World War the 16-year-old *Niobe* underwent a much-needed refit, then joined the RN's 4th Cruiser Squadron on the North America and West Indies Station, intercepting German ships along the eastern seaboard of the United States. During this period, she chased the German raider *SS Prinz Eitel Friedrich* into Newport News, Virginia, where the enemy vessel was interned and later pressed into service with the USN when America entered the war in 1917.

Her best days behind her, *Niobe* returned to Halifax in July 1915 and became a harbour depot ship in September of that year. During the Halifax Explosion of December 6, 1917 her upper works were wrecked and several of her crew killed. She remained in service as a depot ship until 1920, after which the ship was sold for scrap and broken up in 1922.

Models and artifacts of *Niobe* are housed at several Canadian institutions in the Nova Scotia provincial capital of Halifax, including the Maritime Museum of the Atlantic on the waterfront, and the Naval Museum of Halifax located at CFB Stadacona. The latter includes the original ship's bell in its *Niobe* Room.

An anchor believed to have been one of three bow anchors used to secure *Niobe* following the Halifax Explosion was unearthed at HMC Dockyard in Halifax on October 14, 2014 – exactly one week before the anniversary of the arrival of the ship in Canadian waters in 1910.

http://www.navy-marine.forces.gc.ca/en/navy-life/history-niobe-day.page

– **Tom Douglas**

News Briefs (continued)

DGMEPM member receives U.S. Navy and Marine Corps Commendation Medal

On June 27 ***LCdr Craig Piccolo*** was awarded the U.S. Navy and Marine Corps Commendation Medal by RADM Michael Jabaley, Program Executive Officer Submarines (PEO Subs), at the Washington Navy Yard. LCdr Piccolo was awarded this commendation for his exceptional service as the Canadian Submarine Liaison Officer (CSLO) to PEO Subs from 2013 to 2016.

As DGMEPM's submarine representative to NAVSEA, Craig was noted for his contribution to a multitude of Foreign Military Sales (FMS) cases, his role in enhancing the relationship between the RCN and USN, as well as his "exceptional professionalism, personal initiative and complete dedication to duty."

Bravo Zulu, Craig, and good luck on your next adventure in Toronto with the Joint Command and Staff Program (JCSP)!

– Blaine Duffley, Director Maritime Equipment Program Management (Submarines)

Photo courtesy Program Executive Officer Submarines

PMCD certifications

Several MEPM members have graduated from the University of Ottawa's Telfer School of Management – Certificate in Complex Project and Procurement Leadership. The program is designed specifically for government and industry leaders responsible for delivering complex and dynamic large-scale projects and procurement programs. It is designed to help participants learn to lead projects and programs successfully from project identification through to completion, and to develop the business acumen that is critical to the achievement of these projects and programs. The program is also aligned with the training requirements associated with PMCD level 3. Congratulations!

Photo courtesy the MEPM Bulletin

Michel Carisse, Cdr Steve Whitehurst, Stéphanie Loiseau, Gary Vrckovnik, Darren Gould, Dan Vachon.
Absent: Jocelyn Turgeon

News Briefs (continued)

RCN postgrads win UCL annual ship design competition

Photo by Andrea Grech La Rosa and edited by Jad Raja Zeidan/ UCL Mechanical Engineering

Alasdair Stirling (left), Minstry of Defence (MOD) Head of the Royal Corps of Naval Constructors and Future Submarines, presents the 2015-16 University College London Winning Ship Design Team award to (left to right) Lt(N) Shane Kavanagh, Tom Jordan (MOD), LCdr Emil Schreiner and Jad Raja Zeidan (Civilian).

Two RCN naval technical officers away on DGMEPM-sponsored postgraduate (PG) training at University College London (UCL) in the U.K. have won UCL's 2015-2016 ship design competition for a notional Arctic Control / Emergency Response Ship (ACERS). ***LCdr Emil Schreiner*** and ***Lt(N) Shane Kavanagh*** were members of a team that included fellow students ***Tom Jordan*** and ***Jad Raja Zeidan*** from their masters level Ship Design course.

LCdr Schreiner is completing an MSC in Marine Engineering, and Lt(N) Kavanagh is completing his MSC in Naval Architecture. The two UCL MSc programs work together during the ship design project phase. The competition is held every year, and requires students to design a ship that meets a given set of criteria.

For their project, the four-member team chose to design a ship having a similar mandate to Canada's Arctic and Offshore Patrol Ship (AOPS). Their design of a Polar Class 1 icebreaking vessel powered by liquefied natural gas (LNG) and integrated full electric power propulsion was noted for its significant emission reduction benefits and excellent efficiency over a wide range of operating parameters. Their vessel, which exists only inside a computer, features everything from a light helicopter to unmanned aerial vehicles and autonomous underwater vehicles for surveillance, pollution monitoring, and ice profiling in Canada's environmentally sensitive Arctic waters.

DGMEPM's participation in sponsored postgraduate programs has been an outstanding success story, as NTOs typically return from their masters programs better prepared to take on the increasingly challenging technical roles the Navy requires them to fulfill.

Bravo Zulu to the four design winners!

(With files from LCdr John Faurbo and LCdr Susannah Chen.)

Summary of the ACERS Design

The length of the navigational season will increase as Arctic sea ice recedes, giving rise to an increase in shipping, exploration, trade, tourism and scientific research. Any increase in activity throughout the Arctic will necessitate an appropriate level of response to ensure the safety of life and the environment within Canadian waters. There is an emerging requirement for marine traffic monitoring in the Arctic, year-round environmental response, and improved rescue capabilities. The Arctic Control / Emergency Response Ship (ACERS) is a new class of ship focused on icebreaking, emergency response, and surveillance.

ACERS is intended to:

- contribute to Canadian sovereignty within the Canadian Economic Exclusive Zone particularly in Arctic waters;
- operate within, and in support of, other components of the Canadian Armed Forces and other government

departments in carrying out a range of tasks including maintaining trade routes, ocean hydrographic surveys, surveillance, and the enforcement of Canadian laws/regulations; and

- participate in emergency response activities that threaten lives and/or the sensitive Arctic environment – specifically, search and rescue (SAR), stricken vessel assistance, towing, salvage, and pollution cleanup.

ACERS is a Polar Class 1 vessel allowing it to conduct year-round operations within the Arctic. The ship is designed to break three metres of ice at three knots. ACERS is powered by LNG – which offers significant emission reduction benefits – while the Integrated Full Electric Power propulsion system ensures the vessel has excellent efficiency over a wide range of operating parameters. The total installed power is 39.4 MW and the vessel is propelled by three 7.5-MW ice-class azimuthing pods.

The vessel is intended to conduct three-month surveillance missions throughout the Canadian Arctic and three-month emergency response missions through the major Arctic shipping routes. Three unmanned aerial vehicles will allow 24-hour air surveillance and ice floe tracking, while a light helicopter is available for manned missions. Three autonomous underwater vehicles (AUVs) may be used for surveillance, hydrographic surveys, and ice profiling. The AUVs may be launched and recovered through a moonpool to ensure operations are not restricted by the ice pack.

In an oil spill scenario, ACERS is capable of containing a major spill with floating booms, and can begin cleanup utilizing in-situ burning, mechanical recovery, or chemical dispersants. During search and rescue operations, the vessel can utilize its fast rescue craft in open water or the helicopter within an ice floe area. Large medical facilities are located close to the flight deck and boat bays to ensure casualties can be quickly transported to medical treatment. Additional accommodations and rations are available for 50 survivors.

The Polar Code has heavily influenced the design of the vessel. Particular attention was given to activities that traditionally occur on the weather deck. The vessel's foc'sle and quarterdeck are both covered and protected from the Arctic environment. The quarterdeck covering is removable to facilitate container loading and crane operations. The ship's boats may be moved to the boat garage under the flight deck to ensure maintenance can be carried out in a heated environment.

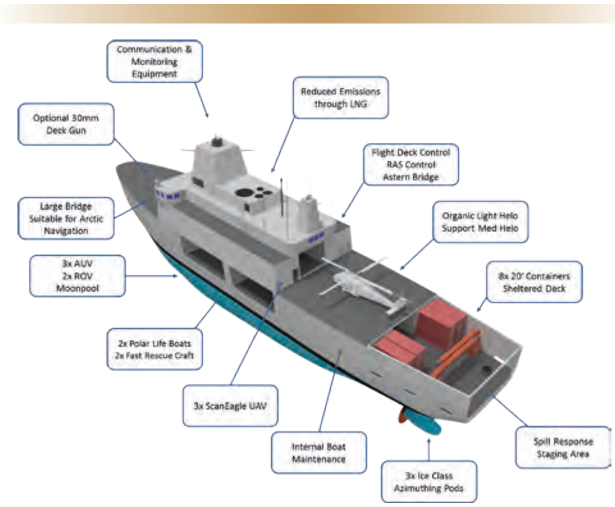
– **LCdr Emil Schreiner and Lt(N) Shane Kavanagh**

References

1. Jordan T, Kavanagh SE. ACERS Naval Architecture Ship Design Report. London: University College London; 2016.
2. Schreiner E, Zeiden J. ACERS Marine Engineering Ship Design Report. London: University College London; 2016.

ACERS Characteristics

PARAMETER	VALUE	UNITS
Displacement	9780	te
Length	105	m
Beam	19	m
Depth	14	m
Draught	8.5	m
Speed (Cruise/Max)	12, 19	kts
Class	POLAR CLASS 1	
Complement	102 (+70)	
Range	22000 (at cruise)	nm
Stores Endurance	120	Days
Cost (UPC)	274	£M (2015)



Rendered images created by Lt(N) Shane Kavanagh/UCL Mechanical Engineering

News Briefs (continued)

Mechanical artistry salutes a generation of service by FMF Cape Breton

Photo by Rachel Lallouz, *Lookout*

FMF Cape Breton designed and built this submarine decanter to commemorate the unit's 20th anniversary. (Left to right) Kevin Schaftlein, Norman Swan, Capt(N) Christopher Earl, CPO1 Ian Kelly, Cmdre Jeff Zwick, Richard Turnbull and Michael Tellier.

Artisan is not typically a word used to describe FMF technicians; however there are occasions when mechanical skill and artistry merge to produce a fully functional work of art. The building of a submarine-styled decanter to commemorate Fleet Maintenance Facility Cape Breton's (FMF CB) 20th anniversary this year was one such occasion.

The idea was conceived when FMF CB Commanding Officer ***Captain(N) Christopher Earl*** attended a naval technical mess dinner in Esquimalt where the after-dinner port was poured from a replica torpedo decanter mounted on a wheeled cart. He thought a similar item presented to the RCN to mark FMF CB's 20th anniversary would be a fitting way to showcase the unit's highly skilled workforce while preserving a naval tradition. Capt(N) Earl chose the concept of creating a stylized *Victoria*-class submarine as a truly appropriate tribute given that much of the FMF CB activity over the past 20 years has been centred on the introduction and continuing technical support for the submarine fleet.

Building the decanter was a team effort, with ***Richard Turnbull***, the Machine Shop Work Centre Manager, contributing to the initial design concept. ***Kevin Schaftlein***, machinist, designed the entire submarine body and the intricate details of the working decanter. ***John Kirstiuk***, from the Shipwright's Shop, completed the design of the rolling submarine dolly. The actual build involved an even a larger team that included all of the designers along with ***Joel Pineau*** (Machine Shop) and ***Dave Imeson*** (Engraving Shop). Electro-Plating Shop had ***Paul Kobierski***, ***Norm Swan***, and ***Chad Duncan*** leaving their mark and protective coating on this submarine project. Other unnamed artisans from the Paint Shop, Sheet Metal Shop and Welding Shop added their own talents to crafting the decanter.

From apprentices to journeymen to management, this talented team turned-to for more than two months to deliver on this idea. The resulting masterstroke was an anodized black aluminum submarine body that encases a stainless steel flask engraved with the names of all the FMF CB artisans involved in the build. All of this was supported by a teak cart rolling on stainless steel wheels. One of the striking details on the decanter is the jumping dolphins motif engraved on the sides of the dolly's wheels as a tribute to the submariners who sail the *Victoria*-class submarines.

Beyond the replica's elegance is the practicality of the build. The stainless steel flask has the capacity to be fuelled with up to 26 ounces of port, and has a RAS (replenishment at sea) fitting within the submarine decanter's periscope assembly to enable resupply via a siphon system. In keeping with mess dinner tradition, the decanter may be rolled up and down the table without ever losing contact with the table as the spirits are served up.

On April 6 the submarine decanter was presented to ***Commodore Jeff Zwick***, Commander Canadian Fleet Pacific, who accepted the gift on behalf of the Royal Canadian Navy. Cmdre Zwick expressed his admiration over the skill, ingenuity, and pride in workmanship of the FMF maintenance team.With beauty and functionality all rolled into one, this is one submarine acquisition that will impress everyone and be celebrated by all those who are lucky enough to angle that decanter's bow down.

– LCdr Angelicco Lopez

(The assistance of FMFCB Unit Chief CPO1 Ian Kelly in organizing photo support is gratefully acknowledged. – Editor)

Photo by PO2 Sean Wieler, FMF Cape Breton

Photo by Rachel Lallouz, *Lookout*

A pressure hull like no other. Pass the port!

News Briefs (continued)

FMF Cape Scott 20th anniversary!

Photo by Cpl Chris Ringius, HMCS *Trinity* FIS.

On May 4, 2016, Fleet Maintenance Facility Cape Scott in Halifax celebrated its 20th anniversary of providing outstanding technical support to the fleet. All six former commanding officers joined Cape Scott's current CO, Capt(N) Stéphane Lafond, along with others of the unit's military and civilian personnel for the unveiling of a commemorative plaque.

The former COs present for the event (see photo, left to right) included ***Andy Smith***, ***Rick Payne***, ***Gerry Humby***, ***Capt(N) Stéphane Lafond***, ***Cmdre Michael Wood***, ***Richard Gravel***, and ***Gilles Hainse***. Following the plaque unveiling, Gerry Humby, CO of the unit when it was stood up in 1996, noted that while there were challenges along the way, Cape Scott has continued to prove the value of what it brings to the Royal Canadian Navy.

A barbecue and a cake-cutting ceremony held at the Capt Bernard Leitch Johnson submarine and vessel maintenance facility followed the plaque unveiling.

(With files from Trident newspaper. The assistance of FMFCS Unit Chief CPO1 Duncan Elbourne is also gratefully acknowledged. – Editor)

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. Contact information may be found on page 1. Letters are always welcome, but only signed correspondence will be considered for publication.

PRESERVING CANADA'S NAVAL TECHNICAL HERITAGE

CNTHA NEWS

Canadian Naval Technical History Association

The CNTHA at 20!

By Tony Thatcher and Pat Barnhouse

CNTHA News
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CNTHA Executive Director
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Views expressed are those of the writers and do not necessarily reflect official DND opinion or policy. The editor reserves the right to edit or reject any editorial material.

www.cntha.ca

The Canadian Naval Technical History Association (CNTHA) aims to capture and preserve oral and written records of Canada's naval technical history by encouraging the establishment of a culture in which Canada's naval technical heritage is preserved and made accessible to future generations. The association was established in 1996, and has been actively engaged since then. The technical history material we have gathered is archived in the CNTHA Collection held by the Directorate of History and Heritage (DHH) within the Department of National Defence (DND). The information is available to official historians, researchers, authors and casual readers alike.

Between 2001 and 2008 the CNTHA's Canadian Naval Defence Industrial Base (CANDIB) subcommittee collected and documented as much historical information as possible on Canadian naval construction programs, and on the effect these programs had on Canadian industry. It also traced the legacy of this developmental activity, calling on the experience and recollections of as many people as possible who were involved in any way in these important events in Canada's naval history.

In 2004 CANDIB entered into a contract with DHH to run an oral history program. This successful contract was followed up by two further contracts in 2005 and 2016, and under these CANDIB met its mission of capturing the story of Canada's naval industrial activity in a highly productive manner. While the mission continues to be a relevant topic, the CANDIB subcommittee has been stood down, and the acquisition of this information now continues under the wider auspices of the CNTHA.

Also in 2004, the CNTHA launched a website to showcase the results of our efforts. The website [www.cntha.ca] was most recently upgraded earlier this year to enhance its overall security, the search capability, and its functionality, and today offers many things of interest to anyone wanting to learn more about


DND Photo

HMCS *Algonquin* under construction at Lauzon, Quebec in 1970-71.

Canada's naval technical history. Photographs, interview transcripts, and the entire collection of back issues of the *Maritime Engineering Journal* are just some of the items available on the website. The feedback we have received from users has been very positive.

Priority Effort

At the moment the CNTHA is supporting the current priorities of DHH in preparing for the writing of Volume IV of the official naval history, which will cover the period 1968-1990. Whatever information people can offer regarding the following topic areas could be extremely valuable in this effort:

- DDH-280 construction and trials
- Improved Restigouche Class (IRE) program
- Destroyer Life Extension (DELEX) project
- Submarine Operational Update Program (SOUP)
- Tribal Class Update and Modernization Project (TRUMP)
- CFAV *Quest* program
- HMCS *Cormorant* diving support ship
- CPF Requirements and Definition phases

Other topics of interest include:

- Time lines showing the links between R&D, and equipment/system development and integration in ships; and
- Background behind major departmental decisions relating to the various ship and equipment programs.

CNTHA News – Continued

Accomplishments

Since its inception, the CNTHA has gathered a large quantity of diverse technical history material into its collection. There are in excess of 500 items, including about 100 concerning the Canadian naval industrial base in some form or another, and more than 50 transcripts of oral, first-hand historical accounts. For the small band of mostly grey-haired ex-Navy volunteers who meet monthly to guide the activity and share the workload, the CNTHA Collection represents an enormous commitment by them, and by the few of our number who have since crossed the bar.

As we continue to find ways to forge closer ties with the Director General Maritime Equipment Program Management division, and with the Canadian naval technical support community at large, let me leave you with the words of our first chairman, RAdm (ret.) Mike Saker, who wrote in this space one year after we launched the CNTHA 20 years ago:

"To everyone who has contributed in however small a way to the achievement of the goals of the Canadian Naval Technical History Association I offer my sincere thanks. Your dedication and effort have made an enormous difference in completing the historical record. I ask all of you who read this to please keep our aims in mind, and to look for ways in which you can help us preserve a record of your technical contribution (past and present) to Canada's navy. I can think of no better professional legacy."

We look forward to hearing from you.

DND Photo

The Canadian Forces oceanographic research vessel *Quest* (AGOR-172).

HMCS *Huron* propelled into history at Naval Museum of Alberta

By Don Wilson, CD, P.Eng

In July 2012 my brother Ken and I had the good fortune of visiting the Naval Museum of Alberta, which in October 2008 had moved to a new facility in Calgary called The Military Museums. This complex consists of eight distinct museums and galleries under one roof, including the Naval, Army and Air Force Museums of Alberta, the four regimental army museums, The Military Museums Library and Archives (University of Calgary), as well as the Founders' Gallery.

Among the excellent displays can be found a number of valuable naval artifacts. One addition, dedicated on June 3, 2012, was a display of the port propeller from HMCS *Huron*. This visit prompted memories of having stood by both *Huron* and *Iroquois* in Sorel, Québec as the Royal Canadian Navy's engineering overseer for the building of these two DDH-280 Tribal-class destroyers. I recalled visiting the ships regularly while Marine Industries Ltd. personnel created these magnificent vessels before our eyes. In due course, both were completed, commissioned and sailed away to Halifax – and beyond. As the engineering officer, I had the honour and privilege of commissioning *Huron*.

That ship – following in the wake of its predecessor of the same name that had garnered battle honours in the Second World War and Korea – was laid down on June 1, 1969 and commissioned as DDH-281 on December 16, 1972. Having distinguished herself time and again as part of the Atlantic Fleet, *Huron* took part in the Tribal Class Update and Modernization Project (TRUMP) in the early 1990s along with sister ships *Iroquois*, *Athabaskan* and *Algonquin*. Once this process was complete, *Huron*'s classification changed from Destroyer Helicopter (DDH) to Destroyer Guided Missile (DDG), and was assigned to Maritime Forces Pacific for the rest of her active service.

As a result of a shortage of crews, *Huron* was decommissioned in 2000 and laid up in Esquimalt. In 2006 the ship was assigned target status for a sinking exercise as part of Operation Trident Fury. Before being towed to the offshore weapons range about 150 km west of Vancouver Island, *Huron* was stripped of her armaments and environmentally harmful contaminants. Some artifacts were preserved, including the propeller now on display in Calgary. On May 14, 2007 a combination of Royal Canadian Navy and US Navy ships and submarines and Air Command CF-18s bombarded *Huron* until she sank.

Photo by Ken Wilson

CNTHA webmaster Don Wilson stands next to the port propeller taken from HMCS *Huron*, a ship he commissioned as engineering officer in 1972. The artifact is on display some distance from salt water at the Naval Museum of Alberta in Calgary.

A history of both *Hurons* can be found at http://www.hmcshuronassociation.com/

Additional information can be found on our own website at http://www.cntha.ca/articles/hmcs-huron.html

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