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CANADIAN FORCES COLLEGE / COLLÈGE DES FORCES CANADIENNES
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EXERCISE/EXERCICE NEW HORIZONS

Naval Maintenance 2020
A Performance-Based Approach to Refit Contracting

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La présente étude a été rédigée par un stagiaire du Collège des Forces canadiennes pour satisfaire à l'une des exigences du cours. L'étude est un document qui se rapporte au cours et contient donc des faits et des opinions que seul l'auteur considère appropriés et convenables au sujet. Elle ne reflète pas nécessairement la politique ou l'opinion d'un organisme quelconque, y compris le gouvernement du Canada et le ministère de la Défense nationale du Canada. Il est défendu de diffuser, de citer ou de reproduire cette étude sans la permission expresse du ministère de la Défense nationale.

“Everything flows and nothing stays the same”.¹ The one possible exception is naval quality assurance. The Canadian Navy has used the same approach for refit* quality assurance since the Second World War (WWII). Although it has been very effective at ensuring work quality; rising costs and changes to contracting approaches have led to several difficult refits in the last ten-year period. A study of the refit reports and cost-arisings of this period reveals that incomplete specification preparation, poor initial work quality, and inadequate programme control have all, at some time, contributed to cost overruns and late deliveries.² As will be explained, within the competitive market of East Coast shipyards, the government is almost encouraging shipyards to underbid their estimates on the costs of quality assurance and project management.

Having entered the twenty first century, it is timely to reflect on the expectations and processes of ship refits. It is time to examine if ship refits can be more efficiently accomplished in ever-tightening budgets and rising costs. Improving the efficiency of the refit process, while safeguarding the overall quality of the repairs, could result in savings for all parties.

One approach that holds considerable promise, and which the United States Congress is heavily endorsing, is performance-based services acquisition. Performance-based contracting means “structuring all aspects of an acquisition around the purpose of the work to be performed with the contract requirements set forth in clear, specific, and objective terms with measurable outcomes as opposed to either the manner by which the

* By refit the author includes all shipyard contracted third-level maintenance including refits, docking work periods, and extended work periods.

¹ Heraclitus, Cratylus (Plato), 402a, The Macmillan Dictionary of Quotations, p 97

² Selected from a Review of Several Collections Refit Reports and Cost Arisings as listed in the Bibliography

work is to be performed or broad and imprecise statements of work”³. The US Congress has directed that 50% of all government contracts issued by 2005, shall be performance-based in nature.⁴

Tightening budgets, increasingly expensive technology and federally legislated changes are all constraining third-level maintenance requirements for warships. *Leadmark*, the Navy’s strategy for 2020, outlines maintenance goals that will require innovative, effective solutions to project management, quality assurance and contracting processes to meet these growing challenges.

This paper will show that Canada should embrace a performance-based approach to contracting ship refits. It should embrace performance-based service acquisition, because it will provide many advantages over the current procedural method for contracting, with few subsequent disadvantages. It should embrace performance-based service acquisition, because it will eliminate a flaw in the current contracting process. It should embrace performance-based service acquisition, because it will provide the innovative, effective solutions *Leadmark* outlines; resulting in the less expensive, more effective, delivery of services to the advantage of both the navy and the shipyards.

In order to lay a maritime course you must understand where you are, where you want to go, and roughly how you want to get there. This paper will outline the various parties’ motivational forces and then examine the background and development of Quality Assurance within the naval refit. It will highlight some of the difficulties currently being experienced and the advantages of performance-based service acquisition. Due to its length, the paper will focus on Quality Management aspects; however, any

³ US Government Office Of Acquisition Management Web Site, Introduction

⁴ Ibid, Introduction

approach to a refit must be an integrated approach to all program management, including project, risk, safety, and environmental management.

In order to understand where you are going, you must understand the motivations of the parties involved. In ship refits there are two key parties to the contract, the shipyard and the government. The government is further broken down into two components, a technical component (which is the Navy) and a contractual component (which is the department of Public Works and Government Services Canada (PWGSC)).

Motivations within a Refit

Warships are designed and built to military specifications because they may be called upon to operate in the hostile environment of combat. Failure of a critical component may mean the loss of equipment or systems, which could easily lead to mission failure, loss of life, or loss of the ship. Operating at the edge of its design parameters, in a non-benign environment, requires that the quality assurance of repairs must always be the foremost priority in a refit or in any ship repair. To quote the old Ford maxim, “quality is job one”⁵ has never been truer than in a warship repair. Whatever quality assurance system is selected for ship refits, it must ensure the quality of the work.

A secondary priority within a refit is the overall schedule. Ship programmes are developed months and years in advance of their implementation, and any delay can have a significant ripple effect through all fleet scheduling. Similarly, a delay in undocking may impact shipyard work scheduling. Therefore, schedule control is another significant priority within a refit.

⁵ Ford Motor Company Advertising Logo.

A third priority, one less understood by most in the military, is the development of the shipyard capability as a vital strategic resource. Canada should never forget her experience in WWII, where a lack of a maritime support infrastructure severely hampered her ability to respond to the German submarine threat. “The shipbuilding industry in Canada in 1939 was practically non-existent.”⁶ The immature shipbuilding industry was unable to build and update capable escorts until almost the end of the war. The delay, while Canada built up shipyard infrastructure, weakened the Allied response during the Battle of the North Atlantic, and cost additional servicemen and merchant sailors their lives.

Another lesson that Canada should have learned in WWII was that dependence upon other nations is not always possible. In times of conflict it is to be expected that a nation will look after its own needs, before those of any alliance member. In late 1940, the United Kingdom was far too occupied with a looming German advance, to spend time assisting a struggling Canada.

The shipbuilding industry in Canada is fighting against subsidized international competition⁷ and national political disinterest.⁸ The government should do what it can to support the industry. As identified in *Leadmark*, “it is important that the facilities and skills necessary for the upgrading and maintenance of major naval units... be nurtured by Canada, either publicly or privately to obviate undue reliance on foreign resources.”⁹ One of the goals of the refit programme should be to help develop and nurture the Canadian shipbuilding industry.

⁶ Kennedy, J. de N., *History of The Department of Munitions and Supply*, p 237

⁷ Cairns, P.W., “Ships and Shipbuilding”, *Maritime Affairs Website*, p 1

⁸ Haydon, P., “The Canadian Government’s Role in Shipbuilding: Past, Present and Future”, *Maritime Affairs Website*, p 1

⁹ *LeadMark: The Navy’s Strategy for 2020*, p 143

The final, important priority within a refit is the shipyard's expectation of a fair and reasonable profit. Shipyards are in business to make money and a shipyard management that does not turn a profit can expect difficulties with the owners and investors. The government is prepared to pay a fair and reasonable wage for labour; however, given the continued expectation of tight federal budgets it will want to minimize the cost of refits. One would think that the two very similar end goals would result in a non-issue; however, that has not always been the case. The overall cost remains a priority within a refit.

There are a myriad of lesser issues and expectations within a refit such as customer satisfaction and professional reputation; however, these do not play a significant role in the outcome of a refit. As stated earlier, the key priority is the quality of the work repairs, which must remain the foremost concern in any refit. Once the quality of the work is ensured; schedule, building shipyard capability, or project cost have all juggled equally for importance in differing times and circumstances.

Having examined the priorities of the parties within a refit, it is timely to examine the development and background of the current process of Quality Control.

Background

Hold Point Control, also called mandatory inspection point control, is a form of inspection control that was used extensively in industry between the 1930's and the 1960's.¹⁰ It went into wide use in the late 1930's, as an essential element of wartime quality assurance. It was required when industries expanded exponentially to respond to the sudden wartime growth in demand. Canada, in the midst of the war, converted into a

¹⁰ Wadsworth, H., *Modern Methods for Quality Control and Improvement*, p 6

highly industrialized state.¹¹ New industries sprang up across the country, often using unskilled labour because of shortages in trained personnel. To ensure the continued high quality of material, hold point control was implemented. Hold point control was carried out through a form of service acquisition called procedural contracting.

Hold point control requires extremely detailed work descriptions for every step in a repair process. The naval Quality Assurance organization adds inspection hold points against each detailed work procedure. These could be an “R” point for a measurement or reading, an “A/C” point for a contractor inspection or an “M” point for a Government inspection. As a shipyard progresses through the detailed work description, the contractor must arrange and manage the inspections identified. In fact, the contractor is not allowed to proceed with the work, until the particular inspection has been completed. A highly motivated contractor may even add additional inspections to the work descriptions within his own quality assurance system.

Hold point control provides exceptional control of the quality of the product, when failure could have catastrophic consequences. For this reason it was widely used by NASA, in the Apollo Program.¹² However, it also has several significant drawbacks, hence why almost every other industry moved away from inspection control to total quality or process control in the 1960’s.¹³

One of the first problems, mentioned earlier, is that inspection control requires an extremely detailed work description of the repair for the hold points to be added. Many years ago warships underwent a baseline refit. A baseline refit is one where all of the systems are overhauled and restored to their original condition. The baseline

¹¹ Kennedy, J. de N., *Histry of The Department of Munitions and Supply*, p 6

¹² Schmahl, K.E., Dale, R.A., *NASA Surveillance for Contractor Performance*, p 194

¹³ Wadsworth, H., *Modern Methods for Quality Control and Improvement*, p 11

specifications were comprehensive, detailed, and in fact, still serve as the basis for refit preparations.

As can be imagined, baseline refits were a very intrusive and extremely expensive method of repair. Due to the rising costs, ships moved to a condition-based repair system, where only repairs required due to a known degraded condition are conducted within the refit. While this approach saves money, it requires each ship to have its repair catalogue written and fine-tuned for each refit. This particularization process takes both time and money for a team to write the individual specifications. Invariably, in thousands of pages of documents, mistakes are made or steps are omitted which almost inevitably become the responsibility of the government in the form of a cost arising in the course of the work. All of the refits reviewed contained minor cost arisings due to missed steps in the specification procedures.

A second, more recent problem is occurring due to a change in the contracting process. Until the last decade, all refits were contracted to shipyards through a process called Request for Proposals (RFP). In its response to the government work package, the shipyard would include a detailed bid to do the work. It would also include a detailed description of how the shipyard was going to manage the process, with descriptions of its project management organization, quality management organization, etc. The bids would be assessed based on cost and the government's review of each contractor's responses. The work would not automatically go to the lowest bidder, but instead, to the shipyard with the best combination of price and management capability.

Unfortunately, this process opened the possibility of human error and bias into the contract award process. After several successful trade tribunal challenges, an Invitation

to Tender (ITT) process was adopted for those contracts not requiring considerable engineering. In the ITT process, a shipyard is pre-qualified for a bid and self-declares that it has sufficient capabilities in quality management, etc. The bids are then opened publicly and the lowest bidder awarded the contract.

This process has led to a very subtle problem. The shipyards must bid the work, at least on the East Coast, in a very competitive environment where only a few thousand dollars can separate the winners from the losers. The salary of one additional member to the Quality or Project Management Organizations could provide this price difference. In the RFP bid process, this was avoided as weaker quality organizations would be penalized, or even disqualified, if they were considered to be inadequate. In the ITT process, the shipyard self-declares its capability, which could then consist of only one person. In a competitive ITT contracting process, without a firm stated organizational requirement, the government is encouraging shipyards to underbid and under staff their management organizations.

This is not to imply that shipyards are giving up on management, only that the initial bid may be lower than the actual cost incurred. To quote one shipyard executive “you won’t make a profit without ships in your yard. It is better to win the bid and argue about the details afterward.”¹⁴ This loophole in the bid process must be closed either through the adoption of a radically new approach, such as performance-based contracting, or through the preparation of detailed management specifications that would ensure the comprehensive management requirements the navy demands. Arguments, particularly immediately after contract start, are to be avoided. It disrupts the team and sets the wrong tone for the work relationship. It is far less complex to avoid a dispute by

¹⁴ Anonymous Shipyard Manager while conducting 2002 ATHABASKAN Refit

preparing a better specification, than it is to resolve a dispute that arises from an ambiguous or poorly written specification.¹⁵

A third difficulty with inspection control is that its rigorous requirements come at a cost. For larger ship refits, the Naval Quality Assurance Representatives (QAR) can number up to 15 people to do the technical, logistic and engineering support, as well as contractor QAR. The QAR are squeezed between a heavy QA demand, and the growing technical and logistic challenges brought about by the vessel's age and the diminishing sources of compatible spares. Allowing the technicians to focus on the growing engineering, technical and logistic support issues, while maintaining the same quality, would be extremely beneficial. Having the shipyard's more directly responsible and accountable for project success would also be beneficial.

Finally, the reason that most companies moved away from inspection control is that it is very intrusive to the workflow. Production teams could be working very effectively on progressing a work package, when they reach a mandatory inspection point. At that time, they are not allowed to progress the work until they have notified the shipyard QAR, who must notify the Naval QAR, to conduct or witness the inspection. Although delays can be reduced through careful planning and close communication, time is often lost. It is recovering this lost time where the greatest gain in efficiency would be made, by switching to a performance-based approach to Quality Assurance. It was to gain these efficiencies that most industries moved to process quality control and then on to concepts like total quality management in the 1960's and 1970's.

We have discussed that naval Quality Assurance uses a form of inspection control, known as hold point control, which has been very effective in ensuring the

¹⁵ Fisher, K., *The Port Engineer's Course Notes*, Introduction

quality of the refit. Unfortunately, changes to the type of refit conducted (from baseline to condition based), and the process used for soliciting bids by PWGSC (from RFP to ITT), have made using the inspection control process more difficult. Finally, the tighter budgets of the 21st century require refit methods to be more efficient. Inspection control is costly; to prepare the work packages, to have a large naval QAR team within the shipyard, and to support the inefficiencies of time lost in stopping work. Having outlined some of the current difficulties with procedural-based contracting, let us now look at why we should embrace a performance-based contracting approach.

Performance Based Contracting

Performance based contracting focuses on the results rather than the process, and requires the definition of what you want to achieve rather than establishing how to achieve it. It consists of three simple questions. What do you want? When do you want it? How will you know when you have it? It very clearly leaves defining “the how” up to the contractor to decide the best method.

US President George W. Bush has pledged that over the next five years a majority of all of his government contracts will be performance-based.¹⁶ This large movement to performance-based contracting has been driven by the same needs the Canadian Government experiences, to get a better return on government investments. The US Office of Federal Procurement Policy (OFPP) conducted a study that found, on average, the technique has cut contract

with the upcoming contracts for CF-18 Hornet and CC-130 Hercules System Support. These contracts for engineering services, repair and overhaul, publication revision, and spares support will be performance-based and include cost saving incentives.

Performance-based contracts can have two fundamental approaches towards developing the specification. The first approach is a Performance Work Statement (PWS). The PWS is a more traditional form of performance-based acquisition. It incorporates a description of the results desired, the statement of work (SOW), with a quality assurance and surveillance plan. The SOW then becomes the principle vehicle for implementing performance-based contracting. Effectively writing the description of the results desired, without telling the contractor how to do his job, is the most important part of the entire contracting process.¹⁸ The Quality Assurance (QA) surveillance plan includes measurable inspection and acceptance criteria that correspond to the performance standards set forth in the SOW. To allow effective measurement of contractor performance, the QA plan and the SOW must be coordinated.¹⁹

A second approach to performance-based contracting is using a Statement Of Objectives (SOO). The SOO is an emerging methodology that turns the acquisition process around and requires competing contractors to develop the statement of work, performance metrics and measurement plan and then the quality assurance plan.²⁰ Both approaches are effective; however, for refit contracting it is believed that the PWS would be more suitable.

¹⁸ Fisher, K., *The Port Engineer's Course Notes*, p B-5

¹⁹ Wehrle-Einhorn, R.J., *Reinventing the Government Contract for Services*, National Contract Management Journal, 1994, p 65

²⁰ US Government Office Of Acquisition Management Website, Section 4.

The US Government and some Canadian departments are moving towards performance-based contracting because it provides, on average, a 15% reduction in contract costs. If no other reason were given, this might still provide sufficient incentive for the Navy to embrace performance-based contracting; however, there are still further contractual advantages that will be identified. Let us now compare performance-based versus procedural-based contracting and highlight some of these additional advantages.

Performance-Based versus Procedural Control Contracting

The best way to highlight the difference in the two approaches is through an example. A procedure-based specification for the refurbishment of a 1000 kW diesel generator on the IROQUOIS Class, would be about 25 pages long. It would outline the removals, safety precautions, measurements and a detailed, step-by-step procedure for the overhaul. It would have numerous hold-points for inspection and include a test sheet. It would also require that the overhaul be conducted under the supervision of a Detroit Diesel Field Service Representative (FSR). In reality, the FSR would know perfectly well how to overhaul a diesel and does not require the detailed procedure the Navy spent time and money developing. The procedure is mainly used to form the basis of the shipyard contractual bid.

A performance-based contracting approach would require that the diesel be overhauled, under the direction of the FSR, but would not define how to accomplish the overhaul. It would also require that the diesel overhaul be finished by a certain period of the refit and that a trial be completed at the end to validate that the performance was achieved. The specification would be shorter, probably only about four pages long. By

being shorter and less detailed, it would be quicker and cheaper to produce. As it is more general in nature, it would be more applicable to the next refit without any modifications.

Both methods achieve the same goal (i.e. the overhaul and testing of the diesel generator); however, the important differences are that in the inspection control example the Navy spent considerable time and money preparing a procedural specification. In preparing the detailed procedures, steps can be missed, which will be completed as a cost arising within the refit. Finally, by telling the contractor how to do the overhaul, the government has assumed a greater portion of the responsibility if anything goes wrong with the repair.

The main advantage of performance-based contracting is that it focuses on the results, without getting caught in the process. Prospective contractors will be submitting competing offers on the same output rather than on potentially different interpretations of the same effort. Thus, performance-based contracting for services is likely to avoid costs associated with ambiguous specifications and resulting constructive changes, as well as the administrative and litigation costs associated with disputes based on those issues.²¹ As it focuses on the output, performance-based contracting has an increased likelihood of achieving production needs. Further, the contractor has flexibility in achieving results, which enables more initiative and subsequently promotes contractor buy-in. In general, less detailed specifications are required, which reduces the time and cost of refit preparation. Finally, as the contractor is the primary decision maker, there is less likelihood of a successful protest.²²

²¹ Wehrle-Einhorn, R.J., *Reinventing the Government Contract for Services*, National Contract Management Journal, 1994, p 72

²² US Government Office Of Acquisition Management Web Site, Section 7.

Another advantage to performance-based contracting is that the management is an integrated solutions team, with all parties taking part. A team approach has been attempted for several years, within current refits, to greater and lesser success; however, with performance-based contracting teamwork is essential. A good working relationship and close teamwork is paramount to a successful performance-based refit. This also builds a better business relationship and more long term trust. “Both parties to a contract must be active participants during performance; passive contract management is taxed, active contract management is rewarded.”²³

A final advantage to performance-based contracting is that the same approach for contracting could be used for both new builds and ship refits. The next major naval build project is expected to be the Afloat Logistics and Sealift Capability (ALSC) vessel. The ALSC project is for the anticipated acquisition and long-term in-service support of a fleet of vessels to replace the Navy's aging Protecteur-class vessels.²⁴ The procurement will be a performance-based contract, with the final designs being developed through a competitive process. The prime contractor will then continue with the long-term in-service support. Using the same process for ship build and ship refit enhances the understanding of all parties in the process. It also leverages the experience gained from the build process, through the introduction into service and into the challenges of in-service support.

While there are many advantages to performance-based contracting, there are also disadvantages. One of the greatest obstacles is that the navy will have to give up some of its control of the refit process and depend more upon the shipyards. Many will find

²³ Fisher, K.W., *Fundamentals of Contract and Change Management for Ship Construction, Repair and Design*, p 2.

²⁴ Public Works and Government Services Canada, Aerospace, Marine and Electronics Sector Website

giving up control very difficult, and resist the change. A second problem is that the government will be starting at the bottom of a very steep learning curve. All of the specification and management SOW's will need to be re-written to reflect a performance-based approach, each with its supporting QA plan. This will be a considerable effort for each class of vessels. Further, as in any new process, mistakes will happen which will result in some unnecessary cost arisings and potentially some increased litigation, until things settle out.²⁵

Taking advantage of the considerable experience being developed by the OFPP, NASA, and the US military can flatten this learning curve. The OFPP, in particular, has a website that serves as a clearinghouse for US government lessons-learned, with some excellent examples. A similar exchange of lessons between the various Canadian Government Departments would also serve to flatten the learning curve. Finally, the maximum use of draft SOW's should be made in the process, to allow early shipyard feedback and process improvement.

We have examined the broad concepts of performance-based contracting, and determined that it provides several significant contractual advantages. It provides tighter, results-oriented specifications that would, in the long-term, be easier and cheaper to prepare. Performance-based contracting allows closer teamwork and more contractor buy-in. It also lowers the litigation risk to the Government. Its primary disadvantage is the steep learning curve resulting from the new process; a curve that can be flattened through several means, including effective exchange of lessons-learned and draft SOWs.

²⁵ Wehrle-Einhorn, R.J., *Reinventing the Government Contract for Services*, National Contract Management Journal, 1994, p 69

All of these advantages provide significant incentive for the navy to embrace performance-based service acquisition. Let us now examine how quality assurance specifically, might be established within a performance-based refit to meet the expectations of the two contract parties.

Performance Based Quality Assurance

Rather than inventing new quality assurance standards, performance-based contracting within a large, extended refit would be best accomplished using existing commercial performance-monitoring tools such as the International Standards Organization (ISO) 9000 Quality System. Quality is ensured through ISO audits, in an audit-incentive approach to contract success.

In shipyards, ISO 9000 has not been particularly successful. While the offshore industry uses it heavily, many commercial marine customers merely want their boat fixed, as cheaply as possible. Therefore, different customers have different expectations of what quality control they want and how much they are willing to pay for it.

A second difficulty results from the origin of the development of ISO 9000. It was initially developed by the automotive and aerospace industries, where it works very effectively on processes that are repetitive in nature and can be well documented (i.e. an assembly line or process facility). In the ship repair business, each repair can be somewhat unique. As previously described for the navy, writing a detailed procedure for the repair can be expensive and time consuming. Again, many customers do not want to pay for the descriptions to be written, which weakens the QA process. The shipyards get around this difficulty by having many general process descriptions, which workers are

supposed to understand and tailor to each job's needs. Unfortunately, not all workers are created equally, and not everyone understands the process. To be effective, quality control takes the involvement of everyone from the President to the lowest worker. It requires specific training.

This training challenge is exacerbated by the labour practices of shipyards who, to remain competitive, hire much of their low-end labour only for the upcoming week. Japanese quality expert Kaoru Ishikawa summed it best with “quality begins with education and ends with education.”²⁶ To have a fully integrated Quality System, shipyards must raise the training level of the entire staff.

It is for this reason that many of the proponents of hold point control continue to support it. As stated previously, it ensures the quality of the refit, regardless of how good an ISO system the shipyard has and regardless of the QA understanding of the workers.

In a performance-based approach to QA, there are two main methods currently being used for large-scale repair. The National Aeronautics and Space Administration (NASA) use one method, with a second commercial method used by most others.

NASA maintained use of the mandatory inspection point (MIP) control until very recently when, much like Canada, budgets began to stretch thin. They shifted to a performance-based contracting approach, which necessitated a shift from intrusive oversight of contractor activities to an insight surveillance role.²⁷ In a pilot project in their shuttle main engine facility, NASA attempted an approach that was somewhat between these two. They reduced the number of Mandatory Inspection Points (MIPs) from approximately 25,000 to about 8500, by eliminating all but the most critical. They

²⁶ Cocheu, T., *Making Quality Happen*, p xii

²⁷ Schmahl, K.E., Dale, R.A., *NASA Surveillance for Contractor Performance*, p 194

then mapped all the processes and developed insight surveillance concepts to review the contractor's performance within the remaining areas of shuttle processing. The results were very successful.²⁸ NASA inspectors found that their reviewing along the overall process, rather than unique inspection points, promoted a better understanding of the entire process and allowed them to better identify systematic problems. In one case they found a defective safety cable that they would not have found using traditional inspection control methods.²⁹ While this approach has been deemed a success, and will be more widely adopted throughout NASA, it appears to be somewhat of a step back from the declared goal of letting the contractor have as much responsibility for QA as possible.³⁰

The second, more widely used, approach is to adopt a methodology based totally on ISO 9000. This approach will require the shipyard to have a rigorous quality control system and to verify the performance of the system through regular (monthly to start) ISO 9000 audits. While this process is first being set-up, qualified independent inspectors should do the audits. These auditors must be experienced and knowledgeable in both ship repair and quality systems to have full credibility.³¹ An independent auditor should be used because the navy does not have particular expertise in this area, and also to maintain credibility. It will also ensure management team cohesion, if difficulties are experienced. It is envisioned that the management team would pass areas of concern or identified difficulties to the audit team prior to starting each audit and then jointly participate in the feedback.

²⁸ Ibid, p 195

²⁹ Ibid, p 201

³⁰ Ibid, p 194

³¹ Taylor, J.R., *Quality Control Systems*, p 289

The increased cost of the audits should be covered by the reduced expense of specification preparation and, if appropriate, a reduced number of QARs to conduct inspections. With experience, the audits will be required less frequently and might be managed within the government organization.

One of the other concepts associated with performance-based contracting is to provide incentives to improve performance or find more efficient means for achieving the goal.³² This is very difficult with intangible services like quality, safety, engineering or project management. While it is easy to distinguish between good and bad quality assurance, it is very difficult to quantitatively distinguish between good, very good and exceptional quality assurance. Nonetheless, some effort should be made to reward excellence. Further, by opening the possibility for positive incentives, you also open the possibility for penalties, which could be useful in some contracts.

For rewarding performance in refit Quality Assurance, it is recommended that the auditors report be considered as a starting basis. If the report is very good, with no perceived QA difficulties and exceptional service being provided, the contractor should be paid a reward of around 115% of the cost of the QA (a 15% profit would be considered high by PWGSC). If there are a few areas of improvement, the cost plus a small profit may be reasonable. Larger difficulties might mean the elimination of any profit or perhaps penalties, etc. If the reports are going well, and less close auditing is required, then the audits could be held every two months, or less frequently, and the costs of the audits held as Crown savings.

³² Wehrle-Einhorn, R.J., *Reinventing the Government Contract for Services*, National Contract Management Journal, 1994, p 69

The advantages to this QA approach are several. Foremost, because of the close auditing, the work quality of the refit should not be jeopardized. Secondly, it reinforces the quality of the work by using the contractor's profit motive (i.e. high quality means increased profits). Finally, rather than imposing a separate naval quality inspection scheme, it reinforces the shipyard's ability to build and use ISO 9000. The frequent auditing will ensure that ISO 9000 is widely trained and understood. This will pay dividends by building the strategic repair capability of the shipyard. It could also lead to the increased satisfaction of other commercial customers, which leads to increased national and international business and hence back to increased strategic capability. This concept that better quality makes for better business, is a cornerstone of the ISO 9000 philosophy.

If directly adopting an audit approach were considered too significant a step for the Navy, an interim step could be used similar to the NASA approach. The Navy's current use of "M" points could be maintained, with the "A/C" points replaced with surveillance methods. However, this approach would fail to take advantage of the full potential of performance-based contracting and would provide little cost saving.

It must also be repeated that any new approach to contracting must be an integrated approach for project, environmental, safety and risk management. It would include a re-write of all specifications. It must also have the support of the shipyards and PWGSC. One of the advantages of the performance-based contracting process described is that it would be equally applicable within the refit to environmental protection management using the ISO 14000 standards and project management, using standards identified by the Canadian Project Management Institute.

Conclusion

The Government had used the same approach to refit naval vessels since the Second World War. In hold point inspection control, the government prepares extremely detailed work descriptions, and then injects hold points to monitor and control the quality of the repairs. Although it has worked well, increasing expenses, tightening budgets and contracting changes have all impacted the effectiveness of recent refits.

A new approach is needed to squeeze every available cent from the refit dollar. Performance-based contracting of ship refits will provide such an approach. It has been embraced by agencies known for demanding a high quality of repairs, like NASA and the US Department of Defence. It has been studied by the Office of Federal Procurement Policy to reveal, on average, a reduction on contract costs of 15 percent. It is being adopted for the majority of US Government contracts by 2005, and will be used by the Canadian Air Force for the system support contracts of the CF-18's and CC-130's.

In addition to reducing contract costs, the navy should embrace performance-based contracting because it provides significant advantages over procedural based contracting. Once the learning curve is passed, the specifications are shorter and less costly to write. As the specifications are results orientated, they have an increased likelihood of achieving success. By promoting contractor flexibility, you enable more contractor initiative and support, which should result in further cost savings. Finally, by promoting and strengthening a consistent approach to the ISO 9000 Quality System, you are building the shipyard industrial capability, which enhances this strategic capability identified by *Leadmark*.

Significant quality improvement requires fundamental organizational change and that change requires commitment, leadership and strategy.³³ The navy is known for its commitment and leadership, it is now time to adopt a more successful strategy. While the use of performance-based contracting is still fairly new, it appears to provide some extremely worthwhile benefits, while supporting the core party expectations of the refit. It should be proactively investigated and seriously considered as a viable means to stretch the refit dollar, to meet the maintenance goals outlined in *Leadmark*, the Navy's strategy for 2020. Canada should embrace a performance-based approach to contracting ship refits.

³³ Cocheu, T., *Making Quality Happen*, p xiii

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