Marine Machinery Association -
Reducing Shipbuilding Costs in the Supply Chain

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For the past several years, the topic of reducing shipbuilding costs has been constantly studied, analyzed, and debated – sometimes strongly, in an effort to find effective cost-cutting solutions. Cost overruns have been experienced in so many different navy ship construction or ship repair contracts over the past eight years that 96 programs are nearly $300 billion over budget, according to the Government Accountability Office (GAO). Unless effective solutions are implemented immediately, those costs are expected to grow. Earlier this year, the Honorable Robert M. Gates, Secretary of Defense (SecDef), announced sweeping reforms to the upcoming military budget. However, these measures are only a short term solution to a problem which could impact the Navy's ability for future ship procurement. The primary focus of the Navy has been to meet the following strategic objectives – support multiple mission capability, project sufficient naval presence, implement reduced manpower requirements, and maintain a stable industrial base. These objectives are equally important for an effective solution. Unfortunately, they have not been equally addressed in the development of solutions. Without careful attention given to the supply chain infrastructure, implementation of many measures outlined by SecDef could also negatively impact an already-eroding industrial base.

While Secretary Gates appears to have been successful in restructuring some defense budget priorities, more financial conflicts appear to be on the horizon. In a speech to the House of Representatives earlier this year, Representative Ike Skelton of Missouri, chairman of the House Armed Services Committee, declared that the U.S. faces an urgent need to restore its economy. However, he also said that despite our critical economic situation, we must still maintain and enhance our national power. "In today's world, a strong national defense is not a luxury, it is an imperative." Skelton's statement accurately summarizes the current struggle in improving our forces for national defense. The U.S. must overcome its economic issues to rebuild, modernize, and strengthen military capabilities for projected threats of the future or risk potentially serious consequences.

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The Need for a Strong Navy – A Global Perspective

Other major countries, like Great Britain, have experienced major declines in their military forces year after year. In comparison, the U.S. Navy fleet has shrunk to its lowest level in decades while threats from different regions persist. Despite a decline in procurement from the 1990s and attrition from the past several years' conflicts, our military is still able to successfully project power and protect our national security interests. Unfortunately, our military personnel and equipment are stretched to their limit with repeated deployments. We continue to expect our forces to be successful in their mission objectives, while providing them with equipment that is outdated or beyond its service life. Yet as we wrestle with these budget issues, the threats from our current conflicts continue. Other nations also appear interested in testing our resolve as evidenced by the increase in minor incidents of harassment to our Navy ships. Most recently, a U.S. surveillance ship in international waters off the coast of China was harassed by several Chinese vessels. Another incident from this year included extremely low fly-bys from two Russian military patrol aircraft over a U.S. Navy aircraft carrier. Last year, Iranian military patrol boats harassed and provoked three U.S. Navy warships entering the Persian Gulf. In 2006, a Chinese Song-class attack submarine trailed a U.S. Navy carrier strike group engaged in an exercise in the western Pacific. At one point, the submarine surfaced in the middle of the group. These conflicts are an

increasingly clearer sign that other countries are attempting to gauge our defense and response capabilities.

Few people argue that with the 70-80-90 percent principle. This principle states that with 70 percent of our world covered by ocean, 80 percent of the world's population lives near coastal areas, and 90 percent of global commerce travels over the ocean, U.S. Navy aircraft carrier battle groups represent the best solution for power projection and protection of U.S. security interests. However, cost reduction solutions must be implemented immediately to maintain fleet readiness and prevent a weakening of our sea power. The current Secretary of the Navy agrees.

At a recent meeting with the Congressional Shipbuilding Caucus, Secretary of the Navy Ray Mabus discussed the importance of maintaining a strong Navy fleet along with a stable, domestic shipbuilding industrial base. In his opening remarks, Secretary Mabus asked why, in today's shrinking global environment, does America need to maintain a robust Navy. In response, the Secretary stressed that as a maritime nation, the United States must possess a global fleet. He noted that America's Navy and Marine Corps are always forward deployed and are able to quickly respond to any threat against interests of the United States. He also added that the U.S. does not have to ask permission to use the sea lanes, and a strong U.S. fleet minimizes the need for a presence on land to conduct wars, provide humanitarian assistance, or respond to disasters. Referring to the recent disasters in the Samoa islands, Secretary Mabus reported that ships from the U.S. fleet were already responding to the crisis. He stressed that America needs enough multi-mission platform hulls to respond to all missions.

Maintaining a robust shipbuilding industrial base is critical to maintaining a fleet capable of meeting global challenges.

Secretary Mabus observed that maintaining a robust shipbuilding industrial base is critical to maintaining a fleet capable of meeting global challenges. He also added that the Navy has responsibilities to the U.S. shipbuilding industrial base to provide stability and predictability in its procurement plans. However, he noted the industry's responsibilities to invest in facilities and retain a skilled workforce that will result in cost savings for ship production.

In closing, the Secretary stressed again the importance of the U.S. maintaining a strong Navy. He stated the need for a Navy in order to remain a global power. He also cited the need support our allies, deter conflicts, build relationships with other nations, and maintain the capabilities to provide humanitarian assistance and disaster relief.

Marine Machinery Association – The Critical Industry Link to Resolve Escalating Shipbuilding Costs

The challenge for the Navy and the shipbuilding industry is to overcome the economic difficulties that threaten both the fleet and the industry. Together, they have created a partnership to resolve the issue of rising ship costs. The Marine Machinery Association (MMA) has been at the forefront of efforts to resolve shipbuilding cost issues. MMA was formed in 1984 as a collaborative organization of hull, mechanical and electrical equipment manufacturers who supply components and equipment for Navy ships. Over the years, MMA has expanded to include all manufacturers of systems and products as well as services related to ships and shipbuilding. MMA has 44 member companies from all sectors of the marine industry.

Since its founding, MMA has hosted semi-annual public conferences on shipbuilding across the country. For the past several years, the focus has been on reducing escalating shipbuilding costs. MMA members fully understand the risks to the Navy and industry as well as the consequences of inaction. These concerns are

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shared by government agencies in the shipbuilding community who realize that national security and industrial infrastructure stability are at stake. Fortunately, the past few years have forged strong cooperative relationships between organizations such as MMA and government agencies to develop practical solutions for the problem. In fact, government agencies are increasing their presence at conferences such as those organized by MMA to inform industry members of current initiatives and engage in active dialogue.

MMA – Bringing Government and Shipbuilding Agencies Together For Solutions

Over the past several years, Marine Machinery Association has spearheaded efforts on the part of the marine industry to develop and implement solutions which would aid the Navy in achieving its goal of shipbuilding cost reduction. In fact, the Navy has solicited input from MMA on several cost-cutting measures to determine their effectiveness. Semiannual conferences over past years have focused specifically on this topic. MMA's goal in sponsoring these conferences is to bring representatives from all interested parties, namely the government, shipbuilders, and suppliers into one room where all can share ideas and concerns in a spirit of cooperation. These conferences have opened channels of communication and forged strong partnerships between government and industry. This year's fall conference in Warwick, Rhode Island, hosted by General Dynamics Electric Boat, was no exception. The theme of this conference concerned solutions for reducing costs within the supply chain.

MMA President Gary Schettler
Photo by Jim Quade

Outgoing MMA President, Gary Schettler of DRS Power and Control Technologies opened the conference and discussed the current schedule of MMA meetings and conferences. Mr. Schettler then reviewed the most recent remarks made earlier this month by Admiral Gary Roughead, Chief of Naval Operations (CNO). Mr. Schettler focused on several key areas of Admiral Roughead's remarks, including the impact of maintaining a balance between mandatory and discretionary spending, which will increase critical stresses on the military budget, a shift in focus to producing ships which are scalable to mission requirements, and increased energy security by reducing dependence on oil. He also highlighted recent professional workshops on Navy shock requirements, International Traffic in Arms Regulations (ITAR), and Rights in Technical Data regulations. Mr. Schettler noted additional workshops to be held concerning Naval Vessel Rules and Electromagnetic Interference (EMI) Requirements. Mr. Schettler concluded his remarks by introducing the founder and chairman of MMA, Mr. Jack Janetatos, for opening remarks.

MMA Chairman Jack Janetatos
Photo by Jim Quade

MMA Chairman Jack Janetatos welcomed conference attendees by noting that MMA conferences have discussed reduction of shipbuilding costs for the past seven years. During those conferences, a number of suggestions from MMA members and Navy shipbuilding organizations have been presented. Ideas, such as reducing the number of unnecessary or outdated military specifications, increasing commonality of systems and components between individual ships and ship classes, as well as the implementation of natural systems are all capable of creating efficiency and reducing cost if integrated into the shipbuilding process. Mr. Janetatos wondered aloud if the marine industry or the government had made any progress in reaching these goals each had set for achieving the overall objective of shipbuilding cost reduction.

Along with Mr. Janetatos, Mr. Blair Decker, Director for Materials Acquisition of General Dynamics Electric Boat (GDEB), contributed opening remarks. Mr. Decker began by noting that business relationships are a major key to business success. Mr. Decker recognized that such networking opportunities are an invaluable benefit provided by MMA. He also proclaimed the Navy's need for more ships of all types to meet current and future strategic goals. However, the ships must become more affordable without sacrificing quality and safety. Mr. Decker identified the critical importance of maintaining a ship's construction schedule. He briefly outlined the potential impacts when schedule delays occur. Mr. Decker emphasized material suppliers' critical role in maintaining a production schedule, noting that delayed deliveries of material could significantly impact a construction schedule. Therefore, suppliers are crucial not only to the timely production of quality navy ships, but also in the reduction of costs to build them.

Blair Decker - GDEB
Photo by Jim Quade

MMA Fall Conference Day One – A Shipbuilder's Perspective

John P. Casey - GDEB
Photo by Jim Quade

The first conference speaker was Mr. John Casey, President of General Dynamics, Electric Boat. Mr. Casey opened his presentation by thanking MMA suppliers for helping Electric Boat achieve significant production results despite recent economic difficulties. These include delivery of three new types of submarines, delivery over the past five years of five Virginia class submarines, one Seawolf class, and four SSGNs to the Navy. The shipyard expects to deliver one additional submarine before year's end. Mr. Casey believed marine industrial suppliers provided significant contributions to produce these results. Mr. Casey continued with remarks on the safety and security of our sea lanes and their importance for our survival. He noted a 60-percent increase in waterborne foreign trade since 1995 as well as the fact that 90 percent of the world's goods are shipped by sea. Mr. Casey pointed out that the U.S. economy is so strongly integrated with the shipping industry, that it is an economic and national security issue for the U.S. Navy to exert sea power throughout the world. He defined sea power as the ability to protect political, economic, and military interests through control of the sea. He provided a recent instance of Somali piracy as an example. In that case, a German container ship was seized by a small group of pirates and held for nearly four months until a $2.7 Million ransom was paid. He noted the relative ease with which a small, lightly armed group could disrupt shipping as this one did. Thus we must ensure our capability to protect our interests, which include commerce, science, industry, and security on the seas. Mr. Casey explained the marine industry's role in this effort should be to remain viable to support the Navy and its ship needs.

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Mr. Casey highlighted the accomplishments of Electric Boat over the last several years and attributed much of the success to suppliers. Mr. Casey underscored this success in spite of a sharp decline in marine suppliers since the end of the Cold War. Where nearly 17,000 existed then, only approximately 4800 remain today! Mr. Casey noted the mutual support that exists between suppliers and the shipyard has worked to sustain the industrial base despite the alarming decrease in suppliers.

Mr. Casey concluded his remarks by reminding attendees that Electric Boat is sensitive to the concerns of the supplier base. Although the shipyard has implemented practices which have created stability in the shipbuilding plan and the industrial base, any disruption such as reduction

in the number of submarines built per year, could threaten that stability. Mr. Casey called for vigilance in delivering orders on schedule and on cost with high quality.

Aaron Bresnahan - Wartsila
Photo by Jim Quade

The next presentation was given by Mr. Aaron Bresnahan, Vice President, Global Navy Segment, Ship Power Division, Wartsila Corporation. Mr. Bresnahan began his discussion with information on global economic factors that impact the shipbuilding industry. Most notable was the recent indication of an increase in commodity prices, particularly copper, nickel, and oil. These increases were attributed to increases in demands from China and other financial buyers investing in commodities. While these signs are considered positive economic indicators, many questions remain unanswered concerning the sustainability of this increase. Mr. Bresnahan compared these global economic indicators with some signs that our own economy is slowly improving. However, whether the worst is behind us still remains to be seen.

Despite the positive economic news, Mr. Bresnahan also noted some alarming statistics in the global shipbuilding industry. So far, 2009 appears to have the poorest performance with the lowest number of worldwide shipbuilding contracts in several years, dropping from approximately 2400 contracts in 2008 to barely 151 projected by the end of 2009. He predicted that 2010 would also have a low quantity of orders for new ships. The U.S. is following a similar trend by increasing the construction cycle of its aircraft carriers from four years to five and by cancelling orders for costly newer ships. Mr. Bresnahan indicated that the numbers on global shipbuilding forecasted a major restructuring in the global shipbuilding industry. Maintaining the industry within the U.S. is not only a concern for business, it is also a national security interest for the government. In contrast to the U.S., Mr. Bresnahan noted that China, recognizing the potential for problems, has begun to plan ahead and expand its shipbuilding capabilities. In doing this, China expects to capture approximately 35 percent of the global shipbuilding market share. Unfortunately, shipyards in other countries are also experiencing difficulties. Still some international companies like Russia's largest energy company, GAZPROM, are investing significantly in new construction ship orders, taking advantage of competitive pricing and other incentives. While all of this news is encouraging, what exactly does it mean for the shipbuilding industry? Will the current global trends continue or will nations shift their focus from sea power projection to littoral type combat strategies? More importantly, is there enough volume in shipbuilding orders to maintain the shipbuilding base and supplier at home and abroad? To date, the shipbuilding industrial supplier base in the U.S. has managed to survive economic difficulties by making difficult business decisions. Mr. Bresnahan predicted that in coming years, additional restructuring and realignment would be needed to reduce the impact from shrinking ship orders.

China, recognizing the potential for problems, has begun to plan ahead…

From the supplier prospective, Mr. Bresnahan noted a number of factors which affect the cost and availability of material. These factors included changing specifications, commodity prices, restrictions on specialty metal use, labor costs, and reduced volume in orders. All of these factors have the potential to affect the cost of Navy shipbuilding if steps are not taken to correct them. Mr. Bresnahan also discussed a new initiative circulating through Congress that would allow the government to acquire exclusive rights to technology from a contractor in order to increase competition and obtain the fairest price for development. Congress hopes this initiative will force contractors to avoid cost overruns in their products for the military. However, reducing the effects of the supply cost drivers would result in significant reductions in shipbuilding costs.

Finally, Mr. Bresnahan provided examples from the Coast Guard as a model for Navy shipbuilding. He noted the Coast Guard's simplified contracting structure, along with proven, durable hull designs which are purchased in volumes that make them more affordable. Mr.

Bresnahan concluded his remarks by noting that the marine industry would face challenges over the next few years as volume orders for new ships declined. However, he noted the opportunity for improvement in the industry which comes with challenges.

Tom Bowler -BIW
Photo by Jim Quade

Mr. Tom Bowler, Vice President, Programs, of Bath Iron Works (BIW) provided the next presentation. His discussion began with a brief history of BIW's use of modular construction processes. Modular construction of smaller ships has become a common process in modern shipbuilding. Construction and later assembly of these highly outfitted segments can significantly reduce the costs associated with the installation of systems and equipment in each segment or module. Large openings allow for easy access to install components that would otherwise require costly rigging and hull cuts to accomplish. The only significant limitations to modular construction are in the crane lifting capacities of the facility. Mr. Bowler described the yard's progression from building super modular units to mega modular units and finally ultra units. However, ultra units exceeded the capacity of the yard's cranes at that time. To resolve this situation, BIW made huge investments to improve their capabilities and facility. Mr. Bowler explained how a significant investment in infrastructure has helped BIW meet its objectives of efficient shipbuilding. One successful example of reducing shipbuilding costs has been a decrease in labor costs. Using their effective design and construction practices has resulted in a 34 percent reduction in construction man-hours for recent deliveries of Arleigh Burke class destroyers.

Mr. Bowler noted that his shipyard was able to effectively utilize modular design because of the yard's "Ready to Build" philosophy. According to Mr. Bowler, ready to build means that construction doesn't begin until several other objectives have been met. First, a stable and proven ship and system design is needed to identify construction process and materials. Next, the strategy for construction is developed and material is ordered. Also, the facility's capabilities and processes, including the development of the workforce, are validated for the construction task. Only when these objectives are met does the construction begin. The goal is to build the first ship just like the ships which follow. In other words, there should be no trial and error in first ship construction.

…shipbuilders and suppliers must work together to ensure material is available, appropriate vendor documentation is provided, and any changes to materials or specifications are immediately resolved…

The point in detailing this information was a simple one. As great as the processes are, they can only work if marine suppliers are able to support the needs of shipbuilders. That means shipbuilders and suppliers must work together to ensure material is available, appropriate vendor documentation is provided, and any changes to materials or specifications are immediately resolved to avoid delays.

Manufacturer's Panel Discussion on Supply Chain Management

Next, several MMA representatives took the stage for a manufacturer's panel discussion. The discussion, which consisted of five presentations, was moderated by Mr. Jack Barney of Johnson Controls, York Navy Systems, who started off the discussion with the first presentation. Mr. Barney presented information on innovative ways to reduce shipbuilding costs. He mentioned suggestions such as volume purchasing of ship hulls for each class. Aside from a reduction in material costs, this idea could reduce lifecycle costs as well. Mr. Barney also identified standardization of equipment across different ship platforms as a significant contributor to cost reductions. To achieve this

Jack Barney – York
Photo by Jim Quade

standardization, outdated technical specifications and testing requirements would need to be eliminated or revised instead of having specifications which are unique to a specific class. Mr. Barney also noted Value Engineering and Performance-Based Logistics as other excellent cost cutting solutions.

Next on the panel was Mr. Matt Streeter of Fincantieri Marine Systems, North America. Mr. Streeter discussed supplier alliances as a means of controlling costs. Mr. Streeter remarked that supply chain management in shipbuilding lags far behind other industries. He cited factors such as a lack of consensus on structure, function, and dynamics of integrating shipbuilding and supply chain management. He also identified adversarial relations among suppliers as an additional factor. To resolve these issues, it is necessary for shipbuilders to recognize the importance of supply chain management as a key strategy for reducing costs. As Mr. Streeter stated, alliances among suppliers have the ability to extend resources and technologies. They can also be very flexible, combining the right combinations of attributes from each partner to achieve the overall objective for a particular contract. However, a number of barriers exist which inhibit or prevent these alliances from forming. For example, trust is difficult to build between businesses which could potentially be competitors for the same diminishing Navy contracts. Additionally, suppliers are reflexively concerned about guarding their own financial interests – especially in the slow economy that exists today. Besides guarding financial interests, companies are also intent upon guarding proprietary information and other technology from competitors. Mr. Streeter emphasized that these barriers must be overcome to achieve success. As an example, he noted his own company's success in allying with other businesses such as Fairbanks Morse and several foreign major ship repair companies. He concluded by encouraging MMA members to do more in this area.

Following Mr. Streeter was Mr. James Baur of Jo-Kell, Incorporated. Mr. Baur discussed the successes of his company using the partnership principle described by Matt Streeter for supply chain management. Mr. Baur presented an impressive list of businesses which regularly partner with Jo-Kell to serve their customer base. He also described the benefits of these partnerships which include cost control, material availability, timely delivery, and improved quality. He concluded that suppliers and shipbuilders should continue to strive for commonality in components.

Suppliers and shipbuilders should continue to strive for commonality in components.

The next speaker in the panel was Mr. James C. Stouch, Vice President, Business Development and Sales for Precision Custom Components (PCC), LLC. Mr. Stouch opened his presentation by relating the history of his company. Mr. Stouch discussed the company's capabilities and their extensive experience in serving the U.S. military. He also highlighted several special processes employed by PCC including special welding techniques and catapult cylinder production for Navy aircraft launching systems. He concluded by noting that extensive manufacturing experience such as that possessed by PCC facilitated the development of solutions to complex material, welding, and processing specifications. This experience has also helped PCC to reduce production man-hours and cycle time while maintaining continuity.

The final presenter for the panel was Mr. James R. Hamel, Director, Defense Programs for Curtiss-Wright Flow Control Company. Mr. Hamel discussed the benefits and potential issues concerning the production of complex equipment for Navy and commercial customers in the same facility, along with the cost impacts. Using one of three business groups, Curtiss-Wright Flow Controls Company, Mr. Hamel provided an example that illustrates his concept. In the early 1950s, the Electro-Mechanical Division (EMD) manufactured canned motor pumps for the U.S. Navy. Using the same technology, EMD also began building similar pumps for the first U.S. commercial nuclear plant. Over the last several decades, these two pumps have formed the baseline for nearly all of EMD's products. The benefits of such a program are significant. For

example, the investment in engineering and skill maintenance for one market can benefit other markets. This multiple market development also allows for procurement of material in volume purchases which can create cost savings. The availability of material provides stable workflow and allows for timely delivery of products. Production for multiple markets also minimizes potential economic difficulties if a specific market experiences fluctuations, such as reduced orders for new ship hulls.

While these benefits are significant, there are also some challenges to the multiple market approach that should be considered. For example, unique requirements or specifications for one market, like the military, may not be practical or acceptable for another market's use, for example, a commercial customer. Therefore, the manufacturer or supplier could incur added costs and other difficulties of maintaining separate specifications. Additionally, for acceptance of a new product, multiple markets do not always move at the same pace. Thus, the benefits of multiple market production may not be realized with all products.

Mr. Hamel concluded with the statement that dual production for military and commercial markets can provide significant benefits and reduce costs. However, the challenges must be managed to ensure success.

Industry Panel – From Left to Right: Jack Barney, Matt Streeter, James Baur, James Stouch, and James Hamel
Photo by Jim Quade

Michael Kistler – NAVSEA
Photo by Jim Quade

For the next presentation, Mr. Michael R. Kistler, Executive Director, Systems Engineering Directorate, Naval Sea Systems Command (NAVSEA), discussed the program entitled "Documents for Ship Cost Reduction (DSCR)." The program is designed to help the Navy decide how to revise material specifications for the shipbuilding program and has been implemented as a result of a 2-percent increase in shipbuilding costs related to current specifications. In the spring of 2008, the Technical Warrant Holder from NAVSEA teamed with MMA members to analyze those specifications which affect the costs of materials, equipment, and services supplied for shipbuilding. Ten specifications were initially identified by MMA and presented to NAVSEA. These specifications were reviewed by NAVSEA and the National Shipbuilding Research Project (NSRP) for concurrence. As a result, cost-saving proposals are under review to change these specifications without impacting safety, quality, or mission capability. Initial results indicate a potential savings for the government that is significant.

MMA Fall Conference Day Two – Shipbuilder and Supplier Unite to Curb Costs

The next address was delivered by John D. Holmander, Vice President and Virginia Class Submarine Program Manager, Electric Boat. Mr. Holmander discussed his program's efforts to reduce costs in the Virginia Class Submarine Program. Between 1995 and 2005, the projected cost for 30 ships from this class rose approximately 35 percent from $71.1 Billion to $95.8 Billion. In 2005, Admiral Michael Mullen, then Chief of Naval Operations, directed the shipbuilder to reduce the projected cost from approximately $2.6 Billion to $2 Billion per ship. By 2008, Electric Boat was able to reduce the overall projected costs of 30 ships from $95.8 Billion to $92 Billion. Mr. Holmander detailed the efforts undertaken by the shipyard to achieve these results.

John Holmander - GDEB
Photo by Jim Quade

First, Mr. Holmander compared traditionally focused cost drivers, such as supply chain management and manufacturing efficiencies, with more engaged cost drivers, such as product design and process technology. Electric Boat realized that traditional drivers have the potential to add approximately 20 percent to the cost of ship production, while the engagement drivers could affect costs as much as 30 percent. By shifting focus to the shipyard's processes, significant savings in the production of Virginia Class submarines have been achieved. The strategy included increasing production performance on backlog orders, which are not hampered by the design changes that can often occur with first ship production. Additionally, the shipyard has implemented a plan to design for affordability. It has also developed a more efficient acquisition strategy**.** Continued improvement in labor efficiency has resulted in a reduction of approximately 3.7 million man-hours to date. This effort created a reduction in the construction schedule from 100 to 60 months. The overall savings realized by these efforts have been 30 percent across the board in facility, labor, and material costs, which adds up to nearly $5 Billion.

Mr. Holmander concluded by noting these improvements and a substantial backlog of orders created additional lifecycle value for the Virginia Class as well as stable procurement and production. All of this contributes to maintaining the industrial supplier base.

Supply Chain Management – The Critical Path to Curbing the Cost of Shipbuilding

The next conference speaker was Mr. Gregory. S. Harrison, Director, Material Acquisition for Bath Iron Works (BIW). Mr. Harrison discussed BIW's progress in transitioning to production of the DDG1000 and the important role of the supplier base, which should include specification and approvals that are required for each item. He began by describing the shipyard's performance. He first noted the shipyard's shift to modular construction as a cost saving measure for DDG1000. Making this shift successful, he remarked, hinged on timely delivery of material by suppliers. Next he reported on progress of the design phases of the project. He stated the shipyard's focus was to build the first ship like a follow-on ship, with no midstream design changes. Mr. Harrison then described the yard's progress on the current production of 36 modular units for the first DDG1000 hull, noting that 20 percent are complete in fabrication.

Gregory Harrison - BIW
Photo by Jim Quade

Mr. Harrison described the performance of the supplier base. He noted that all delivery orders for the first hull have been issued. On those orders, approximately 95 percent of scheduled supplier submittals have been submitted to American Bureau of Shipping (ABS) for approval. Nearly all of those reviews are complete with comments provided to suppliers. Mr. Harrison also praised the flow of communication from suppliers who constantly request manufacturing updates.

Additional cost reduction accomplishments for DDG1000 include a 60 percent parts rollover from the DDG51 class to DDG1000. Mr. Harrison acknowledged the supplier's role in general and MMA's in particular for the support that made this initiative successful.

In closing, Mr. Harrison once again emphasized the critical need of timely delivery of materials from suppliers, including the use of supplier performance scorecards and an emphasis in quality from subcontractors. Ensuring timely delivery and quality provides an excellent opportunity for reducing shipbuilding costs.

Following Mr. Harrison was Mr. Brian Cuccias, Vice President, Supply Chain Management, Northrop Grumman Shipbuilding (NGSB) Gulf Coast Operations. Mr. Cuccias began his presentation by describing the operational structure of NGSB and the portfolio of construction projects ahead. He also described the top five priorities in the shipyard's strategy for success, which included a strategy for supply chain management. Mr. Cuccias noted that performance in the supply chain was central to achieving the vision and a significant component of cost reduction – especially in relation to the flow of material from the supplier to the shipyard. He also described a common commodity strategy which involved reviewing the materials need by NGSB Gulf Coast operations and NGSB Newport News to determine common material needs. Where the material requirements overlap provides an opportunity to obtain material using volume buying and can improve the availability of material at the time of construction. Mr. Cuccias outlined the NGSB strategies for supply chain management which include initiatives for supply base risk management, strengthening supplier quality, investments in technical training for buyers and other personnel, partnering with the different construction programs and with engineering, and increasing communication and training for the supplier base.

Brian Cuccias - NGSB
Photo by Jim Quade

Mr. Cuccias summarized his remarks by stating supply chain management is critical for NGSB success and integration. He added that vendor reliability and health is a key to timely shipbuilder execution. He stated that NGSB is focused on understanding the marketplace as well as vendor challenges, risks, and opportunities. He also indicated today's environment creates unique opportunities and the Navy's posture can help sustain marketplace.

ITAR - Global Impacts to Domestic Shipbuilding

The next presentation was a detailed discussion of International Traffic In Arms Regulations (ITAR) conducted by Barbara D. Linney, Esquire of Blank Rome LLP. Ms. Linney discussed the Arms Export Control Act (AECA) which is administered by the Directorate of Defense Trade Controls (DDTC). The purpose of the act is to regulate exports and temporary imports of defense articles listed on the U.S. Munitions List (USML) and related technical data and defense services.

Barbara Linney – Blank Rome
Photo by Jim Quade

The Department of State implemented ITAR to protect technical information from being improperly exported from the United States. Unfortunately, due to the broad interpretation of the USML definitions, many commercial products used aboard U.S. Navy ships or commercial products having dual military and commercial use are arbitrarily included under the ITAR umbrella. The companies supplying those commercial products with no significant military characteristics are still required to abide by ITAR regulations, which add significant cost to their

operations. This increases shipbuilding costs if these systems or components are installed on a military vessel.

Ms. Linney provided definitions for the technical terms and described the type of defense related information that could be considered for the USML. She noted that in order to conduct business under the AECA, an organization must register with the DDTC and obtain export licenses for the specific technology which will be exported. Ms. Linney advised members that planning ahead was importance since processing of all paperwork could be time consuming, taking as long as two weeks or more to complete.

Ms. Linney also identified countries that are subject to U.S. export trade embargos and provided a more detailed definition of an export. She also provided a description of the security controls, such as the National Industrial Security Program Operating Manual (NISPOM) which in place to provide information and prevent exports to unauthorized sources. Next, Ms. Linney explained the criminal and civil penalties for violating export control laws. During the presentation, she pointed out that many companies which deal with the Government are not aware that their products may be subject to export controls and stressed the need for a solid compliance program. Such a program should contain informative training and the status of customers, suppliers, and employees that may be involved in the export. She concluded by noting that a business could avoid legal pitfalls by ensuring only authorized persons have access to controlled items.

Following this presentation, Mr. Andrew W. Dyer, Jr., Esquire, also of Blank Rome LLP presented a discussion on rights in technical data. Mr. Dyer described the various types of intellectual property rights, which include technical data, computer software, patent rights, and copyrights. He also listed the publications which govern these rights for civilian agencies and for the military. He then explained the rights in technical data identified by the Federal Acquisition Regulations (FAR). For example, Type 1 rights grant the government unlimited rights in any technical data. Type 2 rights provide some restrictions but still allow the government some use. Mr. Dyer then contrasted Defense Federal Acquisition Regulations (DFAR) rights which are more restrictive. He concluded by mentioning the Littoral Combat Ship (LCS) program as an indicator of the fate of manufacturer's technical data rights.

Andrew Dyer – Blank Rome
Photo by Jim Quade

In July of 2009, Congress passed a defense spending bill for fiscal year 2010 which includes language for obtaining rights to technical data for military use. Essentially, if a contractor exceeds the costs for construction of a military project, the government would then inherit unlimited rights to the technical data so that the government could allow competitive bidding to take place for a better cost on construction.

Following Mr. Dyer, the conference adjourned for lunch and remarks were provided by Mr. Jack Evans, Executive Director, Program Executive Officer (PEO), Submarines. Mr. Evans discussed the topic of risk management in ship construction. During his address, he noted the importance of adhering to specifications in the construction of ships and their systems. He also described the complications that could occur when departures from specifications are required for a system or component. Mr. Evans stated that in the pursuit of reducing costs via the multiple methods discussed by other speakers, it is critical that technical rigor and thoroughness in understanding the more affordable end products is critical to the safe and reliable operations of the ships we deliver to the Fleet. Using examples of actual decisions in

Jack Evans – PEO
Submarines
Photo by Jim Quade

submarine design, construction, and modernization, he also illustrated the importance of knowing system performance in all environments as costs are driven down.

Mr. Evans concluded his remarks by encouraging conference attendees to invest in today's youth. By challenging them to study sciences and mathematics, as well as promoting the marine industry, a future labor force capable of meeting challenges for ship design and construction can be developed and the critical skill pool needed to keep our fleet at its best will be preserved.

Component Commonality – A Key to Unlock Solutions for Rising Costs

John Sofia – NAVSEA
Photo by Jim Quade

John Sofia, Director of NAVSEA's Surface Technology Program Office, provided an update on the Navy's commonality efforts. Mr. Sofia stated in a presentation earlier this year that the accumulation of non-standard HM&E equipment is a major cost driver in support of shipbuilding. The extremely high number of unique components throughout the Navy supply system resulted in a mandate for commonality throughout the fleet. NAVSEA's response to this problem was to develop the NAVSEA Commonality Instruction. The overall goal of the instruction is to minimize variation in design for the same types of systems across different ship platforms. Mr. Sofia informed the conference attendees that this instruction was approved and implemented by the Navy on April 6, 2009. Since the implementation of this instruction, six major shipboard systems have been analyzed for commonality impacts. The results have been exciting. For the 16 component types within these systems, analysis indicated the Navy could achieve an average of 71 percent reduction in component variants. This would equate to a total cost savings of $732 to $752 Million over a 25 year period. In total, the Navy expects to target 46 systems for analysis of commonality with a goal of reducing the overall number of Navy Allowance Parts Lists (APLs).

David Kreyssig and Pieter Van Dine - GDEB
Photo by Jim Quade

During this presentation, Mr. David Kreyssig and Mr. Pieter Van Dine of General Dynamics Electric Boat also described commonality efforts for valves on Virginia class submarines. The problem for submarines is the complex mechanical systems which require many configurations of valves manufactured to strict specifications. Because of the quantity and variety needed, valves can be a significant driver for submarine construction costs. A single Virginia class submarine requires nearly 6000 valves for all of its mechanical systems. Although some significant parts reduction and standardization have already been achieved for the Virginia class compared to other submarine classes, applying commonality principles to valve requirements could increase the standardization and reduce costs even further. The designers of the Virginia class have already achieved a 15 percent reduction in the number of valves and a 25 percent reduction in the type of valves compared to other submarine classes. The commonality review was designed to increase those numbers, if possible. Surprisingly, the results of the review indicated that a change to common valve bodies would increase acquisition costs and weight to the ship while possibly lowering lifecycle costs. However, the review did identify several cases where a functionally identical but less costly valve or common valve could be used in some applications.

Automation – Striking at the Root of Reducing Labor Costs

The next presentation was conducted by Ms. Roshan Roeder, Technical Director and Mr. Ed Quigley, System Engineering Manager, Large Deck Amphibious MCS Programs for Northrop

Grumman Sperry Marine. The two discussed machinery control automation as a means to reduce total ownership costs. Machinery control system (MCS) automation is already prevalent in commercial marine applications and some foreign navies. The use of automated controls can provide a number of significant benefits for ship such as reduced manpower requirements, ease of use, and automated responses to some types of casualties. The Navy is hoping the integration of automation into the fleet will reduce manpower requirements and their associated costs. Automation also has the potential to reduce maintenance costs since the automated system could implement a program of condition based maintenance instead of the current scheduled maintenance programs in effect. Ms. Roeder and Mr. Quigley noted that while automation could reduce manpower in some respects, there would still be a deficiency since crews would need to have more knowledge and skills in information technology than before. However, the benefits associated with automation can increase operating efficiency through centralized control, remote monitoring and alarm capability, casualty control, report generation, and security.

Roshan Roeder – Sperry
Photo by Jim Quade

The presenters continued to detail areas in which machinery control automation would benefit overall safety and performance of the ship. They concluded by noting Government and industry should define a proper balance of automation during the requirement development phase. Depending on operating requirements, automation can support reduced manning initiatives and reduced total ownership costs. Finally, they proclaimed the incorporation of automated features has been successfully demonstrated and utilized onboard U.S. Navy ships.

Bruce Shively - DSC
Photo by Jim Quade

Following these remarks was Mr. Bruce Shively, Supplier Relationship Manager, Defense Supply Center, Columbus. Mr. Shively discussed strategic sourcing in relation to supply chain management. Mr. Shively explained the Defense Logistics Agency (DLA) is a $36.8 Billion enterprise, providing over 95 percent of military spare parts, managing nearly 4 million national stock numbers (NSNs) across eight different supply chains, and supports 115 nations in Foreign Military sales. Additionally, he stated the agency's warehousing capacity as the third largest with only Fed Ex and UPS having more capacity. He also noted that if the DLA was treated as a Fortune 100 company, it would rank at about number 56.

Mr. Shively explained that good supply chain management requires adherence to several stewardship principles. First, he listed protection of the supply chain by delivering conforming material. Next, he noted enhancement of warfighter readiness by being able to meet the customer's needs. Lastly, he added efficient use of taxpayer dollars, incorporating automation, and maximizing small business participation as other important principles for good stewardship. One important issue described by Mr. Shively, which impacts material pricing, occurs when original equipment manufacturers use exclusive distributors for spare parts, particularly to the Department of Defense and DLA. This arrangement can cause price increases on material without adding any value. He identified some known relationships which cost approximately $192 Million over a three-year period. Mr. Shively suggested that increasing competition through alternative sources would help to control costs.

Continuing the presentation, Mr. Shively next laid out four acquisition strategies to promote good stewardship. For example, for certain commodity groups, it would be more efficient to acquire whole supply chains to ensure availability at the best price. An additional strategy would allow for acquiring and integrating supplies and services where appropriate for the needs of the customer. If services are not required, then strategic materials can be arranged with a flexible response. Finally, non-strategic material can be acquired as needed. Mr. Shively predicted that changing

budget requirements would necessitate changes in future sourcing of materials. He concluded by reiterating future budgets will be constrained. Therefore, warfighter readiness must be enhanced and entire supply chain involvement is critical.

The final presentation of the day was provided by Al Taylor of L-3 Communications Marine and Power Systems, who discussed shipbuilding cost savings. Mr. Taylor described his company as the sixth largest U.S. defense company with over $14 Billion in annual revenues and 60,000 employees. While noting that his company has participated in almost every major Navy program, military sales accounted for only 50 percent of their business.

COTS Technologies – Merging Component Commonality with Commercial Technology is the Future of Shipbuilding Cost Savings

Mr. Taylor stated COTS technologies have been become highly reliable as equipment specifications are beginning to exceed military requirements. Additionally, high levels of redundancy are incorporated into many components. Also, many industrial control components are now safety integrity level (SIL) certified. In addition, COTS hardware pricing is now driven by very competitive industrial applications. He also noted that increasing competition among suppliers would decrease costs. However, he noted doing so would require certification of more suppliers in contrast to an earlier suggestion that the number of suppliers should be reduced.

Al Taylor – L-3
Photo by Jim Quade

Mr. Taylor also provided some suggestions for utilizing technology to its best advantage. He encouraged the conference attendees to stay current on technology as much as possible. He also added that technology should be applied across as much of the fleet as possible and it is important to share technology needs with the suppliers. Lastly, it is often helpful to look at the technologies other navies incorporate into their ships, since they generally do not have large fleets.

He concluded by emphasizing the need for increased communication with suppliers. He also stressed inclusion of as much COTS material as possible into a design and increasing commonality as much as possible across the entire fleet.

After closing remarks by Mr. John Lovasz, the conference was adjourned with an invitation to all for the next annual meeting.

MMA – A Communication Portal for Industry, Shipbuilders, and the Warfighters

Navy officials and industry leaders agree that a strong marine industrial base is a major factor in the solution to shipbuilding costs. In fact, the industrial base itself has provided many valuable suggestions for making ship construction more efficient without sacrificing quality or mission capability. As dialogues continue between government and industry, the Navy will move closer to its goal of achieving the desired fleet within budget limitations. However, there are still challenges ahead that must be overcome. The MMA will remain a communication portal for Industry, Shipbuilders, and the Warfighters to brainstorm and implement the potential and ongoing solutions presented within this paper. In order for the Navy to continue as a global force for good while protecting our shores, seas, and commerce, we need to do all we can to build products that make the necessity of US Navy shipbuilding more affordable for the sake of our nation.

MMA is dedicated to continuing its service as a channel of communication for government and the marine industry to explore cost-cutting solutions. □

For more information on membership or details about the Marine Machinery Association, visit http://www.marmach.org.

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