Not for publication until
Released by the
House Armed Services Committee

Statement of

Fred P. Moosally, President, Lockheed Martin MS2

Kevin Moak, Chairman & President, Gibbs & Cox

Richard McCreary, Vice President & General Manager, Marinette Marine Corporation

Mike Ellis, Executive Vice President & Chief Operating Officer, Bollinger Shipyards, Inc.

Before The

House Armed Services Committee

Subcommittee on Seapower and Expeditionary Forces

February 8, 2007

Not for publication until
Released by the
House Armed Services Committee

Mr. Chairman and distinguished members of the Subcommittee, thank you for the opportunity to discuss the progress we are achieving on the U.S. Navy's LCS Program. This document addresses, in detail, the major issues that are driving cost growth on the LCS 1, lessons learned, and corrective actions we have implemented on LCS 1 and plan to implement to ensure LCS 3 construction does not experience the same challenges. Speaking for the men and women of Lockheed Martin and our partners Gibbs & Cox, Marinette Marine and Bollinger Shipyards, we are very proud to be associated with this important National Defense program. LCS will be a key component of the Navy's Surface Combatant force which is a critical capability for projecting American power abroad and supporting the Global War on Terror. Each of us, in accomplishing our daily tasks on the program, has a deep sense of the importance of achieving the very best for the Navy and our nation.

The Lockheed Martin (LM) Team is committed to delivering LCS ships at an affordable price and has invested tens of millions of dollars in design efforts, business process improvement, and other areas to ensure our team supports the Navy's needs for efficient shipbuilding over the life of the LCS Program. As you will read in this document, our team has experienced cost and schedule growth on LCS 1 due to:

- The initial program's aggressive acquisition plan, which resulted in a moderate risk program plan that provided little flexibility in the areas of cost and schedule from the outset.
- With little schedule flexibility from the outset, the program was significantly impacted by the insertion of new shipbuilding standards and build specifications (shortly after contract award and at the conclusion of Final Design) that introduced extensive changes, above those expected for a lead ship. The Naval Vessel Rules introduced over <u>14,000 new technical requirements</u> <u>which</u> required review and adjudication to determine applicability to the Lockheed Martin LCS design. This in turn drove many of the over 600 engineering changes on the lead ship.
- Adverse material shortages (e.g., steel needed for U. S. Army wartime requirements) and a vendor supply issue on a major component (i.e., main reduction gears delivered six months late) that forced out-of-sequence ship module construction in order to minimize the impact to the overriding program management goal --- schedule.
- First-of-Class issues associated with the process of transitioning a new ship design into production.

Collectively, these challenges forced significant program inefficiencies through out-of-sequence construction, excessive unplanned concurrency between design and production, and significant rework, all of which are still impacting the LCS 1 cost and schedule.

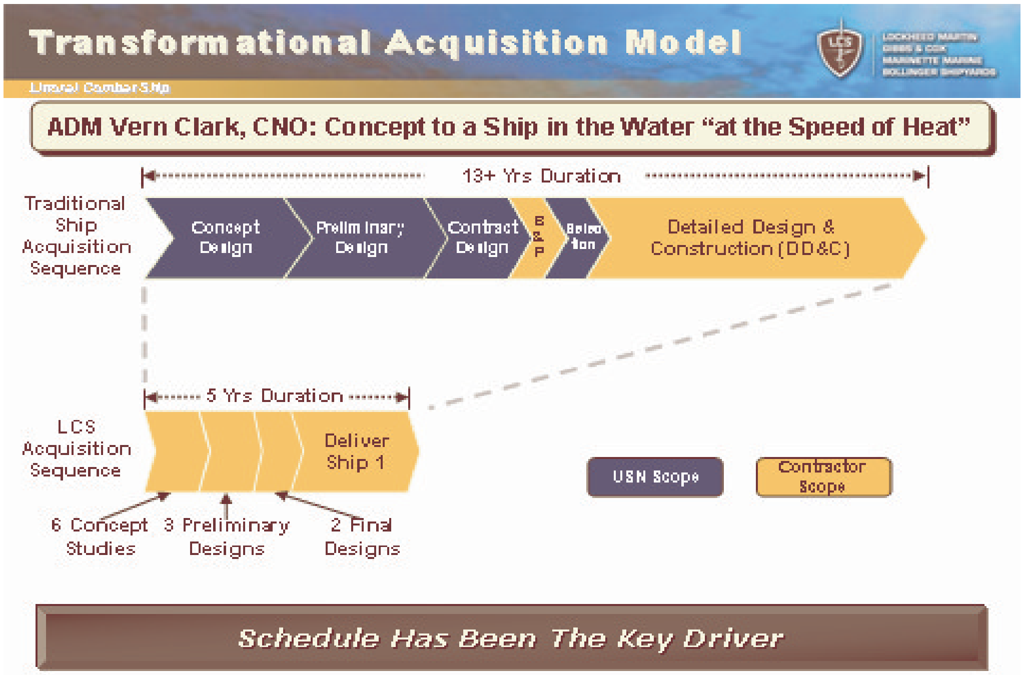
The Team has conducted lessons learned assessments and implemented corrective actions throughout the LCS 1 design and construction program. We recently conducted a detailed root cause analysis and developed additional corrective actions, all of which are being implemented into the LCS 3 program plan to ensure we do not experience the same challenges on that ship.

The LCS Program is a transformational acquisition. And while we have not achieved all of our goals on the lead ship, we are on track to deliver this ship 60% faster than under a traditional acquisition process. In addition, LCS 1 is the first combatant designed to the Navy's new Naval Vessel Rules and the first surface combatant classed by the American Bureau of Shipping (ABS). As such, we are paving the way and learning countless lessons for the design of future U.S. Navy Surface Combatants such as DDG 1000, which will also be designed to these same standards. Despite the cost growth associated with these achievements, we are on track to ensure that LCS will be the most affordable surface combatant in the U.S. Navy.

Overview

The LCS Program had its origins in 2002, when the U.S. Navy established top level objectives and funded industry for exploratory studies for a Focused Mission High-Speed Ship. This ship was envisioned to be a networked, agile, surface combatant capable of defeating anti-access and asymmetric threats in the littorals. LCS was to be procured under a "transformational" accelerated acquisition strategy that would enable the ships to be designed, constructed, and delivered to the Fleet in less than half the time of a traditional acquisition using best commercial shipbuilding practices, commercial off the shelf (COTS) equipment, and a spiral development process. This strategy was reinforced by senior Navy leaders who frequently stressed the need to get LCS to the Fleet with all deliberate speed. Schedule was the overarching program priority since the program began. The Navy also adopted commercial shipbuilding standards and would have the ship constructed and classed under the American Bureau of Shipping (ABS) rules. The ship would also be completely designed by industry. It was believed that this acquisition strategy would lead to significantly lower acquisition costs and a $220M (FY05) unit cost target was established beginning with the lead ship. Unlike previous programs the cost target was included as a program requirement in the JROC approved Capabilities Development Document.

Another key element of the acquisition strategy was to utilize RDT&E funds and cost-plus contracts to pay for the lead ship of each design, as they were in many ways considered prototypes. Cost-plus contracts are the right contracting vehicle for lead ships since requirements are typically immature, and result in significant changes.



Lockheed Martin (LM) LCS Team Approach

Lockheed Martin's approach to LCS was to assemble a team of "mid-tier" shipbuilders and an independent Naval Architect to design and construct the ship. The Navy had consistently encouraged participation from smaller shipbuilders that could more efficiently build ships similar in size to LCS as well as being able to use commercial shipbuilding processes. In 2003, Lockheed Martin established formal agreements with Gibbs & Cox and shipbuilders Marinette Marine and Bollinger Shipyards. Two shipyards were brought on the team to ensure there was sufficient capacity to meet the Navy's steady-state build rate of up to six ships per year.

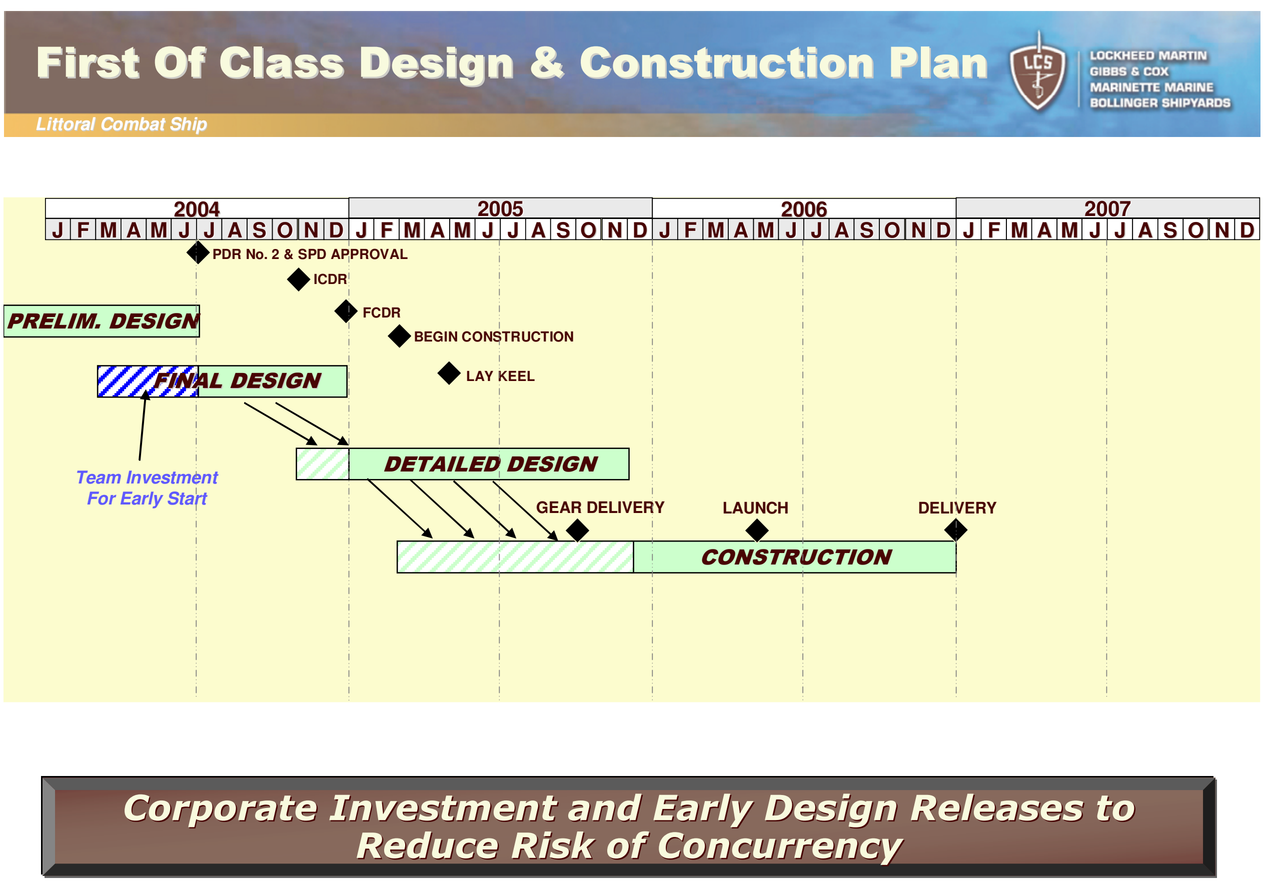
Lockheed Martin serves as the prime contractor and mission system provider for the team. LM's experience includes development and prime contract management of the Sea Shadow, Sea SLICE, and AGOR 26 vessels for the Office of Naval Research (ONR) as well as serving as the systems integrator and combat system developer for eight classes of Naval Surface combatants in six countries. Over 150 ships currently in service in 20 navies around the world, including the battle proved FFG 7 and DDG 51 class U.S. Navy surface combatants, were built to Gibbs & Cox, Inc. designs. Marinette Marine (Marinette, WI) and Bollinger Shipyards (Lockport, LA) have the facilities and capabilities to build ships similar in size to LCS. Marinette Marine has successfully completed commercial, ABS Classed and Government shipbuilding contracts in their long history, including U.S. Navy Mine Countermeasure Ships, U.S. Coast Guard Buoy Tenders and Ice Breakers, and multiple Ferries and Tug Boats. Bollinger Shipyards owns and operates 13 full service Shipyards on the Gulf Coast with a workforce of over 3,000. Bollinger's three new construction yards have built and delivered 597 vessels in the last twenty years. This includes 166 military vessels for various branches of the Government (U. S. Navy, U. S. Coast Guard, and U. S. Army), and 431 commercial vessels. These mid-tier shipyards are lean and have the flexibility to balance commercial and Government workload to ensure that the Navy does not have to pay overhead costs to maintain capability during periods of limited Government funding. Marinette and Bollinger have proven that they are also capable of constructing unique, one-of-a-kind vessels on fixed budgets and schedules if they begin with stable requirements and a mature design package.

The LM team entered the LCS competition with a new semi-planing monohull design based on similar ships built by Fincantieri of Italy. The team developed and implemented a common program approach to ensure maximum learning between shipyards. This included a common computer aided design system, common hull block breakdown and build sequence, and extensive sharing of construction processes. The approach was to form one integrated shipyard with the capability to construct LCS ship modules at either yard. In fact, this was proved during the construction of LCS 1 when Bollinger successfully constructed the largest and one of the most complex hull modules for Marinette Marine.

The LM Team developed a comprehensive phased approach to accomplish Preliminary Design (6 months), Final Design (7 Months), Detailed Design and Construction (24 months) and deliver the LCS using commercial shipbuilding approaches, non-developmental components from domestic and international COTS vendors to meet the cost and schedule goals set forth by the Navy acquisition plan and required in the LCS Request for Proposal (RFP). Given the aggressive acquisition schedule, this plan also time-phased the design and construction activities to allow the designs to be completed and approved by NAVSEA and ABS prior to construction. This approach would allow Marinette Marine (MMC) to construct modules that were pre-outfitted to

85% or more prior to erection. Such an approach is critical for cost-effectively building the ship and historically, MMC has been able to achieve these levels of pre-outfitting on both commercial and government shipbuilding programs.

Preliminary Design began in July of 2003 and culminated in a successful Preliminary Design Review in January of 2004. Final Design proposals were delivered to the Navy in January of 2004 with final design anticipated to start in May of 2004 after award. During the 5 months between the end of Preliminary Design and the start of Final Design the LM team made a significant investment to begin Final Design ahead of contract award to reduce the risk of completing the final design in the required 7 months. The requirements baseline at the January 2004 Preliminary Design Review included the Oct 2003 Naval Vessel Rules (NVR), a draft release of the Feb 2004 NVR, and the 2003 High Speed Naval Craft (HSNC) rules. The LM team in conjunction with the Navy and ABS also established an ABS rules matrix to identify alternate rules to use where no specific rules were listed in the draft NVRs. Using this requirements baseline from PDR the team transitioned into Final Design ahead of contract award. These investment activities included Gibbs & Cox, Marinette Marine, Bollinger Shipyards and Lockheed Martin executing the proposed processes and tools and employing the key personnel identified in our proposal. This period allowed the team to mature the design and start 133 (59%) of the functional design drawings required for submittal to ABS and complete 53 (24%). This effort further reduced the risk going into the 7 month Final Design phase.



As part of the proposal activity, the LM team, negotiated Firm Fixed Price (FFP) subcontracts for 12 major systems, which would remain valid for subcontract execution after the prime contract was awarded. In addition the team executed Letters of Intent with three critical long lead suppliers, whereby these suppliers agreed to undertake design and production planning activities at their own cost and risk, in advance of contract award. These activities were intended to minimize overall cost and schedule risk. The requirements for these components were based on the Preliminary Design requirements baseline, as documented in formal Purchase Technical Specifications. The team also submitted for approval a Specified Performance Document defining the official performance baseline for the program. The mature design that resulted and the negotiated supplier base were part of the LM team's risk mitigation approach to deal with the aggressive acquisition schedule set by the Navy. Despite these mitigation efforts we assessed the schedule as a moderate risk.

LCS 1 Program Execution Challenges

Final Design and Detailed Design & Construction was awarded to the LM team on 29 May 2004. A U.S. Navy / LM Team kickoff meeting was held on 3 June 2004. At kickoff the team was informed that the requirements baseline had changed substantially. A new version of the NVR, dated 21 May 2004, was to be invoked as well as an extensive list of modifications to the Specified Performance Document. The new NVR included over 14,000 new technical requirements and 23 previously unreleased major sections which required review and adjudication to determine applicability to the Lockheed Martin LCS design. This in turn drove many of the over 600 engineering changes on the lead ship. This substantial change to the requirements baseline (driven by the new NVR) caused the team to revisit much of the design accomplished during the Preliminary Design Phase and invalidated the progress made possible with team investment during the early start of Final Design. The LM team pre-contract schedule progress funded with corporate investment was negated by these NVR-driven design changes.

Comparison of the May 2004 and February 2004 NVR Specifications

	Draft Feb 2004 NVR			21 May 2004 NVR		
NVR Part	**Pages**	**# Tech Rqmts**	**# of Sections**	**Pages**	**# Tech Rqmts**	**# of Sections**
Part 0 - Intro/General Provisions	166	1537	9	184	713	11
Part 1 - Hull and Structure	140	1042	4	220	1643	6
Part 2 - Propulsion and Maneuvering	238	2265	2	628	6386	7
Part 3 - Electrical Systems	270	2383	5	417	2967	5
Part 4 - Control and Navigation	210	1680	4	233	2229	5
Part 5 - Auxiliary Machinery Sys	199	1409	6	765	9223	15
Part 6 - Habitability and Outfit	421	2217	14	156	2410	16
Part 7 - Military Environment	10	24	3	17	19	3
Part 8 - Materials and Welding	650	2704	18	587	3845	20
Total	**2,304**	**15,261**	**65**	**3,207**	**29,435**	**88**

On 12 June 2004 the team conducted a second PDR (six months after the original PDR) to reset the requirements baseline. Although PDR was considered successful by the Navy / Industry Team, many of the completed preliminary design and final design products had to be reworked. To maintain schedule the team began Final Design in parallel with this Preliminary Design re-work to meet a December 2004 Final Critical Design Review milestone. During this period the team updated the material Purchase Technical Specifications and began to renegotiate our fixed price contracts with suppliers. Development of the Build Specification began in this early phase, to document and reflect the design as it was evolving. The resulting concurrency in designand construction negatively impacted the team's ability to clearly assess, depict or predict the overall schedule impact due to the cumulative impact of all the changes.

Throughout the process of incorporating the Naval Vessel Rules and the build specification updates, the ship's cost, weight and performance were closely monitored. As cost broached the $220M target, the LM Team continuously offered solutions and reductions to the Navy for consideration. The same was true for the increased weight driven by changes that added capability, redundancy and/or survivability improvements, but impacted performance. The Team formed a "weight management" group with the NAVSEA technical staff where all impacts were assessed and all options to remove weight, implement material changes, and use alternative commercial practices were offered through an ongoing review process. The same structure was established for cost increases as both LM and the U.S. Navy engaged in an iterative process to examine options to remove as much as $60M across a period of 18 months. Some of these recommendations were accepted, but many were deemed unacceptable since they could infringe on the performance factors still considered as top priorities. Throughout the churn of the process, clear offers were presented by the LM Team to balance both cost and weight. While the LM Team established an expedited process for generating and qualifying cost / weight reduction ideas, the Navy's process for considering and approving these options was not similarly streamlined.

In January 2005 the team conducted a successful Production Readiness Review and construction started in February 2005. At this point the team was executing Final Design and Detailed Design & Construction in parallel to maintain schedule. The team experienced two substantial supplier production issues early in construction. The design called for HSLA-80 steel for the shell plate below the waterline for its high strength, light weight and fracture toughness. This steel alloy is unique to military applications and is available from only one domestic supplier. The team was informed by the mill that a higher priority Army program would delay our material for several months. After an exhaustive search for alternate supplies the team decided to redesign the effected hull modules to use alternate steel alloys to maintain the production schedule. In early May 2005 the team was also informed by MAAG Gear AG that a production error that damaged a critical gear forging and would cause a 2-3 month delay in the delivery of a reduction gear. The team responded, and the Navy concurred, with a plan to re-sequence module construction to accommodate the delay. A series of additional manufacturing issues with the reduction gear ultimately caused this delay to grow to 6 months. The team was also forced to renegotiate many of the fixed price material contracts to reflect NVR-related changes. This drove cost increases and schedule delays for HM&E and combat system components such as the machinery control system, switchboards, load centers, and navigation systems.

Main Reduction Gear
MAAG Gear AG is the subcontractor for the LCS main reduction gear. MAAG is responsible for approximately 50% of the gear scope, including the overall design, fabrication of the gear casings and supply of auxiliary equipment. MAAG's subcontractor, General Electric (GE), is responsible for the balance of the scope, including the manufacture of the rotating components, final assembly, and test. The LCS gear is a very complex design, incorporating lightweight gear production technology, capable of handling the high power levels of the MT 30 gas turbines and diesel engines in a CODAG arrangement with a sophisticated propulsion control system.

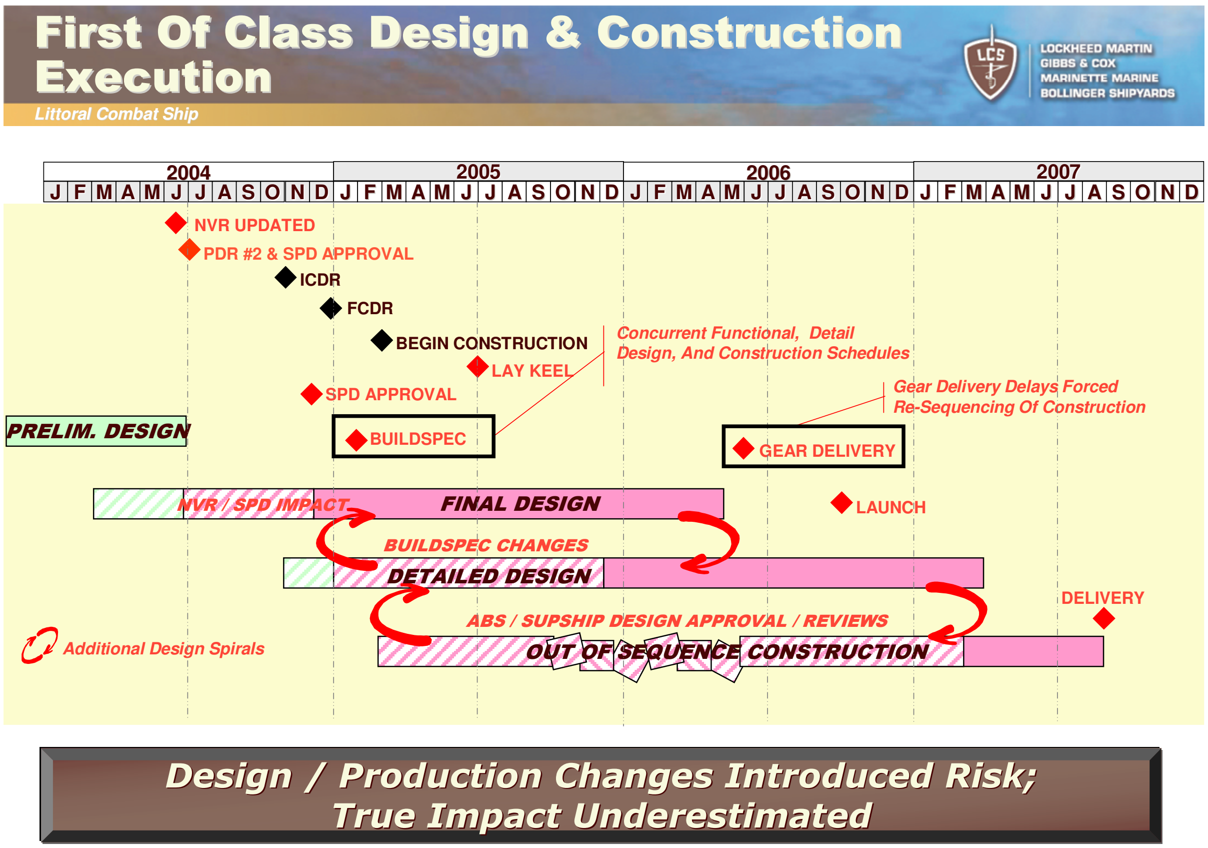
The subcontract delivery dates for the gear had no schedule flexibility, as the opportunity to develop any schedule margin was not available given the design cycle and shipyard material need dates. Delivery of the LCS 1 gear set (two combining gears and two splitter gears) was six months late despite being placed on order with Lockheed Martin investment in September 2004, three months prior to Detailed Design & Construction contract award. Most of the delay is attributable to a number of manufacturing, tooling, assembly, and test issues at the GE gear plant in Lynn, Massachusetts. MAAG Gear AG was under a firm fixed price subcontract from Lockheed Martin and was therefore required to pay for all the re-work on the defective gear. In addition, they were responsible for paying liquidated damages for the late delivery of the gear set, which flowed through LM's contract to benefit the Government.

The six month delay in delivery of the reduction gears came despite Lockheed Martin's comprehensive subcontract management approach that encompasses source selection, acquisition review, purchase order definition, change management, program reviews and closeout. Subcontract Management Teams are established to manage major subcontractors and consist of both the Program Office and Sourcing. The Teams are cross-functional with core members from Procurement, Engineering, Quality Assurance, and Program Management. Other support personnel such as Contracts, Finance and Systems Engineering, are called upon to support the Team as required. The Subcontract Management Team is responsible to ensure successful achievement of the cost, schedule, and technical performance of each subcontract. The Team ensures that technical, contractual, quality and financial requirements are communicated, levied, understood, agreed to and performed by the subcontractor. Subcontractors are required to submit data requirements and metrics on a regular basis. Problem identification and corrective action implementation are conducted for negative trends. Quality acceptance of hardware is conducted on the subcontractor's site with interim inspections when and where applicable.

Throughout the program execution the LM Team responded to requirements changes, design changes, material shortages and delays with alternatives that would maintain the schedule-focus of the program. This aggressive focus on schedule resulted in increased cost of material, rework, inefficient production sequences and substantially less pre-outfitting than planned and collectively resulted in a substantial growth in cost. With the launch of LCS 1 the balance of construction will take place on the waterfront vice the controlled environment of the erection building, further impacting the efficient completion of construction and outfitting.

Over the course of the design and construction effort, the team has also experienced increasing levels of oversight from activities such as NAVSEA, SUPSHIP, PEO-IWS, NSWC-DD, and

NAVAIR which is typical of a traditional acquisition model, but was not expected for the transformational, streamlined LCS acquisition approach. For example, the ABS drawing review and approval cycle time of 4-6 weeks, typical of a commercial approach, became a 12-16 week cycle time and required multiple re-submissions of drawings and approval from a combined ABS, NAVSEA and SUPSHIP approach. This caused uncertainty and indecision within the team on the roles and responsibilities and how the team should respond to direction that was given from multiple sources. This caused an even further delay in the completion of the design, forcing even more inefficient overlap of design and construction.



While it is clear that the introduction of the Naval Vessel Rules after contract award and the subsequent Build Specification post completion of Final Design, caused major re-design (from the commercial design we proposed) and significant overlap in design and construction, these requirements ensure that the U.S. Navy is acquiring a surface combatant with the survivability and service life commensurate with other U.S. Navy Surface Combatants of similar size. The LCS is the first surface combatant designed to meet the rigors of high speed, extreme ocean conditions and extended service life. The LM LCS is built of high strength steels with alloys that provide resistance to fatigue and weapons effects. Analysis shows that the basic hull structure will exceed a 30 year service life and can withstand ocean storm conditions at maximum speeds as well as survive hurricane force wind and wave conditions. The hullform has been tested for performance, strength and survivability by government laboratories using government approved methods. By way of comparison, the LM LCS structural scantlings in many cases exceed that of the FFG-7 Class ships which are of similar size and displacement and are battle-proven in terms of survivability.

The table below provides examples of the NVR-related changes and their corresponding benefits.

NVR Requirement	Benefit
Anti Icing for Gas Turbines	Improved Operational Performance
Navy Standard Watermist, AFFF and HPF system, welded pipe in Machinery spaces	Improved Damage Control
EMI testing to MIL Std 461	Reduced susceptibility of electronics to EMI
Battle Dressing Tank, Eye wash stations, Redundant HW heater	Longer Service Life
Tamperproof Switches on Watertight Doors	Improved Damage Control and survivability
Long Radius Pipe bends	Longer Service Life
Welded vs. Brazed firemain, Navy Certified Sprinkling system components, Quantity of Fire Plugs	Improved Damage Control and survivability
MIL Spec Pumps and Motors, Strainers, and instrumentation	Improved firefighting, Improved Reliability for Sea Water Systems
Increased Thermal and Fire Insulation	Improved Damage Control and Survivability
Dedicated ABT for AFFF	Improved Damage Control and Survivability
Grade A / B components shock qualification	Reduced risk of failure due to shock

As we progressed through LCS 1 design and construction, Costs increased for the reasons previously discussed. This cost was disclosed to the Navy Program office (PMS501) in the LM Team's contractually mandated, monthly Cost Performance Report (CPR). In addition, the LM team conducted bi-weekly meetings with the Navy's Program Manager (PMS 501) and provided briefings to PEO Ships in September 2005, April 2006 and November 2006 on LCS 1 cost growth and the root causes and corrective actions.

LCS 1 Lessons Learned and Their Application to LCS 3

Throughout the performance of the LCS 1 contract, the LM Team has been accumulating lessons learned on LCS 1 through the following approaches:

- Over 75 visits to Marinette Marine totaling 420 man-days by employees of Bollinger Shipyards to conduct module by module reviews and facilitate job knowledge transfer.
- Conducting focused reviews concentrating on particular aspects of the program (e.g. design, procurement, production control, etc.).
- Reviews as a standing agenda topic during Ship Production Progress Conferences.

- Quality improvement/Lean Six-Sigma events focused on the quality as well as the speed of the process.

Lessons learned were also captured through less formal processes such as the following:

- Soliciting of inputs within the various performing Integrated Product Teams; and
- Discussions with people working on other contracts involving similar work

A database is used to store the lessons learned and to relate and track the associated actions, either as part of the risk and opportunity management process or on the master action item tracking list.

As noted above, LCS 1 suffered from the failure of a major system (Main Reduction Gears) and the availability of a critical raw material (HSLA 80 Steel). Both events had significant impacts on the program driving a significant amount of out-of-sequence work and inefficiency, which in turn created more design churn. Although the team cannot anticipate every catastrophic supplier issue, Lockheed Martin has put in place relevant mitigation steps to reduce the probability that supplier issues will recur. The LM Team has undertaken a vigorous process to reduce the likelihood of experiencing LCS 1 challenges on LCS 3.

For instance, unlike LCS 1, the team has had the opportunity to create schedule flexibility for the LCS 3 gears. The required subcontract delivery dates for major equipment are 1-3 months in advance of shipyard need. In addition, the Lockheed Martin subcontract management team thoroughly reviewed with MAAG and GE each LCS 1 gear failure along with all other issues that caused delays. Root causes were identified and corrective actions have been implemented to minimize the likelihood of repeated failures. GE has also changed their management structure at the Gear Plant. Lockheed Martin is on site at GE weekly to review progress and status, and the production of the LCS 3 gear set is progressing ahead of schedule. In addition, Lockheed Martin has been assured by GE's CEO that GE will meet its delivery commitments. At this time, the LM Team believes the appropriate corrective actions have been implemented, and the LCS 3 gear is being effectively managed to support the in-yard need dates and thus avoid the issue experienced on LCS 1.

Regarding raw material availability, Bollinger has ordered steel from Mittal, the only U.S. supplier of HSLA-80, for LCS 3 and scheduled delivery with sufficient lead time to support the original planned production start at the end of January 2007. In July 2006, Mittal suffered a major equipment failure at their rolling mill. The main drive motor for their rolling mill failed and the repair time resulted in a six week outage at the mill. During the period of outage and re-start, Mittal had received additional priorities for armor from the Army. Lockheed Martin has submitted a request for a revised program plan delaying production start to March 2007 to accommodate the steel delay. Currently, Mittal has shipped over 50% of the HSLA 80 steel requirements for LCS 3 and over 80% of all types of steel required for LCS 3. Lockheed Martin has also entered into discussions with Algoma Steel (Canada) as a preliminary step to develop a second source to Mittal. Algoma has preliminarily agreed to make investments to develop the HSLA chemistry and perform necessary qualification testing. Lockheed Martin would also recommend that the U.S. Navy seek a DPAS rating for the LCS program that would guarantee priority over commercial business at the mills. This would further mitigate some of the risk associated with the procurement of this crucial material to support the LCS two-year construction schedule.

Lockheed Martin has already implemented a standard set of material management metrics with Bollinger to identify the time phased requirements for material release and actual performance against plan. A Lockheed Martin material program management representative has been embedded with the Bollinger procurement team to not only track the material management performance metrics, but to drive actions to meet the material release plan. As Bollinger transitions from the material ordering phase to the delivery phase, a supplier management process that will include expediting manpower to status supplier material delivery dates, elevate potential supplier delivery risk issues early, and on site supplier progress reviews for major and/or critical systems will be used. Lockheed Martin representatives will participate in on-site supplier reviews with Bollinger. Additionally, all LCS 3 Product Technical Specifications were updated to reflect the final configuration of LCS 1 and to include any LCS 3 improvements to address cost, weight and producibility. This will ensure the vendors can accurately provide Firm Fixed Price Proposals for these systems without the risk of change and possible cost increase. Lockheed Martin is confident these actions will facilitate on-time delivery of the right material to support the production sequence and eliminate cost growth due to changing or ambiguous requirements.

The LM Team has also contracted with Fincantieri to assist the shipyards with developing more cost effective manufacturing approaches based on their experience producing the MDV 3000 Fast Ferry vessels, which share a similar hull form with the LM LCS design.

We have recently completed another detailed root cause analysis and developed additional corrective actions which have been or will be incorporated into the LCS 3 program plan. A few examples are:

LCS 1 Lesson Learned – Early design products sent to Production contained open issues such as missing vendor information and yet-to-be adjudicated requirement changes creating significant design/build concurrency and leading to construction inefficiencies due to out of sequence work. LCS 3 implements a program schedule that allows for completion of all design products, including full review and approval of all design products by the shipyard and ABS prior to the start of production on each module.

LCS 1 Lesson Learned – Material availability adversely impacted efficient production process resulting in out-of-sequence work and re-work. LCS 3 placed orders for critical equipment as early as possible to ensure in yard and production need dates were met. The effectiveness of this effort is evident in 75% of Tier 1 and 2 subcontractor materials already on order for LCS 3.

LCS 1 Lesson Learned – The U.S. Navy Team roles, responsibilities, authority and accountability within the LCS program were not defined resulting in confusing and conflicting line of authority and accountability. LCS 3 finalized an agreement with the NAVSEA Technical Authority, SUPSHIP and ABS on the drawings they will be reviewing and the schedule for responses and comments. All parties have met their commitments and the drawings have been delivered according to schedule.

LCS 1 Lesson Learned – Despite all our efforts to reduce the schedule risk, key processes such as Configuration Management were overwhelmed by the significant number of changes. For LCS 3 we have implemented an on-line process for vendors to review the data that they delivered for LCS 1 and to certify that it has not changed. The changes for LCS 3 have been assessed and approved through our configuration management process and the volume of changes on LCS 1 will not occur on LCS 3.

LCS 1 Lesson Learned – The team managed performance and drove behavior with metrics that did not comprehensively measure progress and provide the leading indicators required to forecast cost issues with the volume of change and the speed of the program. For LCS 3 we have developed metrics to track the many handoffs of data and products during the design, production, test and acceptance of the LCS Platform. For design products, updated drawings for LCS 3 are jointly reviewed by Gibbs and Cox and Bollinger against clearly defined format and content requirements. To date, all drawings have been completed on schedule.

LCS 1 Lesson Learned – Timing of application of resources to oversee the design and construction of the platform. As the LCS 1 design and construction progressed and the magnitude of design change became clear, Lockheed Martin increased its oversight of the shipyard from 3 to 13 people to assist in engineering, material procurement, business process improvement, and construction management. This approach is being further modified to support construction of LCS 3 at Bollinger Shipyard.

Program Accomplishments

Despite these lead ship challenges the LCS Program has achieved some remarkable accomplishments and is charting a course to a new approach to Navy Shipbuilding. The early program accomplishments include:

- Significantly reducing (~60%) the cycle time to design and build ships
- Implementing new shipbuilding standards (Naval Vessel Rules) and classifying a warship through the American Bureau of Shipping (ABS)
- Introduction of mid-tier shipyards that have the flexibility to move from military to commercial contracts and shift workforce as required, negating idle time and overhead cost impacts to the Government.
- Introducing new hull forms, the most powerful gas turbine in Navy inventory (first in nearly 30 years), and waterjet propulsion to the surface combatant fleet.
- Introducing the first "open architecture" surface warship combat system and total ship computing environment (TSCE)
- Introducing the first Surface Combatant designed/produced from the start with reduced manning and automation concepts to further reduce total ownership cost.
- Bringing mission modularity to the Fleet via a reconfigurable SeaFrame

Conclusion

From the outset of the LCS Program the LM Team has valued the regular and productive discussions and relationships with the U.S. Navy PEO and Program Office. The most obvious benefit from these discussions is the status of the LCS 1 construction at 75% complete and in the water in little more than four years from program inception. The LCS team and the U.S. Navy worked closely and collaboratively in a very dynamic environment of change, innovation, and high visibility. The LM Team will continue to emphasize the importance of written and verbal communication with the U.S. Navy to address and resolve issues, raise risks and concerns, and keep the program moving positively. We are confident that the majority of the cost growth on LCS 1 is unique to the lead ship and will not translate to future ships of the class.

Mr. Chairman, FREEDOM and her sister ships will be superb warships; the right ships for this time in our Nation's history. Sailors who take them to sea will be proud to sail them and pleased with their capabilities. The Lockheed Martin LCS team will take the lessons learned from building FREEDOM and apply them in an efficient and rapid way to future vessels in the class, and we will perform on this program to the standard our sailors deserve and our taxpayers expect. We are firmly committed to working with the U.S. Navy to resolve the cost growth issues and to ensure that this cornerstone program for the U.S. Navy can move forward with Fleet introduction in a timely fashion. Thank you again for the opportunity to present and explain the progress we are achieving on the LCS program.