

SHIPBUILDING

ABSTRACT

United States shipyards build the best military ships in the world. However, the demand for naval vessels is currently very low, and it is unlikely to increase. Large military oriented yards have substantial capacity beyond national security requirements. Historically, political influence has ensured their survival, but future budgetary constraints may supersede this political influence. Several yards are attempting to reestablish themselves in the commercial market, but excessive overhead, lack of market identity, inefficient management, outdated production, and marginal capital investment and foreign subsidies make it difficult for them to compete in the international marketplace. The United States must choose between continued reliance on reduced military procurement and government support or on efforts to create a level playing field. On such a field, U.S. shipbuilders could improve productivity and efficiency as needed to develop a competitive position in a nonsubsidized international environment.

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PLACES VISITED

Domestic

Alabama Shipyard/Atlantic Marine, Mobile, AL
Avondale Shipyards, New Orleans, LA
Bollinger Shipyards, Lockport, LA
Carderock Division, Naval Surface Warfare Center, MD
Central Gulf Lines, New Orleans, LA
Halter Marine Group, Gulfport, MS
Ingalls Shipbuilding, Pascagoula, MS
Intergraph, Arlington, VA
Newport News Shipyard, Newport News, VA
Supervisor of Shipbuilding, Conversion and Repair, New Orleans, LA,
Pascagoula, MS, and Newport News, VA
Textron Marine and Land Systems, New Orleans, LA

International

Archipelago Sea Naval Command, Turku, Finland
ILS, Raisio, Finland
Kvaerner Masa Yards, Ltd., Helsinki, Finland
Kvaerner Masa Yards, Ltd., Perno, Finland
Finnish Maritime Administration, Helsinki, Finland
Finnish Naval Headquarters, Helsinki, Finland
Finnyards, Ltd., Rauma, Finland
Masa Arctic Research Center, Helsinki, Finland
Technical Research Centre of Finland, Helsinki, Finland
Ministry of Business and Industry, Copenhagen, Denmark
Odense Steel (Lindo Shipyard), Odense, Denmark
Association of Danish Shipbuilders, Copenhagen, Denmark
Danish Shipbuilders Association, Copenhagen, Denmark
Danish Shipowners Association, Copenhagen, Denmark
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INTRODUCTION

The United States is a maritime nation. The majority of international goods continue to move between the United States and its trading partners via the sea. The U.S. Navy possesses unequaled ability to protect those sea lanes and carry out other national security objectives, largely because of the high quality of naval vessels produced by U.S. shipbuilders. However, Navy downsizing, potential military budget cuts, low-rate procurement of new naval vessels, and noncompetitiveness in the commercial market threaten the survival of major U.S. shipbuilders.

Six U.S. shipyards construct virtually all large U.S. government vessels including all major U.S. Navy combat ships and account for over 95 percent of the U.S. Navy's shipbuilding budget. These yards are privately owned and directly affect the nation's maritime security. They provide vessels in peacetime, and most of the country's upsurge in times of national emergency.

This report examines the health and viability of the U.S. shipbuilding industry in these six yards. Though they certainly do not make up the entire domestic shipbuilding industry, they employ approximately 65 percent of the nation's shipyard workers and impact U.S. maritime security unlike any other single group. How these major shipbuilders confront the challenges in their future will affect the entire industry and the role that government must take to ensure the nation's defense and economic competitiveness. The analysis of two critical areas, military construction and commercial competitiveness, suggest that modernization and changes in management styles and labor practices will be as important as government and industry partnerships in the future of this industry.

SHIPBUILDING DEFINED

The U.S. shipbuilding industry consists of government and privately owned or commercial shipyards. Government-owned yards currently perform only ship repairs. "First tier" commercial shipyards design, manufacture and maintain large (over 122 meters) military and commercial ships, while "second tier" shipyards design, manufacture and maintain smaller vessels. There are currently seventeen first tier and numerous second-tier yards operating in the United States.

The Big Six

The six shipbuilders examined in detail in this report are all first tier yards and are commonly referred to as the "Big Six." They account for nearly all large ships built for the U.S. government since 1989, including Navy combatants, fleet support vessels, and several varieties of cargo carriers for the Military Sealift Command and the U.S. Army. The following brief descriptions identify the Big Six and assess their current status.

Avondale. The Avondale shipyard in New Orleans, Louisiana, employs more than 5,000 workers and is currently the largest private employer in Louisiana. Current government contracts include a Coast Guard icebreaker to be delivered in 1998 and five strategic sealift ships (T-AKR) with final delivery scheduled in 2000. Avondale also won the contract for the initial LPD-17 amphibious assault ship and has an option to build another T-AKR for the Military Sealift Command (MSC).

One of Avondale's business goals is to reach a 50/50 split between commercial and government work by 2000. Capital improvements in the past two years include construction of a covered facility in 1995 and purchase of a new \$2 million Computer-Aided Design/Computer-Aided Manufacturing (CAD/CAM) system. The yard will deliver two converted commercial product tankers (each 38,000 dead weight tons (dwt)) in June 1997 and is discussing the construction of six 135,000-dwt Alaskan-trade tankers with ARCO and British Petroleum. It is also awaiting approval of Title XI funding for a contract to build six 42,000-dwt product tankers for Maritrans/Crowley.

Bath Iron Works. Bath Iron Works (BIW) of Maine has not built a commercial ship since 1984 and has no commercial contracts pending. After building *Perry*-class frigates and *Aegis* cruisers in the 1980s, the yard won the contract for the designing and building of the *Arleigh Burke* *Aegis* destroyer (DDG-51) in 1985. Bath's 8,000 employees will ultimately build eleven of these ships, with delivery of the last ship scheduled for 2002. By that time, BIW should be starting construction on the LPD-17 amphibious assault ship, which is part of its partnership with Avondale.

General Dynamics bought BIW in 1995 for \$300 million. It plans to invest approximately \$100 million in capital improvements over the next ten years, including a new dry-dock. BIW is also hoping to expand its shipyard into the Kennebec River with the cooperation of a state-owned port authority.

Electric Boat. Headquartered in Groton, Connecticut, Electric Boat (EB) is also a division of General Dynamics and the leader in the design, development, production, and support of nuclear submarines. EB is the second largest employer in Connecticut and the largest employer in Rhode Island, where it has a facility at Quonset Point. The yard presently employs 8,540 workers (down from 23,000 in 1990) and another layoff of 1,500 workers will occur in late 1997. EB has designed fifteen of nineteen classes of submarines and eighteen of nineteen submarine propulsion plants. It is the sole, current supplier of the *Trident* class ballistic missile and *Seawolf* fast-attack submarine, with contracts running through 1998.

EB recently teamed with Newport News Shipbuilding to construct the first four of the Navy's New Attack Submarine (NSSN). Acting as the lead design yard, EB will construct the engine room module, command and control modules, and seven other sections of the ship.

Ingalls Shipbuilding. Ingalls, a division of Litton Industries, is the largest employer in Mississippi with more than 12,000 workers. Current contracts for construction of eight Aegis destroyers and three *Wasp* class large-deck amphibious ships will keep Ingalls busy until 2001. It recently lost a bid to build the Navy's LPD-17. Ingalls is the only Big-Six yard to successfully enter the foreign military sales arena, delivering three SA'AR 5 corvettes to the Israeli Navy.

Ingalls also builds commercial marine structures, including barges and oil and natural gas production platforms, and is investigating a possible return to cruise ship construction. However, it presently has no active or pending commercial shipbuilding contracts.

National Steel and Shipbuilding Company. The National Steel and Shipbuilding Company (NASSCO) entered the ocean-going ship market in California in 1960. In the years since, it has delivered fifty-six commercial ships including roll-on/roll-off (RO/RO) vehicle carriers, container ships, bulk carriers, dry cargo ships, and ferries. Over 40 percent of U.S. product tankers were built at NASSCO. Its government contracts have included amphibious ships, fleet auxiliaries, sealift RO/ROs, hospital ships, and cable repair ships—a total of 38 vessels. NASSCO currently has contracts to construct a combat stores ship (AOE-6 class), to convert three Maersk L-class container ships to RO/RO sealift ships, and to construct up to six T-AKR sealift ships for the Navy with the last delivery scheduled for 2001.

NASSCO is an active player in development programs under the Maritime Technology (MARITECH) program. It has also signed agreements with ARCO Marine to design a new crude oil carrier. Teaming with Totem Ocean Trailer Express, Inc., it is designing trailer ships for vehicle shipments between Tacoma, Washington, and Anchorage, Alaska. NASSCO is also pursuing entry into the cruise ship market with American Classic Voyages of Chicago and American Hawaii Cruise Lines as partners.

Newport News Shipbuilding. Newport News Shipbuilding (NNS) is the largest privately owned shipyard in the United States. Located on 550 acres along the James River in Virginia, it employs over 18,000 workers, down from 30,000 in 1990. It is the only U.S. shipyard capable of building nuclear-powered aircraft carriers and, with Electric Boat, one of two yards capable of building nuclear-powered submarines. It has government contracts to build two *Nimitz* class carriers, delivering the final one in December 2002. As previously mentioned, Newport News recently signed an agreement to team with EB on the construction of at least four new attack submarines. It is also a competitor for the Navy's Arsenal Ship, teaming with Lockheed-Martin and Ingalls.

Newport News is attempting to reduce its reliance on U.S. government contracts and enter the international commercial and military markets. Its stated goal is to achieve a 60/40 split between U.S. Navy and commercial work by the year 2000. NNS currently has contracts to build nine medium-sized double-hulled tankers for Mobil Oil and two foreign shipping companies, under Title XI loan guarantees. The company is also aggressively marketing its fast frigate design (FFG-21) to foreign navies, but has yet to secure an order.

CURRENT CONDITIONS

The competitiveness of the U.S. shipbuilding industry began to decline over a hundred years ago, but some of the most significant events to impact the industry began in the early 1980s. Until that time, Construction Differential Subsidies (CDS) allowed U.S. shipbuilders to obtain commercial orders in the international market, while a slow, but steady requirement for military vessels retained high quality production for the fleet. When President Reagan eliminated the CDS program in 1981, commercial ship building in the U.S. evaporated. It was, however, replaced

by the President's goal of a 600-ship Navy and an abundance of military contracts which allowed most shipbuilders to stay in business.

The end of the Cold War made the 600-ship goal obsolete and led to a rapid and continuing downward trend in overall military procurement. U.S. yards suddenly found that while they had focused on government contracts for the past decade, they had also isolated themselves from commercial shipbuilding markets, developments, and technologies. The result is an industry that must fight for scarce government contracts while it searches for a new identity in a highly competitive commercial market.

Current naval contracts and options on those contracts are worth nearly \$18 billion and will carry the primary military shipbuilders into the 21st century. The Big Six prefer government work: they are organized for government procurement methodology and construction requirements, understand its stringent documentation requirements and quality control inspections, and they are accustomed to working through hundreds, perhaps thousands, of change orders. Change orders usually result in a better end product, but add inefficiency, time, and cost to the construction of military vessels.

These government construction and management processes create a work environment that is not conducive to competition in either the military or commercial international environment. The comments of domestic and international shipbuilders and shipowners imply that major U.S. shipbuilders have not been able to shift from a government focus to a commercial customer focus. It remains subject to high costs and long design and delivery times—and to excessive overhead and inflexible management that cannot react rapidly to customer demands. The industry recognizes these shortfalls and is investing in new technologies to improve its productivity and competitiveness.

The Big Six have improved their productivity in recent years through investment in automated manufacturing technology. Capital investment by these yards accounted for nearly 40 percent of the industry's costs of \$168 million in 1994. In addition to the CAD/CAM systems investment (which all have made), computer-controlled welding and cutting machinery has been installed in all yards. The amount of reliance on automation varies widely among yards, however, and generally does not compare with the extensive technologies found in foreign shipyards. None of the Big Six has the true Computer Integrated Manufacturing (CIM) capability that we saw demonstrated in several European yards and in some U.S. second-tier companies. The addition of covered facilities, use of burn-through primers, and increased preoutfitting using modular construction techniques have also contributed to increased productivity.

The recent reappearance of commercial contracts and recapitalization programs have been driven by the expanded Title XI loan guarantees and MARITECH programs. Title XI effectively constitutes a U.S. subsidy program for commercial shipbuilders and its generous financing arrangements have been very successful in attracting commercial customers. Avondale, NASSCO, and Newport News are now building commercial vessels or have commercial contracts pending Title XI approval, and all six yards participate in MARITECH projects to enhance their technological base and design capability.

Based on this experience, the Big Six object to the Organization for Economic Cooperation and Development (OECD) shipbuilding agreement because it eliminates subsidies in the signatory nations. Under the OECD agreement, U.S. Title XI loan guarantees would be reduced from the current maximum of 87.5 percent of vessel construction costs and a 25-year financing period to the internationally accepted levels of 80 percent of costs and a 12-year financing period. According to the Big Six, implementing the OECD at this time would substantially hinder their efforts to reenter the commercial sector. They also fear that despite OECD enforcement procedures, foreign governments will continue to find ways to subsidize their own yards or suppliers.

The Big Six are currently using their political influence as the American Shipbuilding Association (ASA) to lobby Congress against ratification of the OECD agreement, a position not shared by other U.S. shipyards. To date the United States, which initiated negotiations within OECD at the request of the U.S. shipbuilders, including the Big Six, is the only member nation that has not ratified the agreement. The major shipbuilding nations think that U.S. ratification is vital to the agreement, even though this nation controls less than 20 percent of the global commercial market. Though the U.S. market share is small, OECD members believe that only the United States can provide the leadership necessary to ensure the compliance of all signatories. Our failure to implement the agreement injures the nation's credibility among this same group.

Foreign yards produce most of the world's large, commercial vessels. Asian shipbuilders dominate construction of bulk carriers and tankers while European yards lead the market in more sophisticated ships such as cruise liners, ferries, and container ships. European shipbuilders' opinions are mixed on the ability of U.S. yards to compete in the commercial market, but all agree that U.S. shipbuilders are not competitive internationally in the construction of large commercial ships.

Of those U.S. yards that continue to build large ships, the Big Six capture the lion's share of the work. However, lack of experience in the commercial market and government-focused management makes it difficult for them to compete. Some others, for example, Alabama Shipyards, are making inroads in the transition to commercial work through aggressive marketing and customer focus, though they too are currently dependent on Title XI loan guarantees to secure contracts and are still working below capacity. In general, as we saw in European yards, firms with a commercial emphasis invest heavily in design and production techniques that give their customers maximum flexibility—they are organized to respond rapidly to customer demands.

U.S. yards often fail to meet these criteria for organizational flexibility. They are typically divided by function into several departments such as Production Engineering and Planning, Quality Control, Material Control, and Testing and Safety. Thus they tend to be top heavy, with a management to labor ratio of 1:3. The Japanese, on the other hand, operate with much flatter organizations. They tend to organize their yards by product orientation with two departments: Hull and Outfitting. The resulting management to labor ratio is about 1:7. The U.S. tendency for multiple management levels is indicative of the higher complexity of U.S. shipbuilding projects, and the nature of government work. To compete internationally U.S. yards must address both management and productivity issues.

This discussion of current conditions in the U.S. shipbuilding industry would be incomplete without mention of the second-tier Gulf Coast shipyards that conduct both government and commercial work. In general, these yards possess energetic, aggressive companies, which work double-time to find and please customers. They prefer commercial work and are anxious to showcase their design and production capabilities, while downplaying the difficulties of working on both government and commercial contracts. This aggressive, competitive culture is certainly a major factor in their current success.

CHALLENGES

U.S. Navy/Government Shipbuilding

Their professed goal and efforts to reenter the commercial market notwithstanding, in reality, the Big Six are bent on survival through the turn of the century or until they win the next government contract.

Avondale and Bath recently gained at least partial security for the future with their contract to build the LPD-17, but others find their order books becoming very bleak as they approach the turn of the century. They must compete for and capture the next project. To do this, they must control prices and maintain quality—a combination that up to now, has met with mixed success.

U.S. Navy ships are the best in the world, but they are also the most expensive. Thus, cost was a major factor in the Navy's decision to acquire only five or six warships per year through 2001. After that, the shipbuilders foresee a substantial increase in procurement as the Navy begins to replace ships due for retirement. Unless shipbuilders take extraordinary measures to increase productivity and control costs, the Navy may not be able to afford the next generation of warships, or at least not enough of them to hold the current force structure stable and support the survival of the major shipyards.

But to control cost, the industry must improve productivity through technological modernization and by applying commercial management techniques for maximum responsiveness and flexibility. Commercial shipbuilding can provide the model on which to build this experience. It will not, however, work without a corresponding change in the military's procurement culture.

Navy technical specifications and standards are generally more stringent and expensive than commercial standards. Valid combat requirements generally drive these standards, though the military is making an effort to move toward commercial standards wherever feasible. Another primary driver of high costs is the uncontrolled generating of thousands of change orders during construction. Navy program offices must make every effort to minimize changes if they are serious about controlling costs. The increased use of CAD/CAM systems should help in this effort through more rapid and effective planning before construction begins, a benefit that also applies to the commercial market.

Commercial Shipbuilding

Second-tier yards, which focus on commercial work, are aggressively pursuing contracts, and business is booming in response to the recent surge in off-shore oil exploration. The energy boom has also spilled over into the first-tier yards that build deep-water production and service platforms. However, apart from construction related to the oil industry, worldwide shipbuilding over-capacity and possible over-production by Asian yards

makes the competition for commercial contracts for large ships even more intense.

And, as mentioned earlier, the U.S. yards' lack of significant commercial experience and low productivity rates impact on their competitiveness. One of the greatest handicaps, however, to competing internationally, is a business culture that is geared to government contracts rather than responsive to commercial customer needs. The greatest challenge facing U.S. shipbuilders who want to be truly competitive is the requirement for a changing management climate to increase responsiveness and flexibility.

Foreign yards, for example, constantly emphasize timing—from rapid design to guaranteed delivery dates. For them, improved responsiveness comes through modernizing techniques that increase productivity; they also use teamwork to design, develop, and produce major ship components. Teaming with other domestic or international shipbuilders enlarges their pool of resources and helps them explore worldwide business opportunities. This approach may prove essential for U.S. yards to carve out their commercial niche.

Nevertheless, the position of many, if not most, of the international shipbuilders in the commercial market has depended on government subsidies. These subsidies clearly distort the international marketplace when it comes to the cost of procuring a ship. Most commercial shipbuilders would benefit from an elimination of subsidies and the Big Six should embrace, rather than reject, this approach. U.S. yards need to position themselves to compete in a nonsubsidized market. They need, above all, to improve flexibility and productivity. The scope of these changes depends, of course, on how seriously the yards want to compete.

Until recently, there was little incentive for the Big Six to move seriously into the commercial market. And even today, the incentive may be too weak to overcome the optimistic conviction that naval military construction will increase in the early 21st century. Lucrative government contracts have made the Big Six very profitable, and military work defines their core competency. But they cannot ignore the commercial market; in the event that future government procurements do not materialize, commercial work will be essential to their survival.

Modernization

American shipyards are making moderate efforts to upgrade production processes through automation, CAD/CAM techniques, and facility improvements. Productivity improvements help control costs on

government shipbuilding contracts and are part of any serious attempt to compete in the commercial market. However, the average U.S. yard still has a long way to go before it can compete with the fully integrated shipyards of Asia or Europe. In Denmark, Finland, and Germany, yards that are clearly on the leading edge of technological innovation and computer integrated manufacturing must still invest heavily in research and development for process control and productivity enhancement to remain competitive. The challenge for the major U.S. shipbuilders is how to pay for necessary capital improvements while fighting for scarce government and commercial orders.

Current production in most U.S. first-tier yards requires labor-intensive engineering and building techniques. They add significant time to ship construction and amount to lost opportunity and higher costs for commercial shipowners, as compared to the production schedules in foreign yards. The Navy, too, would gain significantly from the cost-savings that would result from improved production techniques, especially as acquisition budgets continue to decline and more ships reach the end of their life cycle. Major yards must pursue continued improvements to meet commercial demands and control the growing costs of government vessels.

Labor

With dwindling numbers of government contracts and the labor-intensive characteristic of most U.S. yards, a major challenge faced by shipbuilders is how to retain sufficient numbers of qualified workers to handle surges in construction. This need is particularly acute when the skills are shipyard specific, such as the skills of welders, pipefitters, and marine electricians. Higher wages for jobs generated in the oil industry pulled many qualified welders from Gulf Coast shipyards. Since orders for oil platforms and service ships were slower than oil field requirements, Gulf Coast shipyards were caught short of skilled workers. Some turned of necessity to foreign labor as a quick source of qualified personnel.

Some yards have initiated recruiting and training programs through local school systems. These programs not only produce skilled workers, but also generate loyalty to the sponsor. It is an excellent way to grow the required labor force, provided that a long lead time solution is feasible.

Any skills shortages in the work force are exacerbated by the high number of employees required in each U.S. shipyard. In a 1993 study, a European shipyard determined that the man-hours required to build ships in U.S. yards is substantially higher than in most locations overseas (Fig. 1). A higher degree of automation and robotics is present in foreign yards

than here—and both have been integrated in improved process engineering.

**Figure 1.—Shipbuilding Productivity in Three Markets.
(Man-hours/Compensated Gross Ton)**

	<u>EC</u>	<u>JAPAN</u>	<u>U.S.</u>
Best	26	20	60
Average	44	23	82

Worldwide, the number of shipbuilding workers has been steadily declining (Fig. 2). However, total productivity from that smaller work force has increased substantially, particularly in the regions that show the greatest investment in automated processes. While system upgrades may eliminate some jobs, effective retraining can minimize that impact while increasing overall productivity. Automated systems also increase flexibility for surges in production since it is easier to run machines for longer periods than to train skilled laborers.

Figure 2.—Shipyards Employment, 1976-1995.

	<u>1976</u>	<u>1992</u>	<u>1995</u>
OECD – Europe	333,330	83,880	80,296
Japan	175,000	56,000	51,000
United States	171,600(1982)	123,800	106,000

OUTLOOK

Resourcing the National Security Strategy

The shipbuilding industry must fill two requirements in order to support current U.S. national security strategy. First, the industry must have the capacity to increase its production of sealift and combat ships to meet the challenge of any future threat. Second, the industry must produce sufficient numbers of capable ships at an affordable cost to ensure that the military can perform its maritime missions.

The traditional context of surge, which implies long lead times to a protracted conflict, no longer fits into our current rapid response strategy. Since the construction time of modern warships is long (over three years

for an Aegis destroyer), forces on hand will need to respond to the regional contingencies envisioned in the national strategy. Shipyards will have a role in replacing battle losses and repairing damage, but any future conflict will likely be a “come as you are” war. However, it may be necessary for the United States to increase production rates gradually to meet the threat of an emerging regional or global competitor. In this case, the existence of a surge capacity in shipbuilding becomes an important deterrent to potential adversaries who might otherwise engage in a naval arms race.

The shipyards of the Big Six are operating at well below maximum capacity and are in a strong position to meet any required increase in production. The physical space, equipment, and expertise are readily available to increase annual rates of production, though a rapid increase in the labor force may be difficult to produce. The current backlog of work at the Big Six will ensure that these conditions remain stable at least through the turn of the century.

The Navy will buy only five to six ships per year through 2003, while the QDR projects maintaining a fleet of approximately 300 ships.

Figure 3.—Current Plans for Navy Shipbuilding, 1998-2003.

	FY98	FY99	FY00	FY01	FY02	FY03
CVN-77			AP		1	
NSSN	1	1		1	1	
DDG 51	3	3	3	3	1	2
SC21						1
LPD 17		1	2	2	2	2
AOE(X)						1

A 35-year service life for these ships means that the Navy would annually need eight to ten new ships each year to sustain the size of the fleet. Although extending service life to forty years—something that is technically feasible in existing newer ships—could reduce this figure. Current rates of procurement are well below that level because warships are extremely costly, and the defense budget is tightly constrained. Barring unforeseen change, the Navy will shrink, and no increases will occur in the order book for ships.

Current military contracts are spread across the major shipyards, resulting in some assurance that each has enough work to stay afloat for the near term. However, it also ensures that ships will continue to be constructed at inefficient rates of production with the government paying a premium to retain a surge capacity in ship construction. These budgetary

and force structure pressures can only be relieved by increasing the procurement budget (unlikely), reducing operational requirements (unlikely and perhaps imprudent), or by finding ways to increase the productivity and efficiency of U.S. shipyards.

Short-Term Outlook

The short-term outlook for the Big Six is solid. Each of the yards has a backlog of work that will ensure its survival and profitability for the next three to five years and, in some cases, beyond. In particular, Avondale and BIW will increase their activity with the LPD-17 contract. However, none of the yards are currently working near capacity. All have downsized to match the workload, and more downsizing is likely to occur.

In the commercial arena, ship contracts are modest and do not use a significant amount of the industry's over-capacity. Construction of off-shore oil exploration and support facilities will continue to be in demand for at least the short term, but again this does not use a significant amount of total capacity. Competition for future shipbuilding contracts will continue to be keen and new projects will probably be on a small-scale. It is unlikely that U.S. shipbuilders' position in the global commercial market will change significantly in the next five years.

Long-Term Outlook

The long-term outlook for the industry is less rosy. It hinges on adjustments within the industry, developments in military procurement, and the market for commercial ships. In both the military and commercial sectors, some observers suggest that a construction boom will start around the turn of the century. This "bow wave" prediction is based on the current Navy fleet size, the traditional service life of U.S. Navy and commercial ships, the current slow replacement rate for both, and the upcoming requirement for double-hulled commercial oil tankers. If either boom materializes, the long-term outlook for the industry will improve. If not, low-rate naval procurement and a soft commercial market may force a restructuring of the industry. One or more of the Big Six may be forced to leave the military shipbuilding field, or the nation will pay higher costs to keep them in business.

An increase in Navy ship construction would be a tremendous boost for U.S. yards. It might also have more than one driver. It could, for example, be in response to events affecting U.S. security or it could reflect a consensus, political or otherwise, that maintaining the Navy at 300 ships

is prudent. Regardless of the reason, procuring eight to ten ships per year would ensure the survival of all six yards. In this case, commercial contracts would not be a significant factor for their survival, and the yards would likely remain focused on military work.

However, fiscal realities and the trend in military force structure do not support this “bow wave” prediction. It is unlikely that the military will substantially increase the acquisition of new ships in the next fifteen to twenty years. This circumstance makes commercial markets even more important for the long-term viability of U.S. yards and retention of shipbuilding infrastructure.

An increase in demand for commercial vessels could assist U.S. shipyards if buyers find the over-capacity of U.S. yards more attractive than waiting for a foreign competitor. To capture a suitable share of the market, however, U.S. shipbuilders would still need to invest in modernizing their facilities and production methods, and modify management styles to serve commercial customers.

Even with these improvements, commercial competition will not be easy. Substantial global over-capacity with potential over-production, in commercial shipbuilding will continue to increase over the next ten to fifteen years, particularly in Asia. The South Koreans are apparently planning to become the number one shipbuilder in the world and the expansion of their facilities continues. Even more significant, the Chinese are just beginning to enter the market and appear to be putting substantial resources into shipbuilding infrastructure.

U.S. yards are not in a position to capture a significant share of the market. The chief impediments to commercial success for the Big Six are a corporate outlook and culture that has focused them on the Navy market for over a decade. As pointed out in the 1996 ICAF Industry Study, the prospect of winning the next Navy contract has a paralyzing effect on shipbuilders that limits their willingness to make all of the changes necessary to be competitive.

This observation is not a criticism of the management of the Big Six. The decisions they make on modernization and investment are reasonable given their operating environment. The incentive for primary military shipbuilders to move seriously into the commercial market has not been evident. As pointed out by one European shipbuilder, American shipyards can make profits of up to 15 percent on military contracts involving no risk, while European yards must struggle to make 4 percent on commercial contracts. However, given that huge uncertainties now affect the long-term future of both military procurement and the commercial market, shipbuilders do need to focus on improvements that are complementary to

military and commercial customers. The dual nature of this need is a key to controlling the costs of military ships while developing the responsiveness required for other customers.

Political and Social Factors

Shipbuilding is an intensely political industry. The Big Six are critical drivers in the economies of their respective regions. They include the largest private employers in Louisiana, Maine, Mississippi, Rhode Island and Virginia, and the second largest in Connecticut. Their payrolls have a significant impact on regional economic activity. Elected officials pay close attention to the health of shipyards in their states and fight hard to protect them.

When a ship contract is awarded, the economic impact is substantial, concentrated, and members of Congress are quick to rise to the defense of the yard in their district or state. This political scrutiny is particularly intense when the primary customer for a shipyard is the military. An excellent example is the political activity associated with the award of the LPD-17 contract. The competition pitted Avondale (Louisiana) against Ingalls (Mississippi), and the congressional delegations lined up accordingly. Even after the award, the subsequent U.S. Government Accounting Office (GAO) protest, and resolution of the Navy's contract, congressional involvement is still high and may spill over to other current or future Navy contracts.

The high stakes involved have also created other players in the political process. Shipbuilders are represented by two trade groups that lobby actively in Washington. As mentioned earlier, the Big Six are represented by the ASA. The Shipbuilders' Council of America (SCA) represents the remaining U.S. shipbuilders. The SCA seeks to level the playing field by eliminating government subsidies and, hence, presses ratification of the OECD shipbuilding agreement. Conversely, the ASA argues for keeping government assistance, and opposes the OECD agreement. Labor unions are also involved and lobby to protect their members and expand their influence. In short, the success of shipbuilding firms depends at least as much on politics and the ability to influence the political process as it does on business practices and economics.

Industry Posture

An assessment of the industry's overall posture depends on which segment of the market is considered. The U.S. government will buy