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BEST PRACTICES

High Levels of Knowledge at Key Points Differentiate Commercial Shipbuilding from Navy Shipbuilding

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Highlights

Highlights of GAO-09-322, a report to congressional committees

Why GAO Did This Study

Cost growth is a prevalent problem in Navy shipbuilding programs, particularly for the first ships in new classes. In response to a mandate in the conference report accompanying the Defense Appropriations Act for Fiscal Year 2008, GAO undertook this review to (1) identify key practices employed by leading commercial ship buyers and shipbuilders that ensure satisfactory cost, schedule, and ship performance; (2) determine the extent to which Navy shipbuilding programs employ these practices; and (3) evaluate how commercial and Navy business environments incentivize the use of best practices. To address these objectives, GAO visited leading commercial ship buyers and shipbuilders, reviewed its prior Navy work, and convened a panel of shipbuilding experts.

What GAO Recommends

GAO suggests Congress consider refining required reporting to include additional design stability metrics. GAO is also making recommendations to the Secretary of Defense aimed at improving shipbuilding programs by balancing requirements and resources early, retiring technical risk and stabilizing design at key points, moving to fixed-price contracts for lead ships, evaluating in-house management capability, and assessing if the desired fleet size sufficiently constrains the cost and technical content of new ships. The Department of Defense agreed with five recommendations and partially agreed with two. GAO believes all recommendations remain valid.

To view the full product, including the scope and methodology, click on GAO-09-322. For more information, contact Paul Francis at (202) 512-4841 or francisp@gao.gov.

What GAO Found

Delivering ships on time and within budget are imperatives in commercial shipbuilding. To ensure design and construction of a ship can be executed as planned, commercial shipbuilders and buyers do not move forward until critical knowledge is attained. Before a contract is signed, a full understanding of the effort needed to design and construct the ship is reached, enabling the shipbuilder to sign a contract that fixes the price, delivery date, and ship performance parameters. To minimize risk, buyers and shipbuilders reuse previous designs to the extent possible and attain an in-depth understanding of new technologies included in the ship design. Before construction begins, shipbuilders complete key design phases that correspond with the completion of a three-dimensional product model. Final information on the systems that will be installed on the ship is needed to allow design work to proceed. During construction, buyers maintain a presence in the shipyard and at key suppliers to ensure the ship meets quality expectations and is delivered on schedule.

Navy programs often do not employ these best practices. Ambitious requirements are set and substantial investments made in technology development, but often the Navy does not afford sufficient time to fully mature technology. New designs often make little use of prior ship designs. As a result, a full understanding of the effort needed to execute a program is rarely achieved at the time a design and construction contract is negotiated. This in turn leads the Navy and its shipbuilders to rely on cost-reimbursable contracts (rather than fixed-price contracts) that largely leave the Navy responsible for cost growth. Complete information on the systems that will be installed on the ship may not be available, leading to changes that ripple through the design as knowledge grows. Starting construction without a stable design is a common practice and the resulting volatility leads to costly out-of-sequence work and rework. These inefficient practices cause Navy ships to cost more than they otherwise should, reducing the number of ships that can be bought under constrained budgets. The Navy's in-house capability to oversee design and construction has eroded, and it has been slow to build capacity to support new programs. Congress has recently encouraged greater technology maturity and design stability at key points, but required reporting does not directly address completion of a three-dimensional product model.

Differences in commercial and Navy practices reflect the incentives of their divergent business models. Commercial shipbuilding is structured on shared priorities between buyer and shipbuilder, a healthy industrial base, and maintaining in-house expertise. The need to sustain profitability incentivizes disciplined practices in the commercial model. In Navy shipbuilding, the buyer favors the introduction of new technologies on lead ships—often at the expense of other competing demands—including fleet size. This focus—along with low volume, a relative lack of shipyard competition, and insufficient expertise—contributes to high-risk practices in Navy programs. Further, the consequences of delayed deliveries and cost growth are not as severe in Navy programs because of the use of cost-reimbursable contracts.