

Potential Department of Defense Use of Commercial High-Speed Sealift (2000-2010)

Authors: Ed Savacool, Stanley Associates, Inc.
Cory Gifford, Stanley Associates, Inc.

Abstract: *In light of the Department of Defense (DOD) planning for “getting to the fight fast,” the Center for the Commercial Deployment of Transportation Technologies (CCDoTT) analyzed the potential use of commercial high-speed sealift (HSS) vessels by DOD. CCDoTT, under U.S. Transportation Command (USTRANSCOM) and Maritime Administration (MARAD) oversight, contracted with Stanley Associates, Inc. to develop and administer a DOD questionnaire and to develop a comprehensive report of the findings. Band, Lavis & Associates, Inc., John J. McMullen Associates, Inc., and Marine Consulting Services assisted Stanley Associates. The primary objective of the questionnaire was to obtain potential DOD user perspectives to assist CCDoTT in identifying commercially viable and potentially militarily useful HSS vessels. DOD Services and CINCs provided responses to the questionnaire.*

The questionnaire covered two types of commercial HSS:

- 1. High-speed cargo ships with trans-oceanic range capabilities that may have the potential to support inter-theater sealift deployment operations.*
- 2. High-speed freight capable ferries with shorter ranges that may have the potential to support intra-theater sealift operations.*

The questionnaire identified general agreement that the future availability of commercial high-speed cargo ships and freight capable ferries could be very useful to DOD. However, responses were qualified by DOD Services and CINCs that to be militarily useful, high-speed cargo ships and freight-capable ferries should have certain capabilities.

This paper summarizes the report "Potential Department of Defense Use of Commercial High-Speed Sealift (2000-2010)," which has been reviewed by all DOD Service and CINC staffs responding to the questionnaire. Also highlighted are two other reports developed by the authors for CCDoTT, "Current and Planned Capabilities of Commercial High-Speed Ships" and "An Assessment of Current and Planned Capabilities of Commercial High-Speed Ships."

INTRODUCTION

It is becoming increasingly important for the Department of Defense (DOD) to have the agility necessary to deploy large and small forces rapidly to a wide range of contingency operations. In the near future (2000-2010) it may be possible to deploy selected forces using commercial high-speed sealift (HSS) vessels with speeds between 40 and 60 knots.

This project focused on the questions:

- Could DOD use commercial HSS and, if so, how would HSS be used?
- Could commercial HSS support operations in the variety of world ports that DOD must use?
- Just how agile are these existing and pending commercial HSS for DOD use?

To answer these questions and more, the Center for the Commercial Deployment of Transportation Technologies (CCDoTT) analyzed the degree to which existing and planned commercial HSS vessels could be of potential use to the DOD.

CCDoTT decided to approach this critical study by forming a HSS Team of sealift operations and engineering experts. Stanley Associates was selected to lead this project with support from Band, Lavis & Associates, Inc., John J. McMullen Associates, Inc., and Marine Consulting Services. The Stanley HSS Team structured the project to assist CCDoTT in identifying and focusing on existing and planned commercial HSS vessels that offer DOD the most useful operational configuration capabilities.

Project Overview and Definitions

It is very important for the reader to know that for this project, CCDoTT assumed commercial HSS would be used "as-is." Therefore, we established the following assumptions:

- DOD would not take any initiative to influence the planned designs or existing commercial ships.
- DOD would not add National Defense Features (NDF) to the commercial HSS.

For the purposes of this project, we divided commercial HSS into two categories:

- *Commercial, high-speed cargo ships:* Defined as having a design speed (at full load displacement) of at least 33 knots and an un-refueled range of at least 3,500 NM.
- *Commercial high-speed freight ferries:* Defined as having a design speed of at least 35 knots (at full load displacement), being freight capable, and having an un-refueled range of under 3,500 NM.

In the simplest terms, the project matched "as-is" commercial HSS and HSS designs with DOD-identified potential missions.

PROJECT COMPONENTS

The HSS Project included three major components documented in three separate reports. The following is a brief definition of the project phases:

DoD Potential Use Questionnaire

The first part of the project identified how the DOD envisioned potentially using the capabilities of commercial HSS. To do so the Stanley HSS Team developed and sent a questionnaire concerning DOD use of HSS to all Services and CINC Staffs. The results of this phase of the project can be found in the CCDoTT report "Potential DOD Use of Commercial High-Speed Sealift (2000-2010)."

Commercial High-Speed Ship Survey

The Stanley Team focused the second part of the project on determining what HSS ships either exist today or may be in design and be capable of being built by commercial industry between 2000 and 2010. The CCDoTT report "Current and Planned Capabilities of Commercial High-Speed Ships" presents the principal characteristics and capabilities of existing and planned commercial HSS ships.

The Assessment of High-Speed Capabilities

The final phase of this project focused on assessing the capabilities of commercial HSS. This analysis is documented in the CCDoTT report, "An Assessment of Current and Planned Capabilities of Commercial High-Speed Ships."

PHASE I: DOD POTENTIAL USE QUESTIONNAIRE

With oversight from the U.S. Transportation Command (USTRANSCOM) and the Maritime Administration (MARAD), the Stanley HSS Team began perhaps the most important phase of this project - identifying the potential DOD use of commercial HSS. Therefore, this initial phase focused on the development of a detailed questionnaire that was intended to determine the degree to which existing and planned commercial HSS vessels could be of potential use to DOD in the 2000-2010 period. After reviewing the questionnaire with representatives from the Joint Chiefs of Staff, USTRANSCOM, and Deputy Chief of Naval Operations (Logistics), the questionnaire was sent to all Services and CINCs. Service responses were received from:

- U.S. Army
- U.S. Navy
- U.S. Marine Corps

CINC responses were received from:

- U.S. Atlantic Command
- U.S. Central Command

- U.S. European Command
- U.S. Pacific Command
- U.S. Special Operations Command
- U.S. Transportation Command, along with its component Air Mobility Command

Part One of the questionnaire addressed potential DOD use of commercial, high-speed cargo ships, and Part Two, the potential use of commercial high-speed freight ferries.

Since the questionnaire dealt with a timeframe in the future, hypothetical assumptions were provided addressing the following areas: (1) expected increases in the number of commercial HSS vessels by 2005, (2) expected speed, range and cargo configurations of these vessels, and (3) the number and on berth availability of these ships to provide support to DOD.

The questionnaire addressed potential use of various configured commercial HSS to support the following: (1) the initial or surge phase of deployment operations to transport combat, combat support (CS), and combat service support (CSS) units; (2) tactical resupply and sustained resupply phases of deployment operations; and (3) intra-theater sealift operations.

Summary of Questionnaire Responses on Potential DoD Use of Commercial HSS Cargo Vessels

Potential DOD use of commercial HSS RO/RO-capable ships during the initial or surge phase to transport combat, combat support (CS), and combat service support (CSS) unit equipment (UE)

- All responding directly to the questionnaire said there is a potential DOD use for RO/RO-capable ships to transport UE during the initial or surge phase. Many responses noted specific conditions or caveats relating to desired ship characteristics and features.
- Table 1 presents a detailed summary of important assumptions and individual responses.

Potential DOD use of commercial HSS cellular containerships during the initial or surge phase to transport CS and CSS UE.

- The majority responded yes; one said perhaps, one had no preference, and one said no regarding a potential DOD use of HSS cellular containerships to transport CS and CSS UE during the initial or surge phase. Many responding yes expressed conditions or caveats relating to desired ship characteristics and features.

- Table 2 presents a detailed summary of individual responses.

Potential DOD use of commercial HSS RO/RO-capable ships and cellular containerships during the tactical resupply and sustained resupply phases to transport UE, general cargo and ammunition.

- Approximately 75 % of those responding said yes; one said possibly, and one said no regarding a DOD use of either type of HSS ship during tactical resupply and sustained resupply operations. Some of those responding expressed a preference for transporting UE by RO/RO, emphasized the need for SPOD infrastructure to support container operations, and stated the need for these vessels to have a better capability than conventional RO/RO-LO/LO to operate in the objective area.
- Table 3 presents a detailed summary of key assumptions and individual responses.

Possible impact that commercial HSS could have on the need for a large sustainment build-up to support major or lesser regional contingencies

- Half responding said yes, that the availability of HSS could result in faster delivery of required resupply or replacement equipment potentially reducing the logistics build-up ashore. One respondent observed that commercial HSS could potentially influence the need for a large sustainment build-up while lessening the requirements for host nation support and in-theater infrastructure.
- Other responses can be summarized as follows: (1) The impact would not necessarily be on the sustainment build-up but rather on the overall deployment of the contingency. More rapid sealift could place more forces and supplies on the ground faster, enabling a quicker transition from deployment operations to decisive operations. (2) There are possible positive and negative impacts. HSS could potentially close the force faster. On the other hand, other factors affect HSS support, such as the ability of a unit to be ready to load earlier and the SPOD's capacity to provide greater throughput with more ships arriving sooner. (3) The real value would be in the added flexibility this capability would give USTRANSCOM to respond to changing priorities.

Possible impact that commercial HSS could have on the need to preposition sustainment stocks.

- Half of those responding saw no future impact on the need to preposition sustainment stocks. One said probably not, one perhaps, and two said yes, that the availability of commercial HSS could possibly reduce the requirement for some prepositioned sustainment stocks.

Possible impact of commercial HSS on decisions related to the movement of DOD cargo by airlift or sealift.

- All but one response indicated that there could be an impact on DOD decisions related to the movement of cargo by airlift or sealift. The one negative response said that other than mitigating risk in the halting phase, there would not be much impact on the actual tonnage requirements.

Potential DOD uses of commercial HSS cargo ships to support other DOD missions.

- Over half responding referred to other potential DOD missions for commercial HSS, such as (1) Peacetime transport of DOD cargo that currently goes to Europe by air. In addition to maintenance of readiness-related sustainment, other cargo such as personnel property (unaccompanied baggage) could be candidates for commercial HSS movement; HSS could improve quality of life by significantly shortening the standard 45-day required delivery date from the east coast to Europe. (2) Re-deployment operations. (3) Support of disaster relief and humanitarian relief efforts.
- Some respondents expressed concern about either cost or availability of these vessels for other than major contingencies, since they would be in private service moving high value/high revenue-generating cargoes.

Summary of Questionnaire Responses on Potential DoD Use of Commercial HSS Freight Ferries

Potential DOD use of commercial HSS freight ferries to support intra-theater sealift of UE, general cargo, and ammunition.

- Combat UE Responses Seventy-five percent responding saw a potential DOD use of these vessels for intra-theater shipments of combat UE; the remainder said no. One of the negative responses was related to the questionnaire assumption that these vessels would not be capable of transporting heavy tracked vehicles. Many responses noted specific conditions or caveats relating to desired freight ferry characteristics and features.

- CS and CSS UE Responses Just under 90 % responding said yes, there is a potential DOD use of these vessels for intra-theater shipments of CS and CSS UE.
- General Cargo Responses Half responding said there is a potential DOD use of these vessels for intra-theater shipments of general cargo; the remaining said no or that it was situational dependent.
- Ammunition Responses - Seventy five percent of those responding said there is a potential DOD use of these vessels for intra-theater shipments of ammunition.
- One response was negative regarding any potential DOD use of freight ferries (i.e., for UE, general cargo, or ammunition), since these vessels were too small and too few in numbers to have any significant advantage over theater airlift.
- Table 4 presents a detailed summary of individual responses.

Potential DOD uses of commercial HSS freight ferries to support other DOD missions.

- Over 60 % responding said that there are other potential DOD missions for commercial HSS freight ferries such as (1) Support of Special Operations Forces as insertion and extraction assets; (2) Shuttle ships to station ships; (3) Alternative to intra-theater airlift if APODs are subject to weapons of mass destruction and CRAF stops flying to these ports; and (4) Humanitarian assistance missions even potentially for operations such as NEO over short distances.

Conclusions

Based on the responses to the questionnaire, there appears to be definite interest in utilization of commercial HSS cargo ships and high-speed freight ferries to support DOD operations. The following is a summary of the conclusions reached:

- There is significant DOD interest in the potential use of commercial HSS cargo ships and freight ferries in the 2000-2010 timeframe. To be most useful to DOD, any future U.S.-flag commercial HSS should have at least some of the desired characteristics or features identified by DOD Services and CINCs as noted in the basic report.
- Using the DOD desired ship characteristics, features and cargo types identified in this report, continuing

efforts need to focus on identifying and assessing commercially viable HSS cargo ships and freight ferries that offer DOD the most useful operational configuration capabilities.

PHASE II: COMMERCIAL HIGH-SPEED SHIP SURVEY

The purpose of this component of the overall project was to acquire and disseminate information on the principal characteristics and capabilities of current and planned commercial high-speed cargo ships and freight capable ferries. This effort supports one of CCDoTT's primary objectives, which is to identify and focus on commercially viable and potentially military useful HSS platforms (i.e., ships that offer DOD the most useful operational configuration capabilities). The information obtained during this study was used in a follow-on assessment of current and planned capabilities of commercial high-speed ships.

To obtain this information, Stanley Associates' HSS Team developed a commercial survey. Care was taken in designing the survey to request only that information essential to perform an abbreviated assessment. (This was considered prudent based on past experiences in conducting similar surveys; the more information requested the fewer the responses.) In September 1998 letters and survey forms were mailed to over 140 commercial ship designers, builders, and operators located throughout the world.

To augment survey results, Stanley's HSS Team gathered extensive commercial high-speed ship information from other sources. These sources included *Jane's High-Speed Marine Transportation* (1998-1999 edition); the Drewry Shipping Consultants Ltd. publication, *Fast Ferries - Shaping the Ferry Market in the 21st Century*; numerous trade periodicals such as *Fast Ferry International* and *Speed at Sea*; and Internet web sites of high-speed ship designers, builders, and operators.

Ship Characteristics and Configuration Data

Ship characteristics and configuration data obtained from returned survey forms and literature and web searches were then organized into three data tables:

- Commercial High-Speed Monohull Ships and Designs
- Commercial Multihull Ships and Designs
- Commercial Air Cushion Ships and Designs

Since the intent was to display only high-speed freight-capable ferries, the following screening criteria were used: (1) length overall (LOA) must be at least 50

meters, and (3) must be able to transport at least 25 cars or other cargo (omitting passenger-only ferries).

In many cases where data was not available, estimates were developed. For example, estimates were developed for cargo deck area by using a standard deck-area-per-car factor and multiplying this factor by the car capacity. Similarly, developing a standard weight-per-car and multiplying this factor developed estimates for cargo payload.

PHASE III: ASSESSMENT OF HIGH-SPEED CAPABILITIES

CCDoTT designed this component of the project to assist CCDoTT in identifying and focusing on existing and planned commercial HSS vessels that offer DOD the most useful operational configuration capabilities.

This phase of the project used information included in two CCDoTT reports previously developed by the same Stanley HSS Team:

- "Potential DOD Use of Commercial High-Speed Sealift (2000-2010)," which summarizes DOD Service and CINC staff responses to a CCDoTT questionnaire on DOD use of commercial HSS.
- "Current and Planned Capabilities of Commercial High-Speed Ships," which presents the principal characteristics and capabilities of existing and planned high-speed cargo ships and freight-capable ferries.

Included in this portion of the project was an initial assessment of two types of commercial high-speed ships:

- Longer-range cargo ships that may be capable of supporting DOD inter-theater deployments.
- Shorter-range, freight-capable ferries that may be capable of supporting DOD intra-theater shipments.

High-Speed Cargo Ships

To focus on potential commercially viable and militarily useful HSS cargo ship designs, three screening criteria were established.

- The design must have been developed for commercial cargo service; i.e., the design drivers must have included economic considerations such as the need to generate an acceptable return on investment (ROI) in the commercial market.

- The design speed (calm water) must be at least 33 knots at full load displacement (FLD) and maximum continuous power (MCP).
- The range at FLD and design speed must be at least 3,500 nautical miles (nm). This represents a relatively short Atlantic Ocean crossing.

Initial assessments were conducted on the following cargo ship designs:

RO/RO capable ship designs

- BATHMAX 4000
- FastShip TG-770
- FastShip TG-880
- Halter High-Speed Freight Vessel
- InCAT 130m
- Q-10

Cellular containership designs

- BATHMAX 1500
- Fast Container Liner
- PEBOS Containership

Assessment factor attributes included:

- Design Speed
- Unrefueled Range
- Panama Canal Transit
- Refueling
- Ship Berthing
- Cargo Payload
- RO/RO and LO/LO Cargo Stowage Capability
- Installed Load and Discharge Features
- Passenger Related Features

High-Speed Freight Ferries

To focus on commercial freight-capable ferries and designs of potential use to DOD, three criteria were established:

- The design must have been developed for commercial service and include a capability to transport heavy trucks, trailers, or containers.
- Service or design speed (calm water) must be at least 35 knots at full load displacement (FLD) and maximum continuous power (MCP). This represents the lower end of speeds identified by DOD Service or CINC staffs when responding to the questionnaire.
- Unrefueled range at FLD and design speed must be at least 700 nautical miles. This range is less than desired by U.S. Army and USCENTCOM staffs, but

is considerably higher than the lower end of the assumed range (250-2,500 NM) provided with the questionnaire.

Initial assessments were conducted on the following operating ferries and designs:

Operating Ferries

- InCAT 96m (WPC)
- MDV3000
- Stena HSS 1500

Ferry Designs

- Austal RO-CON
- InCAT 120m (WPC)
- NQEA Sea Truck

Assessment factor attributes included:

- Service or Design Speed
- Unrefueled Range
- Panama Canal Transit
- Refueling
- Ship Berthing
- Cargo Payload
- RO/RO and LO/LO Cargo Stowage Capability
- Installed Load and Discharge Features
- Passenger Related Features

General Conclusion

Due to the higher freight rates required to make high-speed vessels profitable, the owners/operators may not be able to effectively compete for DOD Preference Cargo. If this is the case, to gain access to future U.S. flag high-speed cargo ships and freight-capable ferries, the U.S. Government will need to ensure that these unique vessels are enrolled in programs such as the Maritime Security Program (MSP) or National Defense Feature (NDF) Program. Without such a legal commitment, time would be lost during a contingency for contract negotiations and there would be no guarantee of vessel availability short of requisitioning.

Recommendations

- CCDoTT, in coordination with USTRANSCOM and MARAD, should investigate the costs and benefits of establishing a High-Speed Maritime Security Program (HSMSP).
- CCDoTT, in coordination with MARAD and USTRANSCOM, should selectively fund concept designs of cost-effective military-related features on high-speed cargo ship and freight-capable ferry designs that would be U.S. built and crewed. The goal

should be to improve the military usefulness of these unique commercial vessels.

- USTRANSCOM and MARAD should encourage the development of a viable National Defense Feature (NDF) Program to improve the military utility of future U.S. flagged commercial ships, including high-speed cargo ships and freight-capable ferries.

COMMERCIAL HSS UTILIZATION TO IMPROVE MILITARY SEALIFT

The Stanley HSS Team addressed how DOD could employ commercial HSS to improve Military Sealift. For the analysis, we reviewed the three major studies of this project, as previously discussed.

Some of the planned commercial HSS cargo ship designs and existing freight ferries and designs offer DOD a new dimension for the acquisition of an improved sealift capability. Commercial HSS cargo ships hold much promise for an improved rapid deployment capability of high priority unit equipment and cargo. This improved rapid deployment could serve as a deterrent. In addition, in case of hostilities HSS could reduce the risk to the forces deployed by increasing the flow of unit equipment early in an operation, thereby serving to more quickly build up a strengthened military presence.

HSS RO/RO-Capable Cargo Ships

Designs for commercial high-speed RO/RO-capable ships offer the most promise for improving the delivery of unit equipment (UE) during the initial or surge phase of deployment operations and delivery of replacement UE during the tactical resupply and sustained resupply phases. Many existing commercial designs would be capable of carrying a wide variety of unit equipment. DOD requires flexible sealift assets, and the RO/RO design offers this capability. Current Army and Marine Corps afloat prepositioning programs utilize RO/RO capable vessels.

The combination of high transit speeds and the traditional flexibility of the RO/RO design were cited as having potential use by virtually all DOD service and CINC staffs. Most respondents to the survey stressed that every scenario is different and that factors such as distance to the objective area, specific port features and the actual design and number of vessels that can be obtained would impact any plan for the use of commercial HSS.

Based on the number of commercial HSS RO/RO-capable ships postulated in the survey, the US Army staff cited priority cargo as being Combat Support (CS) and

Combat Service Support (CSS) UE. The USMC staff identified priority UE as CSS with limited combat for security to possible full combat with integrated CS.

A number of respondents felt that HSS could help the buildup of assets and relieve some of the threat and dependency that is currently placed on Airlift.

High Speed Cellular Container Ships

Based on survey responses, high-speed cellular container ships have limited application for surge requirements. They share similar hull forms to the HSS RO/RO-capable ships, but are much less flexible in their ability to move outsized cargo and have little ability to operate without a substantial amount of port infrastructure. Scenarios that would support the use of high-speed container vessels would involve the control of a well-developed port facility that could be utilized to offload the containerized cargo. Commercial container systems are able to accommodate adequately most forms of combat cargo, with the exclusion of exceptionally large or heavy equipment. Service and CINC Staffs observed that priority cargoes did not differ considerably from those applicable to RO/RO's, although respondents thought the use of container vessels in the initial or surge phase was remote.

Using HSS cellular containerships for surge or initial deployment of unit equipment had many critics. The use of these ships during tactical re-supply and sustained re-supply is more appropriate. Early acquisition of commercial HSS by DOD would allow for a smoother and more flexible flow of cargo into an area of operation. While conventional hulls offer much greater cargo capacities, HSS could be used separately or in conjunction with slower ocean transport. The speed of those transport vessels would allow for more trips and more rapid response in filling unforeseen needs as requirements are generated. This additional flexibility may well outweigh the reduced cargo capacities associated with high-speed hulls.

Freight Capable Ferries

Using high-speed freight capable ferries for intra-theater sealift has also been identified as scenario dependent. The factors of location and range could substantially influence their potential usage. Most of the larger operating high-speed ferries are capable of making an ocean passage when transiting without cargo. But some may be unable to self deploy so consideration must be given to getting them to the theater of operation. An additional concern of one respondent was the inability of the ferries to transport tracked vehicles. Despite some

limiting factors, the majority of the survey respondents found these small cargo carriers to be of potential benefit in the near future. The majority of the respondents felt that the ferries could be used for transporting Combat, Combat Support and Combat Service Support UE and ammunition. Only half of the respondents felt that the ferries would be useful for general cargo.

CONCLUSION

Commercial HSS has vast potential for solving some of the deployment problems currently faced by DOD. The current and pending HSS have been identified by all major military commands as useful for specific missions. This is encouraging news for industry and DOD.

While we answered the question of whether DOD could use existing commercial HSS, we still need to examine the agility of these ships to complete the possible missions identified by DOD. The recommendations provided in this paper provide a roadmap for further agility assessments.