Increasing Seabasing

Interoperability in the Pacific

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The ESD (expeditionary transfer dock)[1] was developed to enhance the Navy and Marine Corps' amphibious operational reach by increasing our seabasing capability. The employment concept moors the platform alongside an LMSR (large, medium-speed roll-on/roll-off) ship in order to receive equipment pre-positioned aboard the LMSR via side-port starboard ramp and cranes, combat load the equipment onto CAC operating from three specially-designed lanes aboard the MLPs (mobile landing platforms), and then the LCAC deliver their loads ashore in support of combat operations.[2] The primary capabilities of the ESD include limited marshalling, staging, and reconfiguration of equipment at sea in addition to over-the-horizon delivery of equipment and personnel ashore via LCAC.

Beginning in fiscal year 2016 with the addition of the ESD to the MPF (maritime pre-positioning force) program, MARFORPAC (Marine Corps Forces, Pacific) planned and conducted various maritime events to validate the added capability this platform brings to littoral access and mobility in the Pacific. Working with PACFLT (U.S. Pacific Fleet), CD&I HQMC (Concept Development and Integration), and the Navy chain of command for the maritime prepositioning squadrons, MARFORPAC selected various seabasing objectives to complement the robust MPF exercise continuum in the Pacific.

In May 2015, MARFORPAC hosted the PALS (Pacific Command Amphibious Leaders Symposium) designed to bring together senior leaders of allied and partner nations to increase amphibious capability development and interoperability.[3] The showcase event was Exercise Culebra Koa in the Hawaiian Island area of operations. This exercise was intended to be a comprehensive demonstration of naval power projection demonstrating the ESD and LMSR capabilities to operate with LCAC connectors provided by the 15th MEU. Within the MPF program, the LMSRs (Bob Hope class, Watson class, and Shugart class) are the only vessels certified to moor to the ESD, and LCAC are the sole certified connectors for moving vehicles and equipment from ESD to shore. The event was ultimately cancelled—the ships were unable to moor together, conduct skin-to-skin operations, and transfer equipment due to sea state and a bow thruster casualty on the ESD, USNS *Montford Point* (T-ESD-1).

In February 2016, MARFORPAC conducted exercise FB16 (Freedom Banner 16) in support of exercise SY16 (Ssang Yong 16) in the vicinity of the Republic of Korea. SY16 was a large-scale amphibious exercise that aggregated two ARG/MEUs and an infantry battalion, building up to MEB-level operations. Commander, Expeditionary Strike Group Seven and Commanding General, 3d MEB led the exercise, which combined the *Boxer* and *Bonhomme Richard* ARGs as well as the 11th and 31st MEUs. FB16 included a pier-side offload of equipment from USNS *Williams* in the vicinity of Gwangyang, Korea, sustainment to ground forces

MARFORPAC hosts PALS, a symposium that brings together senior leaders of allied and partner nations. *(Photo by Cpl Wesley Timm.)*

ashore from the USNS *Sacagawea* (T-AKE), and attempted to demonstrate the unique capability of the ESD with a planned skin-to-skin mooring with the USNS *Stockham* in order transfer a company-sized raid force for seizure of a port to support a larger assault follow on echelon. Due to weather and sea state, the skin-to-skin mooring was unable to occur in the timeframe needed to support the raid force. The ESD and LMSR did, however, conduct one successful skin-to-skin mooring and moved one HMMWV from the LMSR to the ESD, but no equipment was transferred ashore. Additionally, the ESD was able to ballast down and conduct operations with one LCAC. This event was not a skin-to-skin event and did not involve the transfer of equipment.

Prior to conducting ESD seabasing operations during SY16/FB16, the ESD had an accumulated record of zero successful skin-to-skin moorings between the ESD and LMSR out of seven such attempts in the Middle and Western Pacific Ocean. Those attempts included one during Exercise Culebra Koa off Oahu, Hawaii; two off the west coast of Okinawa; three in vicinity of Sasebo, Japan; and rehearsal operations during exercise SY/FB16. Most recently, the ESD suffered a throttle casualty, losing control of her port engines from the bridge and was unable to maintain heading control using the installed DP 0 (dynamic positioning zero) system. ESD operations were temporarily halted for repairs on the throttle followed by a mandatory U.S. Coast Guard inspection in order to bring the ESD back up to fully operational capable status.

Following the challenges associated with ESD operations during SY16/FB16, CG, 3d MEB arranged for conversations with subject matter experts regarding the ESD. Specifically, the discussion centered on background, history, reasons behind the numerous unsuccessful attempts to conduct ESD operations in order to gain a clear understanding of current issues, and possible solutions to improve the ESD capability.

It was determined that current capability shortfalls of the ESD and the fact that the skin-to-skin operations have recently been unsuccessful are predominately due to sea state and mechanical issues with the bow thrusters. The two primary risks involved are "deck washover," or waves over the deck that would sweep away personnel and equipment when the ESD is at full ballast-down depth of 15m, and skin-to-skin damage to both vessels (ESD/LMSR) and their installed systems.

Statistically, USNS *Montford Point* entered exercise SY16 with a record of 22 successful skin-to-skin moorings and six successful touch and goes during calendar years 2014 and 2015. These events were conducted at Long Beach Harbor, Puget Sound, and off the shores of Camp Pendleton, California, in sea states 1 through 3. Sea state 3 skin-to-skin moorings only occurred off the shores of California with maximum wave heights ranging between 2.2 to 3.8 feet.

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Although skin-to-skin operations were successfully demonstrated off Camp Pendleton during test and evaluation exercises, for PALS16, and for Pacific Horizon 17, it should be noted that wave periods vary depending on geographic location. The Southern California areas of operation typically experience longer period waves/long swells while other areas might experience shorter wave periods and "choppier" conditions, all with the same wave height, but with a completely different impact on the ships and resultant motions of both vessels. Just because skin-to-skin operations were successfully demonstrated off Southern California in sea state 3 with wave heights between 2.2 and 3.8 feet, there is no clear indication the same success will be possible with similar wave heights or sea states off the coast of Korea, in the North Atlantic, or other regions.

To date, there has been limited success in employing this platform to meet operational requirements associated with the mobility challenges we face in the Pacific. Of note, there have not been any attempts to operate the vessel in any other combatant commander area of responsibility. Given what has come to be routine threats in the Central Command region, as well as increasing instability in the Eastern Mediterranean/Eastern European area, the possibility of operating the ESD in these regions cannot be discounted. Some of the specific technical shortfalls experienced during exercises in the Pacific were:

- Lack of capability of the VTR (vehicle transfer ramp) aboard the ESD during increased sea state conditions;
- Lack of a robust dynamic positioning required when bringing ships skin-to-skin. The system aboard the ESD Class ships is only capable of maintaining ships heading, and the heading of the LMSR. It cannot maintain geographic position automatically nor can it maintain relative position to the other vessel while making an approach. A Class 1 or better DP system is required for those operations;
- Knuckle cranes are incapable of operating at increased sea state to support operations;
- Repeated bow thruster mechanical issues when positioning the ships for skin-to-skin; and
- Adequate pumps in order to effectively ballast up/down the ship in dynamic conditions.

What We Wanted

The original requirements-driven design of the ESD program offered the Navy and Marine Corps a unique, high-performance platform to facilitate

at-sea cargo transfers from MPF. The platforms would partially submerge in water and allow cargo to float on and off of it. The ESD is essentially a "beach" that links a roll-on/roll-off cargo ship to small, barge-like watercraft, such as LCAC, the INLS (improved Navy lighterage system) and LCU (landing craft, utility), and can deliver Sailors, Marines, and their equipment from the seabase ashore.[4] The initial requirements provided by the ESD would function as a staging position or seabase for conducting arrival and assembly at sea of the MEB. It would carry 1,112 personnel, provide a seabase where Sailors and Marines are matched with their equipment, and employ the combat-ready force ashore via surface and aviation connectors at a time and place of their choosing. Of note, that original design would have allowed the LCAC to make their approach from the stern of the vessel, just as they do with current amphibious warships.

In the fall of 2009, largely due to the looming fiscal down turn, MPF (Future) was placed on hold as part of the Quadrennial Defense Review, and the U.S. Navy conducted a review of alternative concepts to reduce cost, examine enhancements, and concepts that would give the MPS squadrons additional capabilities. As a result, the original design of the ESD was altered mainly because of price—in the range $1.2B dollars per ship. This resulted in the tailored, commercial, near-term seabasing platform that we currently have in service today. The price tag for the new solution was $500 million. The current ESD is a significantly reduced capability than the original capabilities development document. (See Table 1.) Also of significance, with the current design LCAC are required to approach the vessel from the beam, which leads to concerns regarding sea and wind direction for both vessels as well as the LCAC.

What We Bought

The ESDs assigned to the MPF program, USNS *Montford Point* and USNS *John Glenn* are 34,544 MT displacement carriers for LCAC. It is an auxiliary vessel (non-warship) designed to operate in permissive environments. In higher threat environments, the ESD operates under the protection of warships or other joint assets. It is built to American Bureau of Shipping steel vessel rules standards and is not shock hardened. It is a modified deep-draft crude carrier design of the Alaska-class tanker that provides a platform of 25,000 square feet of raised vehicle deck space for marshalling, staging, or temporary storage of equipment or vehicles. The ESD supports RO/RO (roll-on/roll-off) operations with the LMSR and the EPF (expeditionary fast transport) formerly known as the JHSV (joint high speed vessel). It carries a VTR for connection to LMSRs. The ESD supports transfer operations with LCAC and is conducting research and developmental demonstrations to test interoperability with the INLS LCU.

The ESD has three LCAC lanes for surface connector interface that support the transfer of equipment and vehicles between the ESD and LCAC for transportation to and from shore. Ship-to-shore movement from the ESD is one dimensional, predicated on the availability of amphibious ships and their embarked LCAC. AAVs may transit from the LMSR to the ESD, conduct water-tight integrity test, splash from the LCAC lanes, and perform other preparations as necessary on the raised vehicle deck.

The *Seabasing Joint Integrating Concept*, (Washington, DC: DOD, 2005), originally established an objective of operating through NATO Sea State 4. The ESD capability development document established a threshold requirement, based on a cost constraint, through mid-sea state 3 (~3 ft. wave

Capability		Original ESD Design	Current ESD
Mission Payload	Accommodations	922 personnel	34 personnel
	Vehicle Square	50,000 enclosed sq ft	25,000 exposed sq ft
	Cargo Fuel	905,000 gal	380,000 gal
	LCAC	6 full service spots including Intermediate-level Maintenance	3 limited service spots (Fueling/Barriers/Navigation Lights)
Employment of Forces		1/3 Surface for a Battalion Landing Team (BLT), Arrival & Assembly (A&A) conducted At sea	Delivery of equipment only, Arrival & Assembly conducted Ashore
Vehicle Transfer at sea		Sea state 4 Vehicle Transfer System and Dynamic Positioning with GPS redundancy	Sea state 3 (skin-to-skin)
Embarked Forces Command and Control		5,000 sq ft for BLT planning, training and control	Space & weight to support LCAC Ops and Debarkation control
Aviation		(1) Level I, Class 2 operating spot (MV-22/CH-53 capable)	None
Ship Utility Services		Organic to support all shipboard functions	Electrical and potable water to support up to a 445 personnel accommodations module

Table 1. Original design requirements versus received requirements. *(Table by author.)*

height). During testing, Military Sealift Command validated the ESD could operate through sea state 3 (4.1 foot wave height) vice mid sea state 3 increasing the operational threshold to closer match the capabilities of other connectors and enablers which use other sea state scales.

What Is Needed to Bridge the Gap

In conjunction with the Navy, MARFORPAC will continue the evolution of seabasing enabling capabilities in order to increase interoperability and mobility in the littorals by gaining knowledge from employment of alternative platforms, using a synchronized process of requirements generation, conducting concept and gap validation, and implementing solutions generated at the PALS. For the mid-term, MARFORPAC will inject ESD opportunities at the annual Maritime Prepositioning Exercise Working Group in order to align concept validation and seabasing enabling objectives with future exercises to continue to expand interoperability and proficiency. Additionally, as a first-in-class ship, additional experience is required to increase proficiency in skin-to-skin operations. In FY18, PACFLT supports an initiative to conduct a quarterly ESD to LMSR skin-to-skin marriage in order to increase proficiency. Ideally, these events will be scheduled when there is an amphibious warship in the local area, so LCAC operations can also be included. Given that both ESDs are to be forward deployed assets, opportunities for the LCAC community to gain live training are severely limited, and there is currently no simulator or trainer with the requisite ESD software.

Materiel solutions will also increase the operational capability and capacity issues. Solutions may be a result of science and technology, while other upgrades and modifications may be solely dependent on engineering feasibility studies and funding. Any combination of the solutions mentioned below have the potential to markedly improve the current employment of the ESD and limit the effects of sea state. These solutions include but are not limited to:

- DP/VTAS (dynamic positioning/vertical transfer alongside system). In February 2010, a Class 1 DP system was tested in the Gulf of Mexico, using the MV *Mighty Servant* and the LMSR USNS *Soderman* as test vessels. The installed DP system kept both ships apart, at a safe distance, and maintained that distance precisely at 34 meters, plus or minus .5 meters, while still being close enough to put a ramp between and transfer combat vehicles and gear. The VTAS ramp is a stabilized system that compensated for the varying roll and movements of both ships. As demonstrated during the testing, this stabilized ramp allowed for the safe and efficient transfer of wheeled and tracked vehicles, including MTVRs, AAV-7s, and even M1A1 tanks. DP/VTAS is a proven concept, and it should be reconsidered.
- An upgraded ESD ballasting system to reduce the time required for ballasting operations thereby widening the operational window for skin-to-skin operations and further support equipment transfer from the LMSR to the ESD. Currently, the ESD has a four-day ballast operation requirement, which limits the time window and location for conducting skin-to-skin operations.
- The Office of Naval Research's environmental ship motion forecasting technology would increase safety by improving "seaway environmental forecasting, in order to predict ship motions and determine windows of opportunity for inter/intraship material and personnel movement."[5] This system is currently planned to be installed on USNS *John Glenn* (T-ESD-2) prior to her participation in PALS 16 in the vicinity of Camp Pendleton. Sea states will impact the ability to conduct skin-to-skin operations, deploy the VTR, transfer equipment between ships, and interface with surface connectors.
- A 10 degree twist-capable VTR to replace the current vehicle transfer ramp. The twist-capable VTR will better facilitate ship-to-ship vehicle transfers while underway and up to sea state 4 conditions to enable faster, safer vehicle transfer operations.
- Upgrade of the DP system to allow full station keeping as opposed to heading only. This upgrade would limit the effects of sea state and provide full station keeping and full computer redundancy as opposed to the single computer, heading only system currently in use. At minimum, a Class 1 DP system will give the ESD this capability.
- Addition of a modular troop berthing solution to accommodate a rifle company-sized force with appropriate

ARG/MEUs are aggregated as part of amphibious exercises being conducted with allied nations. *(Photo by LCpl jacob Pruitt.)*

An LCAC approaches the USNS* John Glenn *(T-ESD-2) during Exercise* Pacific Horizon *2017.
(Photo by LCpl Roxanna Gonzalez.)

command and control space. This will bring an initial arrival and assembly at sea capability as envisioned in the original design.

- Gaining additional information and knowledge of the operating envelopes for surface and vertical connectors. The surface connectors that interface with the ESD operate in both open ocean and close to shore, to include loading and discharging cargo and personnel through austere port facilities and across beaches. The ESD can conduct transfer operations in conditions up to mid-sea state 3. Vertical connectors have limitations on approach to the flight deck of the LMSR based on ship housing, cranes, and other obstructions. An understanding of the safe operating envelope for each combination of ESD, surface/vertical connector, and LMSR is required to ensure limits are included in the planning process for any mission.
- The ships' crews use an SOE (safe operating envelope) developed during the six months of ESD post-delivery trial and testing by Military Sealift Command and Naval Sea Systems Command, Program Executive Officer Ships, Program Manager Ships 385 responsible for strategic and theater sealift. As new lessons are learned and new procedures are proposed with each experimentation, demonstration, and exercise, the operations manual will be revised and updated by stakeholders and subject matter experts.

Way Ahead

Freedom Banner is the only annually funded MPF exercise in the Pacific, and it continues to be the mainstay not only for PACFLT and MARFORPAC but for the entire Navy and Marine Corps in MPF concept validation, doctrinal development, experimentation, and seabasing integration. We should continue to use this exercise to validate potential improvements to our ability to conduct seabasing, including those specific possible solutions already mentioned in this article. The Navy and Marine Corps team will continue to use this exercise continuum to enable the rapid deployment and engagement of a MAGTF anywhere in the world to support the National Defense Strategy. The unique area of operations within the Pacific, which is home to the U.S. Navy's greatest fleet concentration, affords the opportunity for PACFLT and MARFORPAC to be the Department of the Navy's experts in seabasing doctrine. Additionally, these organizations are best positioned, staffed, and operationally focused to lead the Navy-Marine Corps team in seabasing development that will better inform senior leaders on the employment, integration, modifications, and future location of assets associated with the seabase.

As the Navy and Marine Corps continue to execute a rebalance to the Pacific, MARFORPAC continues to sharpen amphibious, expeditionary, and maritime capabilities through training and exercises staying true to the Marine Corps capstone concept, *EF 21*, (*Expeditionary Force 21)*. We must remain committed to increasing operational mobility throughout the Pacific through partnership with the U.S. Navy and support from U.S. Transportation Command.[6] PACOM, PACFLT, and MARFORPAC's strength rests squarely with increased interoperability and close integration already successfully developed with our Pacific region allies and partners. The unique geographical position affords the ability to leverage maritime platforms, which enhances operational reach and strengthens naval integration.

Notes

1. In September 2015, the Secretary of the Navy changed the designation of the MLP (mobile landing platform) to ESD (expeditionary transfer dock). This change conforms to the Navy's system of ship designations instead of an acronym.

2. Robert Work, *Thinking About Seabasing: All Ahead, Slow*, (Washington, DC: Center for Strategic and Budgetary Assessment, 2006).

3. LtGen John A. Toolan, "Partnering in the Pacific," *Marine Corps Gazette,* (Online: July 2015), available at https://www.mca-marines.org.

4. "Mobile Landing Platform [MLP] Program," *Global Security*, (Online: May 2016), available at https://globalsecurity.org.

5. "Environmental and Ship Motion Forecasting (ESMF), Announcement #10-019," *Office of Naval Research*, (Arlington, VA: 2010).

6. Headquarters Marine Forces Pacific, *Campaign Plan FY 15-22,* (Camp Smith, HI: 2015).