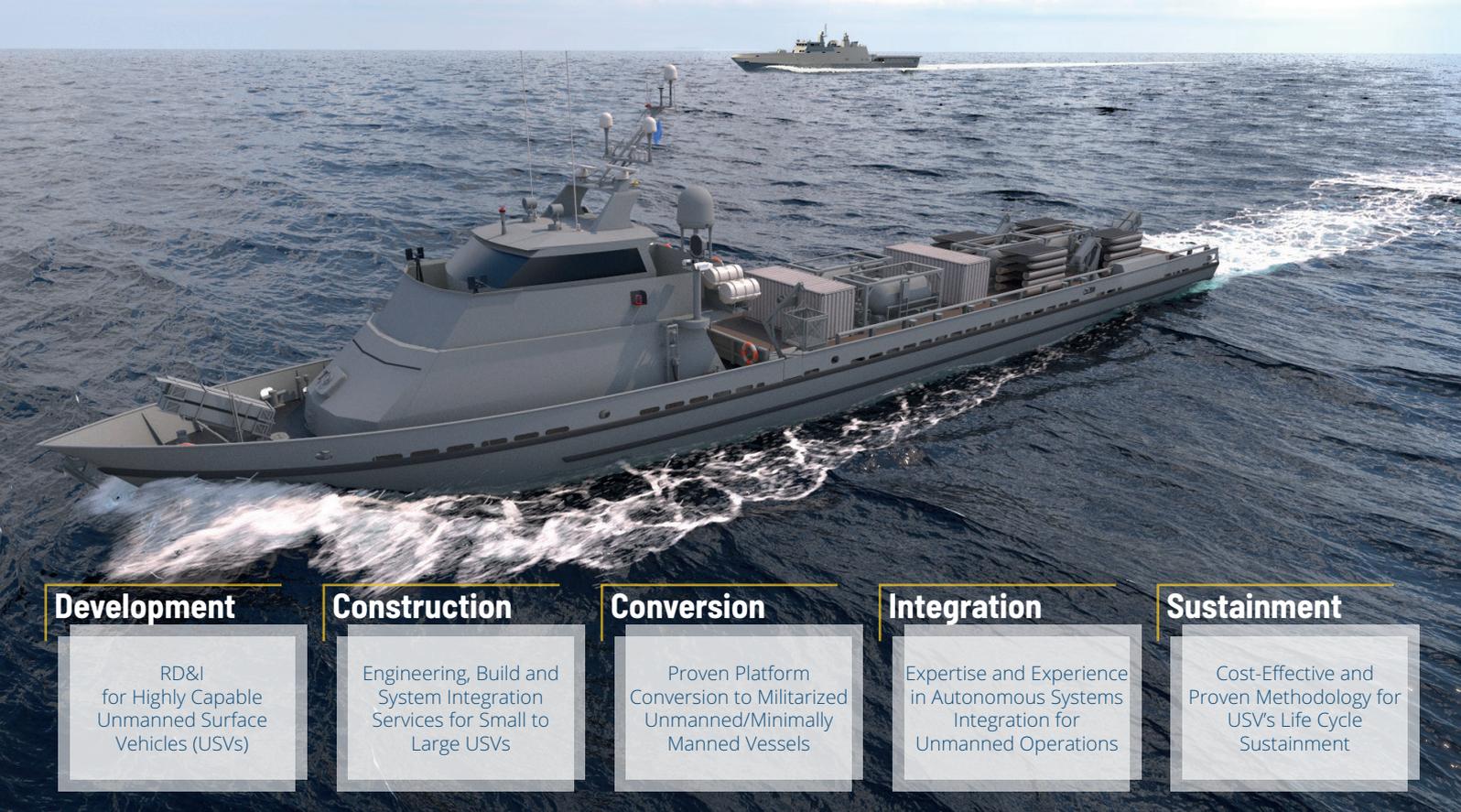




Case Study

Unmanned Vessels

Strategic Enabler for
Modern Naval Warfare Network



Development

RD&I for Highly Capable Unmanned Surface Vehicles (USVs)

Construction

Engineering, Build and System Integration Services for Small to Large USVs

Conversion

Proven Platform Conversion to Militarized Unmanned/Minimally Manned Vessels

Integration

Expertise and Experience in Autonomous Systems Integration for Unmanned Operations

Sustainment

Cost-Effective and Proven Methodology for USVs Life Cycle Sustainment

Unmanned Capability to Form Crucial Part of Modern Naval Fleet

Autonomous vessels are nothing short of the future of modern naval warfare, simultaneously projecting power, meeting critical humanitarian needs, and heightening the level of security in maritime infrastructures across the globe. Unmanned ships are affordable in construction and easy to maintain. They reduce the standard manual requirements of seafaring vessels by their nature, and they are highly adaptable for multi-mission needs. Deployed unmanned ships can provide remote support capabilities and establish availability in various scenarios of operations and are the main enabler of Navies’ strategy shifting towards a distributed architecture fleet.

Swiftships pioneered in multiple disciplines helping Navy to speed-up development, testing and deployment of USVs into its fleet. It started investing in testing autonomous platforms before 2005, and its name became central to conversations around Unmanned Autonomous Vessels (UAV) since the US Navy’s 2018 selection of the Swiftships’ Riley Claire – a 175 feet Fast Supply Vessel (FSV) – for transformation into a Large Unmanned Surface Vessel (LUSV), named “Nomad”. Nomad became the first unmanned vessel of its kind added to Unmanned Surface Vessel Division One (USVDIV-1) and it has been thoroughly tested during autonomous missions.

Towards Future Navy

Manned-Unmanned Teaming Experimentation

The large unmanned surface vessel Nomad arrived at Pearl Harbor to participate in Rim of the Pacific (RIMPAC) 2022. Unmanned and remotely operated vessels extend the capability of interconnected manned platform sensors to enhance capacity across the multinational force. Twenty-six nations, 38 ships, four submarines, more than 170 aircraft and 25,000 personnel participated in RIMPAC.

The world’s largest international maritime exercise, RIMPAC provided a unique training opportunity while fostering and sustaining cooperative relationships among participants critical to ensuring the safety of sea lanes and security on the world’s oceans. “All the fleet feedback from RIMPAC will go into an iterative test and experimentation process. It will also help inform decisions the Navy will have to make. It provides a mature understanding of the manning, training, maintenance, logistics, concepts of operations and more that will make the program successful once fielded.”- Rear Adm. Casey Moton said on interview¹.



The Large Unmanned Surface Vessel Nomad in the Front of Manned-Unmanned Fleet Formation during RIMPAC 2022 exercise

¹Source: <https://tinyurl.com/5xzec67>

Revealing Capable and Reliable USVs for Military Operations

Bringing over 80 years experience in engineering and construction highly specialized military surface vessels, Swiftships is filling the gaps in the existing USVs market. Understanding military clients' requirements, highly developed infrastructure and knowledgeable personnel, allow the company to adapt and innovate in the quickly evolving dynamics of the naval industry and its needs for autonomous capabilities.

Mission Flexibility

Enable modular missions on the same platform

Endurance

High endurance to support long-distance operations

Redundancy

In-built diagnostics, response and full system/machinery redundancy

Reduced Drag

Hull optimization for special operations and increased stability

Efficiency

Improved propulsion for improved performance and lower costs

Swiftships has outpaced its competitors by developing a fleet of small, medium, and large Unmanned Surface Vessels (USVs) that combine power, speed, stealth, mobility, ease of deployment, and mission readiness. Even without a sailor-in-the-loop (either onboard or remotely), these platforms are incredibly dependable, with integrated automation providing a sophisticated command and control system.

"We have extensive knowledge of Unmanned vessels [that we began to] develop before autonomy became a hot topic. In essence, we invested in autonomy over twenty (20) years ago in developing Dynamic Positioning System (DPS) integration with vessels, then carrying that to further to Unmanned capabilities. We also continue building on experience in converting our commercial FSV (aka Riley Claire) to militarized version (aka NOMAD), that encompasses extensive refit/ship modernization services." said Swiftships' CEO, Shehrazade Shah.

Game Changing SUVs

Swift Challenger

In 2022, Swiftships unveiled its 46' Small Unmanned Surface Vehicle (SUSV), aka Challenger to support the growing needs of the defense industry. Challenger is a proven platform that has served in various military and commercial engagements for over 20 years. It can support human-crewed and unmanned operations complying with the protocol of the NATO Standardization Agreements (STANAG) 4586, Joint Architecture for Unmanned Systems (JAUS). The challenger arrangement and hull have been developed to support inland/riverine, coastal patrol, and other associated missions. This ensures an enhanced force profile that is not limited to one engagement area. These missions include strategic strike and mine countermeasure/sonar deployments and the associated mission profiles comparable to or exceeding our competitors' capabilities.

The Challenger's intelligence systems will enable mariners to work smarter and delegate routing efforts to advanced self-piloting technology. Multi-modal situational awareness aboard the ship allows for threat-based object recognition, while further tracking, high-speed data connectivity, and anti-collision capabilities will help the United States (US) Navy Fleet Forces Command (FFC) to meet its mission of achieving fully autonomous capability by 2025. The human presence will likely be widely maintained until the autonomous technologies are solidified in their reliability. Still, the Challenger is one of many ships helping pave the way for a more reliable, independent future.



45+ Knots

with range of 400nm



40+ Hours

Endurance



Optimized Hull

Proven hull, reduced drag and improved stability



Improved Propulsion

for enhanced speed, range, stability and endurance



Multi-Mission Systems

Integrated advanced ISR package, mine hunting capability and a strategic strike missile package



Shallow Waters and High Seas

Unique hull design allow operations in multiple environments

Proven Platforms for Medium to Large USVs

Navy's latest plan is to increase its fleet by about 150 unmanned surface and underwater vehicles by 2045. The acquisition strategy is based on building new design medium to large unmanned vessels and converting already proven platforms to militarized unmanned/minimally manned vessels.

Swiftships provides its services to Navy including construction of prototypes and conversion of its proven platforms, offering its unique competitive advantage of over 100 proprietary designs with all test data and experienced in-house engineering team.

Mr. Shah further said, "This is the sweet spot for Swiftships due to our years of experience delivering diverse platforms that include small to large military and commercial vessels. Our vessels can perform a myriad of tasks as variegated as such as surveillance, humanitarian aid, supply chain support to border protection and low intensity threat missions, to high-demand or high-threat law enforcement and defense scenarios.



Riley Claire



Nomad

Conversion as a Highly Reliable and Cost-Effective Solution

Unmanned or autonomous missions require a significant machine control capacity, including automated filter replacements and electrical system manipulations, to ensure safe operations. Even more critical for Unmanned missions, is a ship's ability to have collision avoidance via radar and sonar sensors, allowing the vessel to maneuver in open water and busy harbors and ports safely. Collision avoidance is one critical area where an experienced integrator, such as Swiftships, and its industry partners, can flourish.

"Swiftships experience extends from ship exterior modifications to the most complicated machinery and electrical (HME) [components], electronics, communication and navigation (COM/NAV), weapons systems, and numerous system overhauls, servicing, and upgrades" Mr. Shah explained.

The proven case is a conversion of Swiftships' FSV Riley Claire to militarized unmanned vessels Nomad, and its performance on autonomous missions. Nomad traveled from the Gulf Coast through the canal to the U.S. West Coast, a total of 4,421 nautical miles, with 98% of that distance in autonomous mode and the Panama Canal in manual mode. Nomad's autonomous transit provided the opportunity to test vessel endurance, autonomous operations, and interoperability of government command, control, communications, computers, and intelligence systems. Nomad is part of Rim of the Pacific 2022, manned-unmanned teaming experimentation exercise.



Fast Supply Vessel (FSV)



Militarized Unmanned Platform

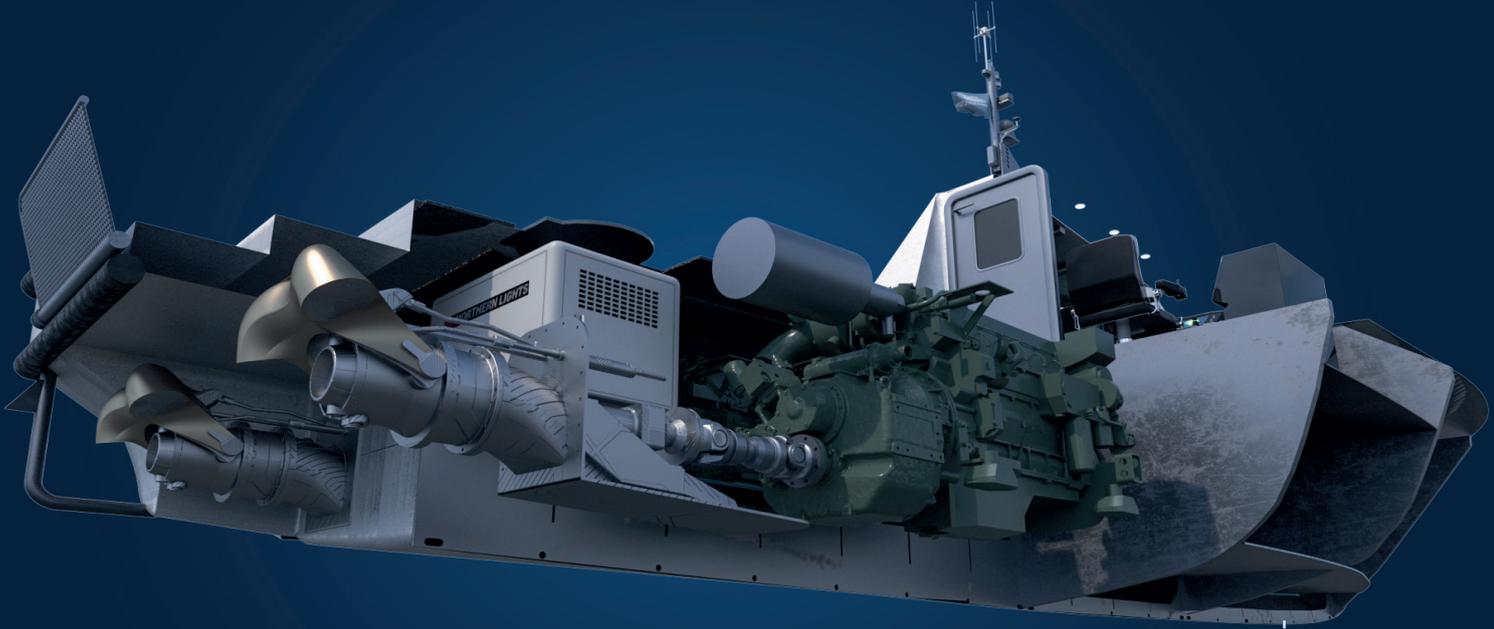


Mission Configured Unmanned Platform

Flexible Platform for Multi-Mission Requirement

Swiftships has developed many configurations for its FVS, not only for autonomy, but also for minimally manned or remote operations of the craft. When outfitted with missile defense, mission modules, UUV and UAV's spoke or launching and retrieval capabilities, this relatively medium size vessels can accomplish many missions simultaneously, such as surface and underwater warfare. Militarized unmanned platforms can also serve as AAW/Strike Platforms and increase power of flag ship.

Swiftships has been working with US Navy (N95) divisions to improve its wide range and capability of commercial platforms to offer Multi-Missions USV (MM-USV) to fulfill fulfill the US and its Allied Forces responsibilities for a fraction of the cost of conventional naval ships. Swiftships' platforms are highly adaptable, allowing clients to integrate sensors, weaponry, autonomy, and various other technologies aboard their boats at a lower price than other vendors.



Swiftships CHALLENGER Machinery

Enabling Capabilities and Technology

Swiftships is a full-service solution provider of complex support systems utilizing laser cameras (EO/IR). These sophisticated sonar systems gauge sea states and detect obstacles in the water, maintain state-of-the-art weapons systems, oversee Integrated Bridge Solutions (IBS), and provide platform solutions, maintenance, and training to ensure successful interoperability. Swiftships' dynamic multiplier platforms offer 4G/5G, line-of-sight, over-the-horizon, and satellite communication. The advanced sensors package allows for the instant capture and transfer of live information, creating a near-sentient computer system that reacts and makes highly accurate steering, accelerating, and high-speed maneuvering decisions while accounting for scenario situations like port security and mine countermeasure, surveillance, and more.

Shehrazee Shah, CEO of Swiftships, talking ed to the industry to The Industry Magazine and said, "Our goal is to continuously exceed expectations, adding these new products to keep pace with technology while capturing the key elements of sustainability and safety."

Our proven seamless autonomous systems integration: physical, electrical, and data interfaces between payloads and the platform, payload launch and recovery systems complimentary to USV capabilities and development. In addition, to the platform, Swiftships offers a full suite of services: cybersecurity, engineering, product support, and payload and weapons systems integration.

Early R&D Projects

Anaconda (AN-2)

Swiftships' in collaboration with University of Louisiana at Lafayette (ULL) developed a partial manned remote-controlled system, aka Anaconda (AN-2), was the first step in developing an autonomous vessel in 2015. It was designed for brown water and near-coast missions with lethal capabilities while removing the threat of harming to the vessel's crew during battle scenarios.

"We keep ourselves ahead of technology advancements in shipbuilding and all elements vital to a vessel to continue the fight even if a casualty occurs during combat. Autonomous platforms can be equipped with highly secure, steadfast, and reliable communication systems based on the requirement. Mostly, they require edge processing, artificial intelligence, and machine learning to filter and process mission data on board and adapt to any situation and environment." said Shehrazee Shah.





Swiftships 75m Corvette

Autonomy Integration to Naval Platforms

Autonomous solutions are already highly used for intelligence gathering, surveillance and reconnaissance, mine counter measures, military training, and tests. We also see unmanned systems applied in maritime security, anti-submarine warfare, drug interdictions, launch, and recovery of host platforms. Advanced technologies allow numerous options for custom autonomous system integration to naval platforms.

Unmanned Vessels' Life Cycle Sustainment

Any platform that is build is going to have a sustainment structure and maintenance requirements, and unmanned vessels will require experienced servicing. Swiftships offers a full range of reliable and cost-effective maintenance packages including planned or predictive, preventative, corrective and continuous maintenance. Our expertise encompasses all aspects, from the ship's exterior upgrades to the most complex machinery and electrical (HME), electronics, communication and navigation (COM/NAV), weapons systems and other systems for overhauls, servicing, upgrades and repairs. Different packages offer multiple aspects of maritime care, based on the user's needs.

"As part of our constant dedication to assisting our customers in succeeding, we have a comprehensive view of the shipbuilding lifecycle. We have the necessary skills and experience to extend the lifecycle of our boats and meet our clients' crucial demands for vessels' conversion.

Conclusions

Vessels, ranging in size from a corvette to medium or small-sized craft, will, by 2025, define the modern fleet, and autonomy will be a key player. Recent advancements allow for leveraging naval platforms that are far less expensive to build, operate, and maintain. These advances, while helping nations project power, are also meeting critical humanitarian needs, allowing for lower casualty rates in terms of human life and a heightened level of security in naval infrastructures across the globe.

Swiftships are perfectly positioned to provide advanced Unmanned service vessels as modern naval warfare continues to evolve. It can offer its clients a turnkey operating capability, including developing tailored conventional or autonomous platforms, with MRO and sustainment programs that will help navies modernize their ships while slashing costs.

References

- 1.Riley Claire: <https://www.electronicdesign.com/markets/defense/article/21211815/naval-ghost-ship-passes-panama-canal>
- 2.Swiftships Challenger: <https://swiftships.com/vessels/46-foot-challenger/>
- 3.USN Fleet Forces Command Strategi Mission: <https://stationhypo.com/2020/08/01/u-s-fleet-cyber-command-u-s-tenth-fleet-strategic-plan-2020-2025/>
- 4.Swiftships ULL collaboration: <https://louisiana.edu/news-events/news/20130812/ul-lafayette-helps-develop-unmanned-boat-military>