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ON

“AUTONOMOUS AND EXPERIMENTAL MARITIME TECHNOLOGY”

BEFORE THE
HOUSE TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEE ON COAST GUARD AND MARITIME TRANSPORTATION

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Introduction

Good morning, Chairman Webster, Ranking Member Carbajal, and distinguished members of the Subcommittee. Thank you for your continued oversight and strong support of the Coast Guard. We are honored to appear before you today to update you on Coast Guard activity related to autonomous and experimental maritime technology.

Across the maritime domain, the pace of innovation is accelerating. The opportunities presented by emerging technology could significantly benefit the Marine Transportation System (MTS). Technological advancements — such as autonomous systems — can evolve global transportation systems and provide novel solutions for ongoing and future challenges, including growing cybersecurity vulnerabilities, supply chain disruptions, navigational challenges, and interference with communication, information, and operational technology systems. With these advancements comes the potential for new and different vulnerabilities which should also be carefully considered. The Coast Guard will closely evaluate the emergence of autonomous and experimental technology, and encourage the growth of technology by updating standards, policies, and regulations.

Coast Guard Autonomous and Experimental Maritime Technology

The Coast Guard Deputy Commandant for Operations, VADM Peter Gautier, released the U.S. Coast Guard Unmanned Systems Strategic Plan in March of this year. That plan outlines a vision for how the Service will respond to and embrace the emergence of unmanned technology in the maritime domain. The Coast Guard’s vision for the future is to not only establish a regulatory framework to ensure a safe and efficient MTS but to also actively defend against nefarious use of unmanned systems and to use unmanned systems to improve execution of the Service’s 11 statutory missions.

Currently, the Coast Guard employs unmanned capabilities in the air domain in three ways. First, as part of a joint program office with U.S. Customs and Border Protection, the Coast Guard uses long-range unmanned aircraft systems (UAS) for land and maritime border security. Second, medium-range UAS on Coast Guard National Security Cutters provide tactical aerial surveillance and reconnaissance capability by leveraging a contractor-owned, contractor-operated (COCO) model. Finally, the Service utilizes short-range UAS as force multipliers in myriad operations, including post-storm assessments, law enforcement, pollution response, port and facility inspections, aids to navigation, and near-shore maritime domain awareness (MDA).

While the Coast Guard does not possess organic unmanned surface capabilities, the Service is learning how these capabilities can enhance mission execution. The Coast Guard recently utilized data from COCO unmanned surface vehicles (USVs) in the Caribbean and in Southern California. These assets provided data-as-a-service collected from a variety of sensors, including radar, cameras, and automatic identification system receivers. Contracted deployments offer the opportunity to enhance MDA while avoiding prolonged acquisition processes and preserving the ability to quickly pivot to new technologies as they emerge. The Service is evaluating the USVs' performance for potential future use.

The rapid commercialization of these technologies – including COCO business models within industry – will likely provide greater access for affordable experimentation and deployments in the near future. The Coast Guard Research and Development Center and Blue Technology Center of Excellence continue to advise the Service regarding technological feasibility and best implementation strategies. This organizational insight enables the Service to continually integrate the platforms and sensors that will best serve the American public.

To maximize platform and sensor potential, the Coast Guard must effectively store, process, analyze, and visualize the data, converting it into information for better decision making to act more quickly and decisively. The Coast Guard created an Office of Data and Analytics to improve data governance and analysis and to reframe the organization's approach to data so that operators at all levels may leverage data to their strategic advantage. Furthermore, to avoid processing data in a vacuum, the Service is working with Department of Homeland Security (DHS) partners to share data and improve Department-wide operational outcomes.

The widespread availability and low cost of unmanned systems means nefarious actors may see opportunities to use UAS to disrupt Coast Guard operations, conduct illicit activities, or jeopardize the flow of commerce while avoiding detection or attribution. In response, the Coast Guard has rapidly acquired counter-UAS (C-UAS) capabilities. These capabilities are deployable ashore and afloat. The Service would welcome the chance to discuss these capabilities further in a classified setting.

Commercial Autonomous and Experimental Maritime Technology

The Coast Guard is monitoring and assessing novel uses of autonomous and experimental maritime technology across the MTS. For example, data collection platforms are being increasingly used within the MTS by companies leveraging autonomous technologies to conduct unmanned surveying operations. While many of these survey platforms are relatively small, some companies are exploring using larger platforms that may present greater potential risks to other waterway users.

The Coast Guard is focused on effectively managing the increasing use of these platforms on our waterways. In addition to survey platforms, the maritime industry is also considering remote-control operations on smaller commercial vessels (e.g., tugs) to improve maritime commerce efficiency.

As current statutory and regulatory regimes for commercial maritime operations are predicated on mariners being onboard vessels, the Coast Guard is working to develop suitable international and domestic governance frameworks to integrate autonomous and remote-control technologies safely and properly into the maritime domain. Internationally, the Coast Guard is leading U.S. efforts in ongoing discussions within the International Maritime Organization (IMO) to develop a code for safe, secure, and environmentally sound operation of maritime autonomous surface ships (MASS) within existing IMO instruments. Domestically, the Coast Guard-chartered Automated and Autonomous Vessel Policy Council is identifying gaps within U.S. laws, regulations, and policies and developing clear and consistent guidance regarding autonomous and remote-controlled technology for the maritime industry and marine inspectors.

With the maritime industry continuing to incorporate these technologies, the Coast Guard appreciates the authority provided in the Don Young Coast Guard Authorization Act for Fiscal Year 2022 to conduct a pilot program to better understand the potential use of remotely controlled or unmanned autonomous spaceflight recovery vessels. Within this pilot program, the Coast Guard is working extensively with commercial space interests to further the development of safe and secure operations for recovering rockets at sea using unmanned, autonomous vessels. As a result, the Coast Guard approved unmanned operations by recovery vessels while accompanying support vessels recover rocket fairings. Based on lessons learned from this proof of concept, the Coast Guard will be poised to facilitate greater use of autonomous systems to support maritime operations.

Alternative Fuels

The Coast Guard is also committed to working with the maritime industry to facilitate the increased use of alternative fuels and technologies for shipboard propulsion. While the use of liquefied natural gas (LNG) is currently a leading alternative to traditional petroleum-based fuels to meet current domestic and international air emission requirements, the maritime industry continues to explore other alternatives including methanol, fuel cells, lithium-ion battery, hydrogen, ammonia, and even nuclear energy sources.

The needs of the maritime industry will drive future ship propulsion fuel solutions, and the Coast Guard is positioned to consider the results of testing of the various alternative fuel options. For both regulators and industry, these alternative fuel options must be carefully considered and appropriate safeguards must be in place. Consideration must also be given to the infrastructure necessary for the development, delivery, and use of alternative fuels, which further increase the complexity of already busy maritime ports.

To this end, the Coast Guard is heavily engaged in ongoing efforts at the IMO to develop suitable requirements for these alternative fuel options. Leveraging the recent International Code of Safety for Ships Using Gases or Other Low Flashpoint Fuels (IGF Code), which was developed for the use of LNG, the IMO provided additional guidance on the use of methanol and fuel cells and is now developing guidelines for hydrogen, ammonia, and low flashpoint diesel. While these alternative fuels share many similarities, each has its own unique risks and challenges that must specifically be addressed to ensure safe use as a maritime fuel.

With limited exceptions, current domestic regulations do not address safe use of alternative fuels. However, they authorize the Coast Guard to consider equivalents to regulatory design standards to evaluate proposals for the use of new technologies and alternative fuels onboard ships. The Service utilizes that authority to facilitate industry efforts to innovate in safe and responsible ways.

In addition to engineering considerations, the Coast Guard is mindful of the need to ensure industry has the proper training and qualifications to operate these systems and that Coast Guard marine inspectors have the necessary competencies to inspect them. The challenges associated with learning to design, operate, maintain, and inspect multiple fuel systems at the same time cannot be understated, but the Coast Guard is committed to working with industry to ensure it is done safely.

Other Novel Technology

In addition to the technologies and fuels described above, the maritime industry continues to seek innovative and emergent technologies for use in the MTS. Submersibles are increasingly employed in commercial maritime operations for activities such as underwater exploration, offshore structure maintenance, and underwater salvage. Their versatility and advanced technology make them a valuable capability which also pose unique governance challenges. These challenges can be overcome through transparency and collaboration to develop necessary and timely standards to meet the needs of the public. The Coast Guard continuously evaluates our ability to assess new technologies and novel uses and is committed to working with industry leaders to develop new standards and leverage existing standards to ensure the safety of these vessels and the individuals that operate them.

Recent advancements in technology have given rise to the development of the next generation of Wing-In-Ground (WIG) crafts. A WIG craft looks and flies like an aircraft but operates at a low altitude above the water surface to take advantage of enhanced aerodynamic lift within the ground effect layer. While the use of WIG craft presents potential opportunities, WIG craft technology is novel and there are few Coast Guard and no Federal Aviation Administration regulations or other industry standards specifically pertaining to their design, construction, or operation, though FAA regulations governing aircraft would still apply to WIGs that operate within FAA's statutory jurisdiction.

WIG craft are, in essence, high-speed craft operating at low altitude over the water. There will be significant challenges integrating WIG operations with existing maritime traffic schemes. Further, due to the unique blend of maritime and aviation principles on which they rely for operation, the design, construction, pilotage, operation, maintenance, and inspection of WIG craft are beyond the Coast Guard's expertise. Successfully addressing the challenges associated with this technology will require the Coast Guard to rely on interagency partners who have the requisite experience, competency, and regulatory authority to evaluate the aviation aspects associated with WIG craft.

Cyber Connectivity

In close coordination with DHS and other DHS components, the Coast Guard is leading several initiatives to meet the growing demand of the modern maritime industry and MTS for updated cybersecurity policy and guidance. The modern maritime industry and MTS rely heavily on interconnected information and operational technologies to provide the most effective and efficient transportation system possible.

We must be cognizant of the fact that every new capability that leverages cyberspace, also presents additional risk of cyberattacks by malicious actors which could threaten the MTS.

The Coast Guard stands ready to support the maritime industry in the implementation and acceleration of new technologies and will continue to address increasing cyber challenges and risks to the MTS to ensure the safety of life at sea, the security of our waterways, and the protection of the marine environment.

Conclusion

The novel technologies being introduced into the maritime environment today are just the next step of maritime evolution. The Coast Guard stands ready to provide regulatory guidance and oversight to maintain safe and secure waterways, and the Service will continue to look for ways to leverage emerging technologies to enhance mission performance. We look forward to answering your questions.