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THE MQ-25 STINGRAY TAKES WING

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The World's First In-Drone: The MQ-25 St

By Mike Moran

On Sept. 19, 2019, a Boeing pilot gave cheering onlookers at the MidAmerica St. Louis Airport in Illinois a picture-perfect landing of the prototype of the United States' next generation of carrier-launched drones. The landing of the T1 was the successful end of a two-hour flight and a key milestone in a larger effort to transform the U.S. Navy's core capabilities to confront the new threat horizon.

"The flight of this test asset two years before our first MQ-25 arrives represents the first big step in a series of early learning opportunities that are helping us progress toward delivery," Capt. Chad Reed, Navy Unmanned Carrier Aviation Program manager, told USNI News.

The MQ-25 Stingray is designed to provide the U.S. Navy with a refueling system based on

unmanned aerial vehicles, or UAVs. The current design will allow it to deploy on the Navy's existing Nimitz-class carriers and the Ford-class carriers that will eventually replace them.

"This aircraft and its flight test program ensures we're delivering the MQ-25 to the carrier fleet with the safety, reliability and capability the U.S. Navy needs to conduct its vital mission," Boeing's MQ-25 Program Director Dave Bujold said in a press release following the successful test flight.

Boeing Wins a Competitive Contract

The Navy awarded Boeing an \$805 million contract for the first four MQ-25s on Aug. 30, 2018, in the culmination of a four-year competition to deliver the first UAVs that will be integrated into the aircraft carrier wing in 2024. Lockheed Martin



Photos courtesy of Boeing Defense, Space & Security.

Flight Refueling by ingray Takes Wing

and General Atomics also submitted bids for the contract. Northrop Grumman, an early contender, withdrew from the process before making an offer. This initial delivery anticipates a total of 72 MQ-25 Stingrays as part of a more substantial \$32 billion acquisition that will deliver a next-generation Carrier-Based Aerial Refueling System.

Calling the deal “historic,” Chief of Naval Operations Adm. John Richardson told NavalTechnology.com when the contract was announced, “We will look back on this day and recognize that this event represents a dramatic shift in the way we define warfighting requirements, work with industry, integrate unmanned and manned aircraft, and improve the lethality of the airwing, all at relevant speed.”

The Navy has sought to develop carrier-launched drones for a broad range of missions, including air-to-ground attack, and intelligence, surveillance

and reconnaissance, or ISR, for more than a decade. The decision was made in 2016 to develop carrier-launched refueling drones as the initial phase of Navy drone deployment. By tightly focusing on the refueling mission, the Navy was able to simplify development and reduce costs. As a platform, however, the MQ-25 lends itself to growing into ISR and even strike functionalities. The MQ-25’s inherently low-observable airframe makes it clear this platform was designed with stealth capabilities in mind, which are crucial for ISR and attack operations.

The cost savings also freed up the Navy to allocate resources to buy additional F/A-18 E/F Super Hornets and accelerate the development of the F-35C Joint Strike Fighter.

The most recent Navy budget submission cited deals such as the MQ-25 program as directed at replacing maturing technologies and reducing risk



Above: Preparing for the first flight (takeoff) of the MQ-25 T1 test asset. Photo courtesy of Boeing Defense, Space & Security.

in the acquisition process. In “Regaining the High Ground” — a study released earlier this year by the Center for Strategic and Budgetary Assessment — authors called for a total overhaul of the carrier air wing, starting with fully committing to the MQ-25 Stingray. The study called for the Navy to exploit the MQ-25’s potential and redesignate it as a multimission UAV while keeping the initial version focused on aerial refueling to avoid delays and additional costs in program development.

Letting Hornets be Hornets

When the first MQ-25 Stingray launches from the deck of a carrier, it will immediately free up F/A-18 E/F Hornet strike fighters from aerial refueling tasks to dedicate more flight hours to other tasks in their diverse mission spectrum, including fleet air defense, air superiority, fighter escorting, reconnaissance, close air support, air defense suppression and precision striking. The tanker role consumes up to 20 percent of a carrier air wing’s Super Hornet sorties and increases airframe fatigue more than other missions due to the heavier configuration when catapulting. The Navy currently

cycles its Super Hornets to minimize the impact of the tanker mission. The Navy requires the Super Hornet fleet to remain in service until 2030-2035.

“An unmanned aerial refueling capability will extend the range of the carrier air wing and make better use of Navy combat strike fighters that currently conduct aerial refueling missions, while reducing the human risk factor of such missions,” Reed told Naval-Technology.com. “Once operational, the MQ-25A Stingray will be the world’s first carrier-based unmanned aircraft, providing a robust organic refueling capability to the carrier air wing.”

The Hornet earned its renown in the military community for demonstrated lethality and flexibility during Operation Desert Storm but remains best recognized in the civilian world as the aircraft flown by the U.S. Navy Blue Angels. These aircraft have served as the primary in-flight refueling solution since the Navy retired the KA-6D Intruder and S-3B Viking tankers. Addressing the Navy’s aging tanker fleet has been a concern of the Pentagon for more than a decade after broad cost reductions in the defense budget were made



Top: Another angle of the first flight of the MQ-25 T1 test asset. Above: The MQ-25 T1 shown in flight with landing gear retracted. Photos courtesy of Boeing Defense, Space & Security.

during the Obama administration.

The Navy recognized at the outset that the MQ-25 program presented unique challenges both in the requirements and in the bid.

“The biggest challenge is designing and building a system to interact with the shipboard infrastructure and coordinating with other programs to ensure alignment as they update their systems,” said Reed.

The Navy has been moving to refine UAV technology to meet the rigorous demands of operations at sea, such as extreme weather conditions and coordination with the high tempo of flight operations. Launching drones from carriers is an enormous technical leap that will eventually

expand the combat range and mission scope of aircraft carriers.

“Operating a UAS (unmanned aircraft system) from the deck of an aircraft carrier has many challenges. While navigating precisely on the flight deck and in the airspace around the carrier is difficult, the biggest challenge is designing and building an unmanned system to effectively operate in close proximity to manned aviation,” said Jeff Dodge, MQ-25 deputy program manager. “On the flight deck and in the air around the carrier, our aircraft has to maneuver around people and other aircraft performing their own critical missions. Even the MQ-25 mission of air-to-air refueling requires



Top: T1 landing from the first flight on Sept. 19, 2029. Photo by Dave Preston. Above: The MQ-25 T1 test asset in flight. Photo courtesy of Boeing Defense, Space & Security.

interaction between manned and unmanned aircraft. The implications on communications, situational awareness and automation are some of the challenges this program is solving.”

The MQ-25 is powered by a Rolls-Royce AE 3007N turbofan engine delivering 10,000 pounds of thrust. It will have the capacity to carry 15,000 pounds of fuel to supply four to six aircraft at a range of 500 nautical miles. Navy personnel aboard carriers will use satellite and radio communications to coordinate refueling with pilots in the air. On the carrier flight deck, the MQ-25 will be managed with hand-held controllers and will launch with traditional catapult and launch recovery systems.

Aboard both the future Ford- and existing Nimitz-class carriers, a new space being called the Unmanned Aviation Warfare Center will

serve as the command center for UAVs. At the recent Annual Symposium of the Surface Navy Association, Capt. Charles Ehnes described it as the “repurposing of a space on the ship to basically be a control room from which you can send and receive data from unmanned systems and give them updates as needed.”

“These spaces will include the Unmanned Carrier Aviation Mission Control System and associated equipment, the Distributed Common Ground Station mission support functionality, and all network-based interfaces and routing equipment required to control the aircraft,” said Dodge.

Meeting the Threats of the Future

“Testing of the initial four MQ-25A Engineering Development Model aircraft is planned to begin



Photo courtesy of Boeing Defense, Space & Security.

The majority of the ongoing development will be carried out at Boeing's St. Louis headquarters, though many subcontractors across the nation will make vital contributions.

The industry team includes:

- Aitech Defense Systems
- BAE Systems
- Collins Aerospace
- Cox & Company
- Crane Aerospace & Electronics
- Cubic
- Curtiss-Wright Defense Solutions
- General Electric Co.
- Harris Corporation
- Héroux-Devtek
- Honeywell
- Innovative Power Solutions
- L3 Commercial Aviation
- Moog Aircraft Group
- Parker Hannifin
- Raytheon
- Rolls-Royce
- Triumph Group

in 2021 and end in time to support IOC (initial operational capability) in 2024. Testing will include sea trials, but dates are not set yet due to typical variability in carrier operational schedules," said Dodge.

The MQ-25 Stingray will be a force multiplier for the new F-35 Joint Strike Fighter, essentially doubling the fighter's range for increased time on station over targets on land and sea. This will allow the next-generation Ford-class aircraft carriers to operate further offshore where they are less vulnerable to enemy assault. The Navy is currently contending with the threat posed to its carrier fleet by the investments adversaries such as China are making in long-range anti-ship missiles like the DF-21. It will also refuel the EA-18G Growler, which provides standoff jamming capabilities to the F/A-18s.

Naval Air Force Atlantic Commander Rear Adm. Roy Kelley wrote in Defense News last year, "Carriers remain relevant and potent year after year and decade after decade because they are adaptable platforms in which flexible payloads deploy. Carrier air wings evolve, incorporating improved and revolutionary aircraft like the unmanned MQ-25 Stingray."

Boeing and the Navy are taking the early learning and discovery provided by the T1 flight test program and using them to start producing the Navy's four Engineering Development Model aerial refuelers, which will be the world's first operational, carrier-based unmanned aircraft. MQ-25 is pioneering the integration of manned and unmanned systems within the carrier air wing, providing what Reed calls "game-changing capability for the carrier air wing and strike group commanders." **FRA**