# Third Marine Aircraft Wing Squadron Prints Medical Device In-flight

Release from the 3rd Marine Aircraft Wing

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Story by  2nd Lt. Andrew Baez, 3rd Marine Aircraft Wing

MARINE CORPS BASE CAMP PENDLETON, Calif. – On June 21, 2023, Marine Medium Tiltrotor Squadron (VMM) 164, Marine Aircraft Group (MAG) 39, 3rd Marine Aircraft Wing (MAW), facilitated the in-flight three-dimensional (3D) printing of a medical cast aboard an MV-22B Osprey, in support of the Marine Corps'

Integrated Training Exercise (ITX) 4-23. This milestone event took place as the U.S. Marine Corps looks to sharpen its expeditionary manufacturing capabilities. The Assistant Commandant of the Marine Corps, Gen. Eric M. Smith, emphasized the importance of these organic Marine Corps capabilities in recent testimony to the Senate Armed Services Committee.

“We have to do some very creative work to do additive manufacturing and 3D printing forward,” Smith said. “If confirmed, I’m committed to continuing that effort because I do see one day we will be printing forward in forward operating bases. We’ll be printing major end items, aircraft engines, propellers, we’ll be doing that forward as opposed to straining the lines that come from the United States through contested logistics areas.”

The successful cast print, in collaboration with the Marine Innovation Unit (MIU) and the Naval Postgraduate School (NPS), showcased one angle of Marine Corps aviation’s capacity to facilitate 3D printing in-flight, mirroring potential realistic, dynamic combat scenarios.

The event began with the concept of a Marine in the field with a broken wrist. The steps included scanning the Marine’s arm, optimizing the cast shape using generative design software, and printing the device while en route to a medical evacuation mission.

Lt. Col. Michael Radigan, an MIU liaison to the Naval Postgraduate School, operated the printer in-flight. He currently works with the Consortium for Additive Manufacturing Research and Education (CAMRE), which supported ITX with advanced manufacturing capabilities. The specific printer used is known as a TAMOS (Tactical Advanced Manufacturing Operational System), developed by Mr. Spencer Koroly from Naval Information Warfare Center-Pacific (NIWC-Pacific), San Diego, California.

“This event was significant because it demonstrated a mobility for 3D printing that we have not seen before,” Lt. Col. Radigan said. “Sometimes there is a perception that 3D printers can only operate in a clean room to get mission capable parts. I think we smashed that theory and showed that not only can they operate on the go, but we can do it well during highly dynamic combat flight profiles.”

CAMRE recognizes that advanced manufacturing will play a significant role in a contested logistics environment. 3D printing complements the supply system and makes it more resilient during combat. Recently, Marines from I Marine Expeditionary Force learned how to build, operate and maintain the machines at NIWC-Pacific to prepare for their deployment in which they will be taking the AMOS printer with them. The printer also prints replacement parts for the machine in the event it needs maintenance, and this allows more independence for the expeditionary unit.

Col. Jeremie Hester, Commanding Officer of MAG-39, views the event a means to better support Marines operating on the ground.

“We are doing what Marine Aviation has always done – support our brothers and sisters on the ground,” Hester said. “Now we are figuring out how to do it better!”

Recognizing the importance of innovation and emerging technologies, VMM-164 was poised to play a critical part in this evolution by providing assault support during ITX 4-23. Third MAW has the capability to host multiple printers aboard aircraft and produce a substantial volume of needed parts en route to an objective. Due to the printers’ low power requirements, follow-on experimentation will explore powering dozens of printers via aircraft power for production at scale in contested environments.

“Third MAW has always kept an eye forward,” Radigan said. “Demonstrations like this reinforce their commitment to staying on the leading edge.”