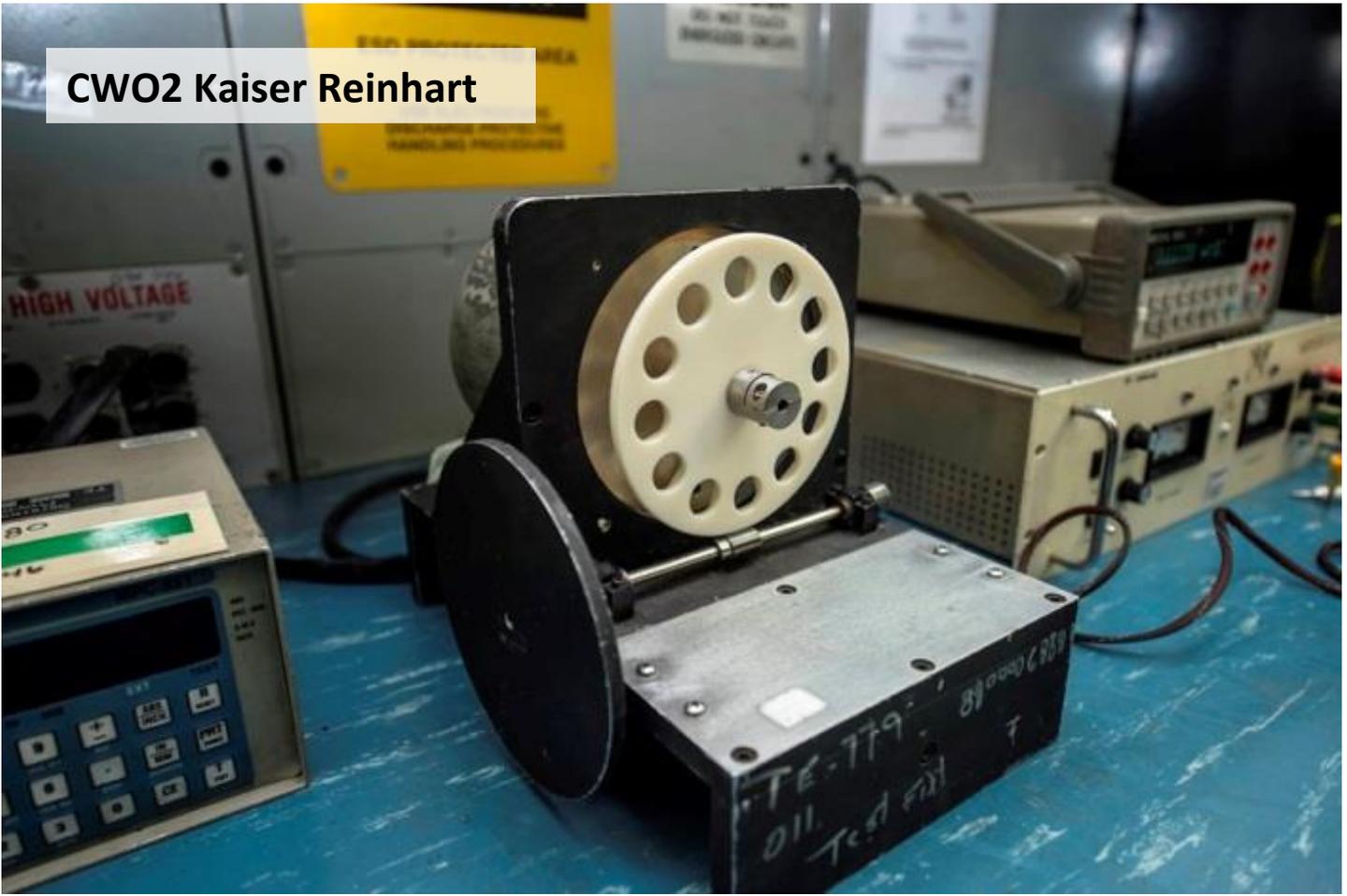


## CWO2 Kaiser Reinhart



### By DON Innovation

While serving as the Maintenance and Material Control Officer onboard USS ESSEX (LHD 2), Chief Warrant Officer (CWO2) Kaiser Reinhart coordinated the maintenance and upkeep of the Fleet's only 3D printing system onboard an amphibious assault ship (LHD or LHA). He encouraged innovation and led the completion of 19 projects spanning four departments and two ships. CWO2 Reinhart provided enhanced mission capability through the reproduction of replacement parts for critical shipboard, aviation, and support equipment.

CWO2 Reinhart has been a catalyst for innovative three dimensional (3D) printing projects onboard USS ESSEX, the only U.S. Navy ship equipped with 3D printing technology. He continuously generates new ideas, inspiring others to create innovative solutions intended to increase operational self-sustainability and reduce repair costs. One of CWO2 Reinhart's projects is detailed below.

In reviewing daily LHD aviation casualty reporting (CASREP), CWO2 Reinhart noted USS IWO JIMA was unable to obtain a required part for a TE-779 test fixture. Due to the inability to obtain blueprints to locally manufacture the part, CWO2 Reinhart quickly conceived a plan to utilize USS ESSEX's 3D printing technology to create a 3D blue print for the necessary part.

The TE-779 test fixture is a piece of aviation support equipment used in conjunction with a readout device, ratio meter, and DC power supply to test the stick position sensor for H-53 Super Stallion aircraft. The ability to test and repair sensors on-site provides self-sustainability for aviation maintenance efforts, ensuring aircraft readiness remains high to support missions within a ship's Area of Responsibility (AOR). While deployed, USS IWO JIMA

generated a Broad Arrow (aviation CASREP addressing a decrease in mission capability), indicating the need for a specific gear for the TE-779 test fixture. Without the part, Aircraft Intermediate Maintenance Department (AIMD) had no ability to test and repair H-53 aircraft stick position sensors.

LHD AIMDs have the ability to test and repair stick position sensors onboard while deployed. This, in turn, reduces the turnaround time to get a working part installed on aircraft. Without these test capabilities, deployed LHDs would have to wait for a position sensor to be shipped from the U.S., a process that could potentially take weeks to complete. The gear required was not available in the supply system and blueprints did not exist.

Utilizing an existing gear from a test fixture onboard USS ESSEX as a sample model, the USS IWO JIMA TE-779 test fixture gear was recreated with 3D modeling and printer technology. Due to limited scanning technology onboard and the amount of fine detail on the part, (i.e. 360 gear teeth located along the outer edge), the first few attempts to use the 3D scanning technology were unsuccessful.

Although scanning technology was initially unsuccessful, CWO2 Reinhart continually pushed forward, looking for alternative methods. He, along with self-taught technicians onboard USS ESSEX, who possessed zero experience utilizing 3D design software, demonstrated that it was possible to manually design the gear, allowing them to revisit the USS IWO JIMA dial project. The technicians manually designed a replica utilizing CAD 3D software, later modifying the prototype design to provide added structural stability and a reduction in material waste.

During the design process, the team manually measured the gear using an existing gear onboard USS ESSEX. Next, they created a 3D model of the gear from the resultant data, utilizing CAD software. . Since the final product would be made of plastic rather than metal, they included additional modifications in the design. These modifications involved structural changes, made to ensure the resulting part would be fully functional and material waste would be minimized. Once the computer model was complete, they printed a final product on USS ESSEX's 3D printer. The printed gear was then installed on the USS ESSEX TE-779 test fixture for verification and operational testing. Operational tests showed satisfactory results, demonstrating that the reproduced gear would be a suitable replacement for USS IWO JIMA's TE-779.

With this new ability to create replacement parts, operational forces benefit through an increase in operational aircraft readiness and maintenance support capabilities. The possible military uses of the 3D print technology are limitless. The ability to make parts with 3D print technology while deployed will save time and money currently spent coordinating, shipping, and waiting for parts to be delivered to deployed locations. Additionally, parts without blueprints or are no longer supported by manufacturers can be “cloned” utilizing available 3D print technology.

