

# **Conversion of an Articulated Tug Barge into an Unmanned Naval Logistics Platform**

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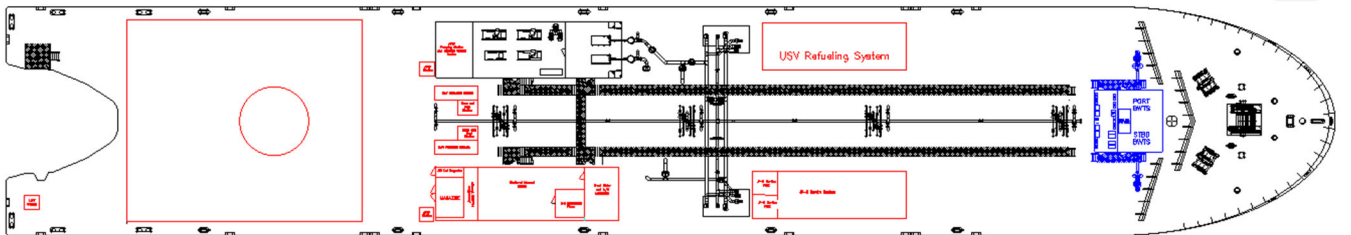
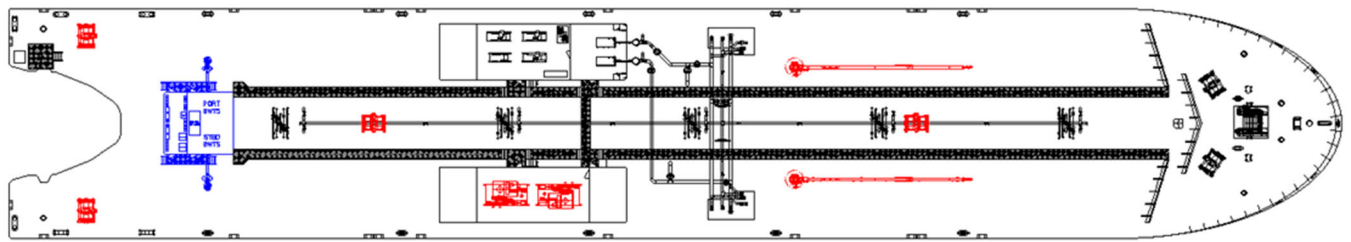
The Marine Corps and Navy are interested in using barges as refueling and rearming stations in order to support small, outlying land bases and to extend the reach of small surface and aerial vehicles. This project was to study the potential conversion of a 125,000 BBL asphalt articulated tug barge (ATB) to serve this purpose. A key objective was to make the converted articulated tug barge (CATB) capable of refueling unmanned surface vehicles (USVs) and unmanned aerial vehicles (UAVs) while being unmanned itself, which presented technological capability, safety, and security challenges. Additionally, the CATB was to preserve the traditional ability to refuel manned surface and aerial vehicles.

The conversion design philosophy stressed the importance of retaining the utmost amount of fuel oil storage volume, keeping costs affordable, and designing the magazine to be small but versatile. The following design variables were analyzed: size and location of the flight deck, pitch and roll control necessary to land aircraft, size of the magazines, number of magazines, location of magazines, USV and UAV refueling systems, and security measures.

The final design for the CATB featured a flight deck for either landing aircraft or hosting a High Mobility Artillery Rocket System (HIMARS), two magazines for armament reloading of manned helicopters, one of which was large enough to accommodate a HIMARS reload. The CATB allocated the space, weight, and power for a UAV refueling system and a USV refueling technology in development.

The study identified many unmanned challenges that require further study and solutions. Current standard practice security measures operationally limit the deployment of the CATB. Ensuring that equipment on the CATB can be completely, remotely monitored and controlled is a difficult task by itself, but it also comes with the added challenge of doing so securely in the cyber domain. Unmanned fueling comes with the danger of fuel spills and fires that will need to be addressed without immediate personnel response. Existing flight deck firefighting equipment could be utilized but automatic detection and activation systems will need to be developed.

From a naval architectural standpoint, an unmanned barge as a logistics node is shown to be feasible. The particular ATB in the study was larger than necessary and smaller ATBs could hold even more promise in cost saving efforts. The team concluded that ATBs are an affordable, promising route for serving some of the Navy and Marine Corps' logistical needs.



### Barge Characteristics

Displacement	4730 LT (lightship); 20730 LT (fully loaded)
Length	455 ft
Beam	80 ft
Draft	12 ft (unloaded), 23 ft (fully loaded)
Endurance Speed	12 knots
UAV Refueling Stations	2
USV Refueling Stations	1
Aircraft capable	V-22(unloaded, SH-60, CH-53, AH-1, MQ-8
Full Magazine Loadout	4 torpedoes, 6 Hellfire, and 75 sonobuoys; or 1 HIMARS reload
JP-5 Storage Capacity	5.25 million gallons