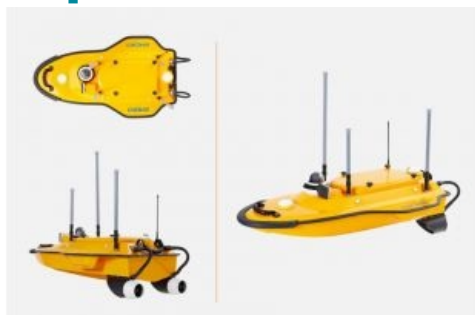


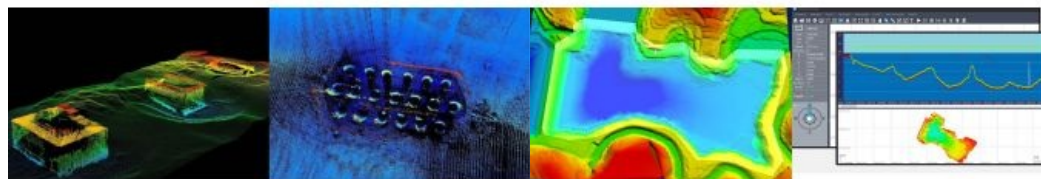
MARINE USVS ELIMINATE THE NEED FOR HUMAN SUPERVISION, ENHANCING PRODUCTIVITY AND OVERALL SAFETY.

CHC Navigation â€™ How Unmanned Survey Vessels Benefit Bathymetric Survey Operations



Marine unmanned survey vessels (USVs) such as the Apache benefit various bathymetric survey operations by eliminating the need for human supervision. This enhances both productivity and overall safety.

Bathymetry includes obtaining recurrent measurements of the water depth, for example to determine whether a vessel can make it to a berthing area or whether dredging is required to create adequate depth. Additionally, in dam and reservoir areas, the depth level is required to calculate the capacity year after year as siltation causes the bed level to rise, reducing the overall capacity.



In general, limited information is known about the seabed, lake or river floor due to low-resolution or obsolete maps resulting

from a lack of time series data. In the case of dams, the bottom is mapped only during construction; time series data is not recorded as depths are difficult to measure over time using traditional surveying vessels.



CHCNAVâ€™s Apache 3 USV, a cost-effective singlebeam marine drone with dual GNSS positioning and heading sensor and IMU sensor for bathymetric surveys of lakes, inland rivers and coastal areas.

Offering a more affordable alternative to traditional manned marine vessels, marine USVs allow bathymetric survey operations to be carried out in an automated way, with the objective to increase the range and complexity of the automated underwater tasks, while at the same time reducing the need for human supervision. Additionally, their portability allows for use in remote and hard-to-reach locations.

PROVIDING POSITIONAL ACCURACY FOR LARGE DEPTH MEASUREMENTS

The Apache series (Apache 3, 4 and 6 USVs) integrates unmanned navigation and topographic surveying technology, providing a stand-alone hydrographic solution. Its main component consists of an autonomous, self-contained hull vessel that sails autonomously to complete the given task, from bathymetric surveying and mapping to channel surveys or geological exploration. It is also equipped with a

singlebeam (or multibeam) echosounder to find the depth and calculate the level of the seabed. Depth is determined using sonar to transmit sound pulses into the water and then calculating the time interval between transmission and return of a pulse.



Bathymetric survey with the Apache 6 USV, CHCNAV's fully integrated innovative solution for 3D bathymetric survey, underwater object positioning, offshore construction, underwater archaeology and wrecked rescue

Integrating a GNSS real-time kinematics (RTK) system using a network of fixed ground reference stations to broadcast the difference between positions given by GNSS satellite systems and known fixed positions, it provides improved positional accuracy from the nominal GNSS accuracy of several metres to about 2-3cm. The rover's GNSS+INS is built into the marine drone and a base station is installed on the ground. The depth measurements are recorded using CHCNAV's hydrographic survey software and transferred to the ground station through an RF communication system.

USER APPLICATIONS

The Apache series from CHCNAV is designed for the efficient hydrographic, bathymetric and hydrological survey of lakes, inland rivers and coastal areas with the goal of underwater object positioning, offshore construction, underwater archaeology and wrecked rescue.



The 3D modelling of the bridge columns in the underwater area; the project was realized with the Apache 6 USV from CHCNAV

The software provides 3D models of the ground, contours and depth based on the data collected by the vessel for various user applications. For example, the processed data can serve as a 3D baseline reference to verify the amount of silt removed. After re-mapping the same area after desilting is completed, both layers can be compared in order to estimate the amount of silt removed. This enables maps of a lake's bed to be used for change detection over time.



The 3D modelling and capacity calculation of a large water reservoir; the project was realized with the Apache 3 USV and AlphaAir450 Lidar from CHCNAV.

Robust and versatile, the USVs from CHCNAV can be fitted with instruments such as a singlebeam or multibeam echosounder, GNSS RTK receiver and other sensors to reduce survey time, improve work efficiency and output high-resolution data that always meets the most demanding hydrographic survey project requirements.

CHC Navigation (CHCNAV) creates innovative GNSS navigation and positioning solutions to make customers' work more efficient. CHCNAV's products and solutions cover multiple industries such as geospatial, construction, agriculture and marine. With a presence across the globe, distributors in more than 120 countries, and more than 1,500 employees, CHC Navigation is today recognized as one of the fastest-growing companies in geomatics technologies.

For more information about the bathymetric survey solutions and dealership opportunities in your country, please contact CHCNAV: <https://chcnav.com/contact-us/send-an-inquiry>

