



Copperstone Technologies Incorporate CEE ECHO™ on HELIX Survey Robot

Novel screw-drive HELIX robots from Canadian firm Copperstone Technologies (Edmonton, AB) are used to conduct bathymetric surveys on hard to access mine tailings impoundments and other process water storage ponds. Copperstone selected the CEE ECHO™ 33/200 kHz echo sounder to provide a resilient sonar solution for this harsh environment.

Water is a crucial resource in the mining industry and it passes through tailings storage facilities where it may be recycled, evaporated, or held in long term storage. Routine water volume monitoring is an essential activity and best accomplished with bathymetric surveys of the tailings impoundment. However, these locations may be challenging to access. Manned boats with portable echo sounders or small unmanned USVs such as the CEE-USV™ are often used for these surveys. However at some sites, even the small USV might be incapable of surveying the entire area or reaching the water pool. The Copperstone Technologies HELIX robot brings a hydrographic survey solution for most challenging locations.



HELIX with CEE ECHO™ 33/200 kHz echo sounder.

Copperstone has modernized the screw-drive vehicle and adapted it to work as a robotic platform specifically for environmental monitoring and tailings investigations. Screw-drives are pontoons that enable flotation, with a helical grouser acting as a propeller when spun at high speed in water. At low speeds, the vehicle can crawl through soft mud deposits, or act as a wheel on hard ground. HELIX Neptune was built with a novel device able to move the sonar transducer in and out of the water, allowing the rover to navigate in mud and sludge without risking the sensor.

After a recommendation from a US mining firm's tailings manager, Copperstone contacted CEE to help determine how best to institute a hydrographic survey capability on the HELIX robot.

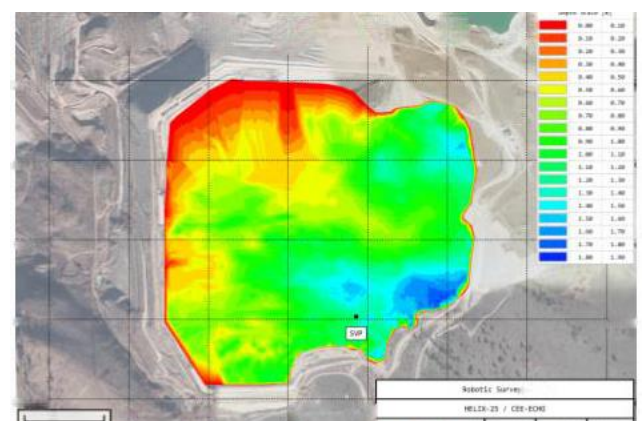
Owing to the presence of an on-board PC and network, telemetry for sonar data was not required; the CEE ECHO™ dual frequency 33/200 kHz echo sounder was selected. The provision of a high definition digital echogram was a crucial requirement, owing to the potential for surveying in unusual and difficult sonar environments. Dual frequency was selected to allow the HELIX to cope with mud suspension or problematic leach solutions if required. Hydromagic software provided access to all the CEE ECHO™ quality control data and is often used in mine surveying, promoting data interchangeability. The CEE ECHO™ on-

board data storage is used as emergency backup for the primary data recorded in Hydromagic. The use of low frequency 33kHz allows some visualization of surface tailings compaction that is not provided by the standard 200 kHz data.



Monitoring the survey using Hydromagic software.

As a complex robot with various sensor packages on board it was important that the hydrographic instrumentation “just worked”. Time on site is a precious commodity, and not wasting this on equipment troubleshooting was a key deliverable from the echo sounder.



Final survey product for large tailings impoundment.