

ECO-LINE, France Improves Underwater Dam Inspections

The Situation

Safety controls in France dictate that dams must undergo an extensive survey every 10 years that include inspection of the underwater structure. The inspection requirements included video inspection with an ROV combined with an accurate 3D rendering to describe the dam foot morphology (silt build-up, collapsing, scouring effects, etc.), and included secondary structures like water gates.



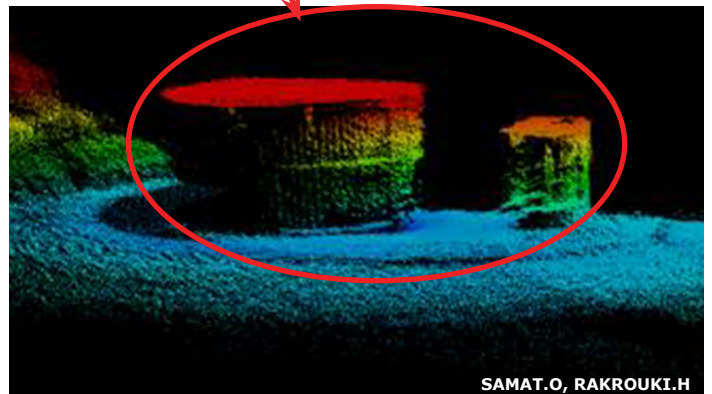
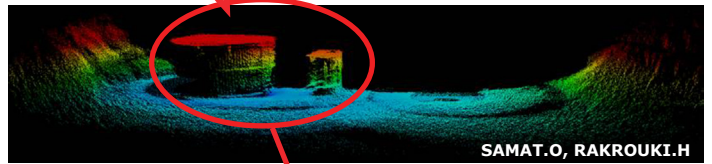
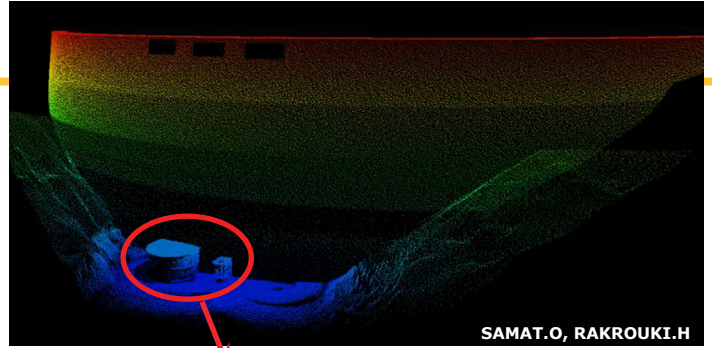
The aerial photo shows the entire dam structure and the targeted inspection area.

Inspecting such complex underwater structures has been challenging in the past, especially in poor visibility conditions making the task both difficult and time consuming. Further, traditional surface deployed underwater inspection systems were often ineffective due to the confined space, depth characteristics of the hard-to-reach structure, and the lack of "ground-level perspective" profile data. Inspection service providers were faced with a challenge - find the right underwater inspection system that could deliver detailed, accurate 3D structural data of a large, complex structure in confined, hard-to-reach spaces.

The Solution

ECO-Line France, a leading distributor of underwater devices for professional and recreational uses recently purchased a BlueView BV5000-1350 3D Mechanical Scanner to add to their pool of underwater inspection equipment. Discovering the need for a portable, accurate underwater 3D system ECO-LINE saw the BV5000-1350 as the perfect solution for dam inspections. ECO-LINE engineers and surveyors found the compact size, deployment ease, and straight-forward operation of the BV5000-1350 compelling, and the ground-vantage point offered the data collection from the unique perspective they sought.

ECO-LINE used the BV5000 for a dam inspection project in the south of France deploying the scanner on a lightweight tripod from a small boat to a depth of approximately 40 meters. Individual 360° 3D scans were taken from 10 key locations to ensure coverage of the dam footing and water gate. The individual 3D scans were merged into a single, fully rotational 3D point cloud using standard point cloud processing software common with terrestrial laser scanners.



The Results

The 3D imagery above was captured with the BlueView BV5000. Olivier Samat, Geomatician, PhD in Geography of ECO-LINE stated "Because of the depth and the architectural complexity of the dam's underwater structure, and to avoid the typical resulting acoustic shadow, we choose the BlueView BV5000 to survey the different components, getting as close to the components as possible. The BV5000 gave us a very accurate 3D point cloud of the dam's morphology. We got all the measurements we needed (water gate grid conditions, scouring effect, etc.), to accurately report the dam foot conditions and morphology." Samat added "This process has been extended to other dams and underwater structures, always with the same accurate results. The BV5000 is easy to deploy and an excellent piece of equipment to perform high resolution 3D surveys and structural inspections in confined place and hard-to-reach areas."

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About the BlueView BV5000 3D Mechanical Scanner

BlueView uses new high-resolution profiling sonar technology to create an easy-to-use underwater 3D scanner, the BV5000 system. The compact, lightweight BV5000 works much like a topographic laser scanner, and uses high frequency sound beams instead of lasers to create extremely detailed 3D imagery and collect accurate measurement data. Designed for high portability and easy integration, the BV5000 system can be deployed on a tripod, ROV, or fixed mount. Operating from a stationary position, the BV5000 creates full 360° rotational scans. Multiple overlapping scans can be registered with or without navigation data to create mosaic images of large structures or areas.

All BV5000 3D Mechanical Scanning Systems include BlueView's ProScan® software and 3D viewer. The BV5000 data is stored in both raw format for post processing, and a standard .xyz point cloud format for easy import to multiple 3D viewing programs. BlueView is an authorized Leica Geosystems distributor, providing access to its powerful Cyclone software to create 3D mosaic imagery and model standard components for CAD export.



BV5000-1350

The perfect balance between range and resolution. The BV5000-1350 is specifically designed for imaging complex underwater structures and areas with an operating frequency of 1.35 MHz that enables ranges of 1 – 30 m (3.2 – 98 ft.).

BV5000-2250

Engineered for ultra-high 3D resolution, the BV5000-2250 delivers unprecedented imagery and detail at close range. The 2.25 MHz operating frequency enables ultra-high resolution 3D scans with ranges of 0.5 – 10 m (1.6 – 32 ft.).



Typical 3D Mechanical Scanning Applications:

- 3D Site Survey
- 3D Structure Survey
- 3D Structure Inspection
- Structure Decommissioning
- Bridge Inspections
- Dam Inspections
- Seawall and Pier Inspections
- Condition Monitoring
- Scour and Erosion Monitoring
- Spool Piece Metrology
- Archeological Site/Structure Mapping
- Ship Hull Inspections and Mapping



The BlueView BV5000 can be integrated onto any work-class or mid-size inspection class ROV to enable easy 3D scanning of complex structures and areas, even in deepwater (up to 4,000 meters) environments. Combine the BV5000 with an ROV to collect 3D data from unique vantage points, providing unmatched visibility into and around the target structure or area.



The highly portable, lightweight BlueView BV5000 is easily lowered into position around complex structures, or in remote, hard-to-reach areas from waterside structures or small surface vessels. When combined with BlueView's lightweight tripod the BV5000 weighs approximately 40 lbs., and is perfectly suited for one-man deployment and operation.

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