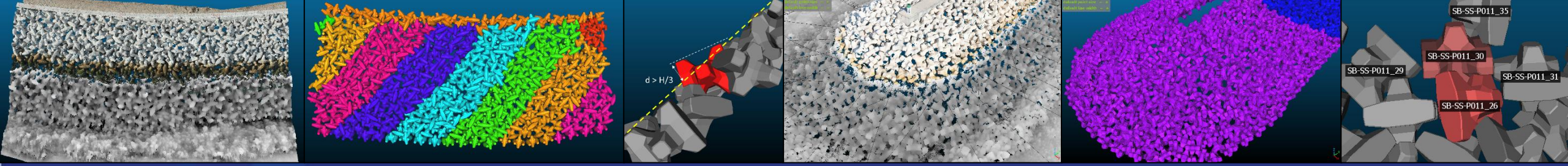


COMPLIANCE CERTIFICATE - GENERAL DESCRIPTION

ACCROPODE™ I & II, ECOPODE™,
ACCROBERM™ I & II, CORE-LOC



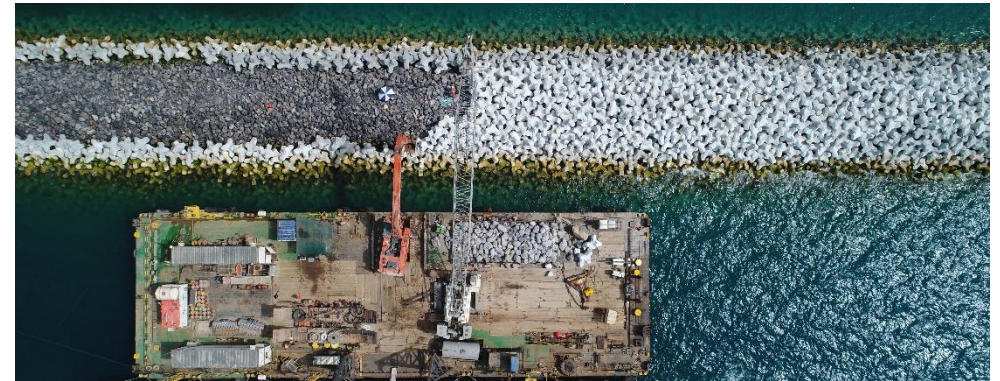
CONTENTS



- DESCRIPTION OF THE COMPLIANCE CERTIFICATE
- HOW DOES IT WORK?
- COMPLIANCE CERTIFICATE IN 10 STEPS
- PROPOSED SURVEY EQUIPMENT
- COMPLIANCE CERTIFICATE REFERENCES

DESCRIPTION OF THE COMPLIANCE CERTIFICATE

The Compliance Certificate is a service provided by Concrete Layer Innovations to verify that the **placement** of armour units (i.e., ACCROPODE™ I & II, ECOPODE™, ACCROBERM™ I & II and CORE-LOC) on a given structure **has been executed in compliance with the principles of the technique**, as defined in CLI's Technical Information Document (T.I.D.).



The service is based on inspection and survey data provided by the Contractor in accordance with a methodology defined by CLI and formalised in the Compliance Certificate Issuing Procedure.

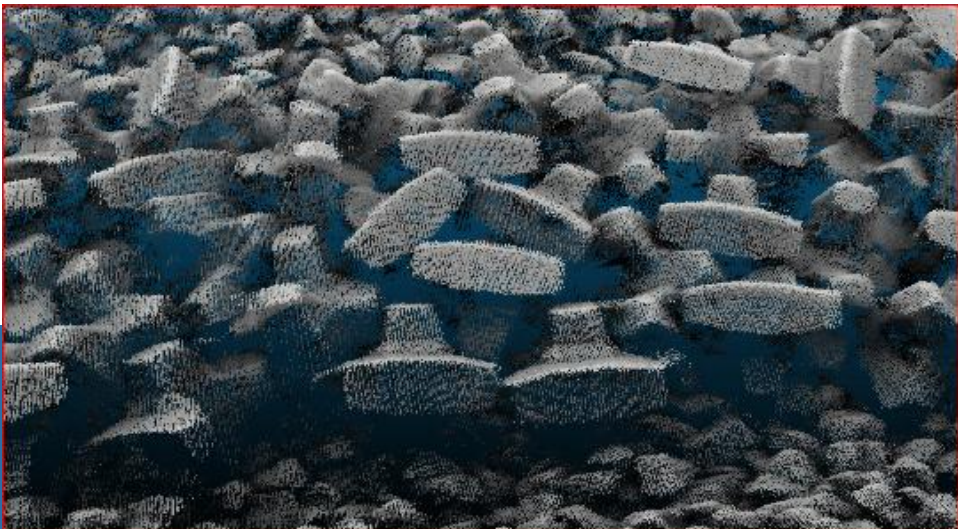
The Compliance Certificate is issued by CLI upon completion of the works and applies exclusively to the **placement** of armour units.

COMPLIANCE CERTIFICATE

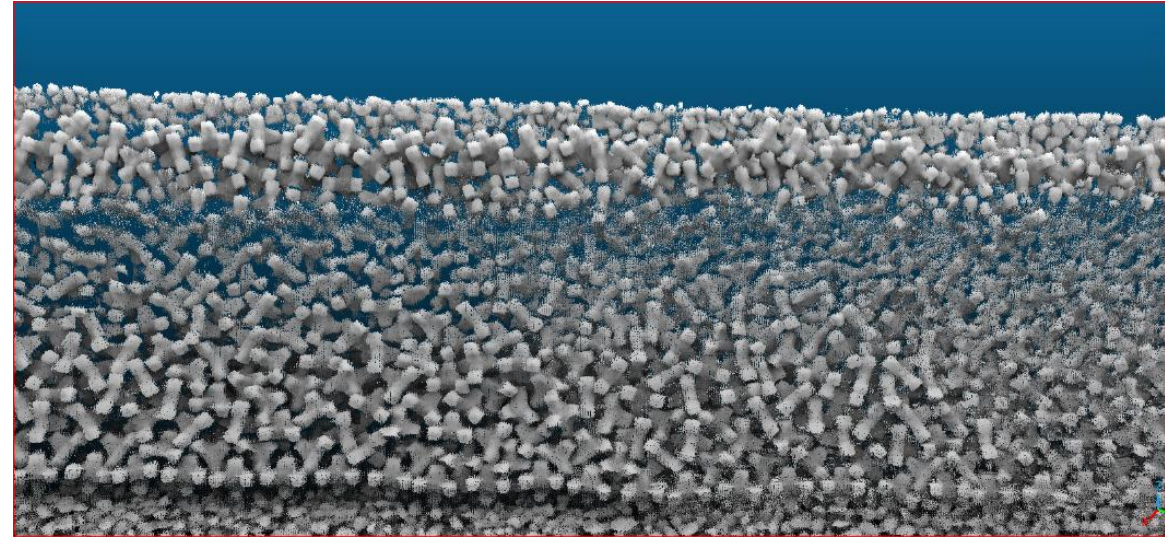
Reliable and effective, ensuring proper installation quality of the blocks.

The main advantages are :

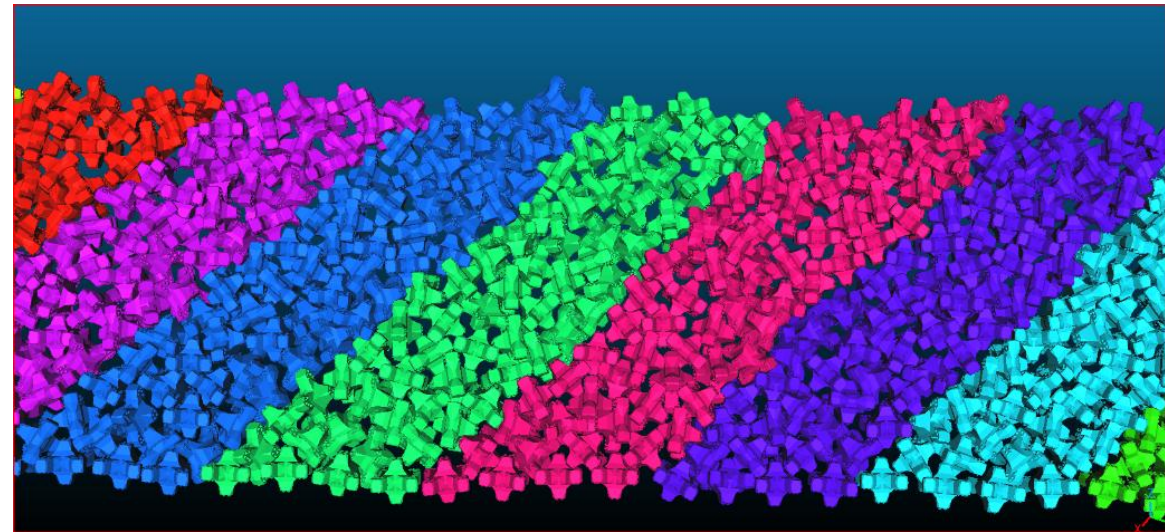
- Ensuring traceability of the amour unit installation
- Easily interpretable data
- Insensitive to water turbidity
- Helps reduce the need for hyperbaric support during inspections



Example of an underwater survey of ACCROPODE™ units



Example of a terrain survey derived from photogrammetry and bathymetry carried out by the contractor



CLI determines compliance of the installation with the reference standard, based on factual evidence, including the 3D model derived from surveys carried out by the contractor

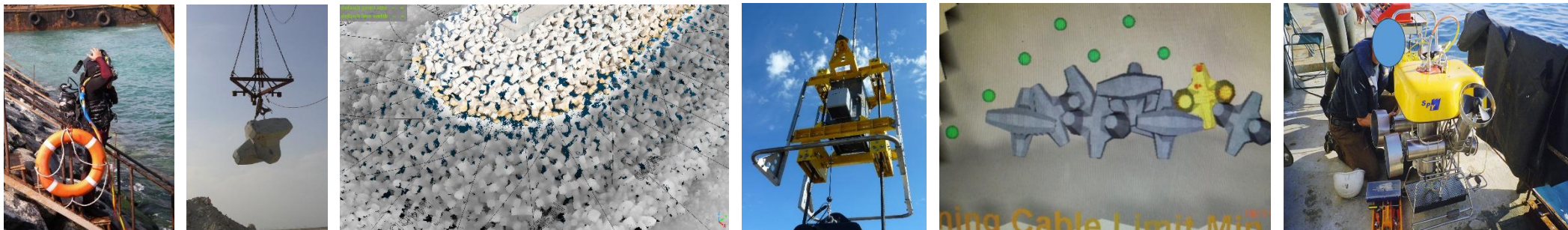
HOW DOES IT WORK?

During the construction phase, the Contractor shall place the ACCROPODE™, ECOPODE™, ACCROBERM™ or CORE-LOC units in strict accordance with the placing principles defined in the T.I.D.



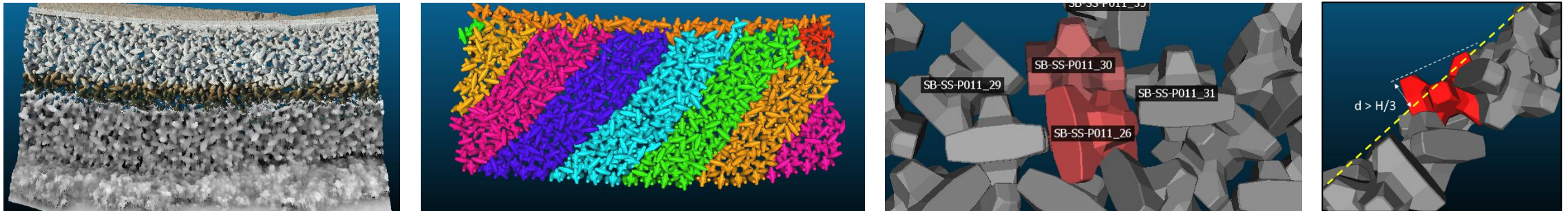
Density	}	1. Respect placing density
Profile		2. Units in a single layer & no unit out of profile (1/3 of the unit outside the armour)
Mesh & Contact	}	3. Each unit is in contact with the underlayer
		4. Units are well interlocked, not free to move
Attitude	}	5. Each unit is imbricated/ keyed between the two units of the row below
		6. The lozenge grid shape is used everywhere (local exception)
		7. The underlayer rockfill cannot be removed, no holes/gaps between blocks
		8. Mostly varied orientations
		9. Avoid to place units with the centreline of their nose orthogonal to the slope

In parallel, the placed armour/toe units shall be subject to regular inspections conducted by the Contractor in accordance with a methodology agreed in advance with CLI. Inspection evidence shall be collected both above and below water level, including dense georeferenced point clouds, images and videos.



HOW DOES IT WORK?

On the basis of this evidence, CLI shall generate a digital twin of the inspected area and assess the condition and of the placed units at the time of inspection. Following completion of the analysis, CLI shall issue a Compliance Report to the Contractor, confirming compliance with the placing principles or identifying any corrective measures required.



Upon completion of the works, and subject to all Compliance Reports being favourable, CLI shall issue a Compliance Certificate for the structure.

4. CR09 - GENERAL ASSESSMENT

- PLACEMENT COMPLIANT WITH NO COMMENTS
- PLACEMENT COMPLIANT WITH COMMENTS
- PLACEMENT NOT COMPLIANT



CC Reports

- ↓ CC Rapport 01 ✓
- ↓ CC Rapport 02 ✓
- ↓ CC Rapport 09 ✓
- ↓ CC Rapport 10 ✓
- ↓ CC Rapport 17 ✓
- ↓ CC Rapport 18 ✓
- ↓ CC Rapport 25 ✓
- ↓ CC Rapport 26 ✓



OFFSHORE BREAKWATER			
INSPECTED WORKS	Compliance reports	Challenges	Armour layer
ACCROPODE™ armour layer	✓ Compliance Reports from CRAA to CRZZ	See Compliance Reports	ACCROPODE™ armour units

Date DDth/MM/YY Signature – Cyril Girardel
CLI Director Stamp

COMPLIANCE CERTIFICATE IN 10 STEPS



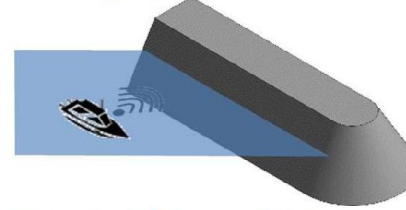
STEP 0 Starting conditions

This activity may be engaged only when the Sublicense contract is in force between CLI and the CONTRACTOR. The Compliance Certificate Procedure needs to be started at least two months before starting to place the units.

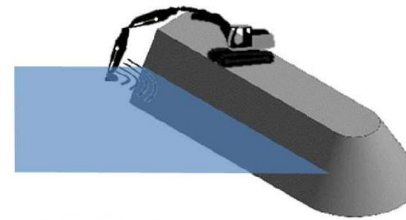
STEP 1 Compliance Certificate Procedure

CLI delivers the Compliance Certificate Procedure with guidelines for the surveys of the armour layer.

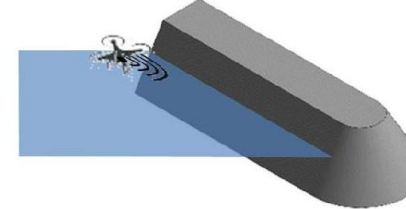
Submerged part



Submerged & Emerged part



Emerged part



STEP 2 Equipment

The CONTRACTOR provides the equipment for performing the survey. For the submerged parts, CLI suggests using a Teledyne T50 multibeam sonar, or an equivalent, with an angle of 0.5° and a minimum of 512 beams. The multibeam will be installed on a vessel or on a long boom excavator. Dive inspections to collect videos/photos may be performed locally by the CONTRACTOR when the multibeam sonar system cannot achieve the expected quality, or in areas it cannot access. For the emerged parts, CLI suggests using a full dry scan installed on a drone or on a crane, or a device equipped with a photogrammetry system or lidar scanner.



STEP 3 Kick off meeting

CLI organizes a kick off meeting or a visit to the site to present the compliance certificate activities and define a joint base timeline for the surveys/analysis.

Photos

Photographs may be useful where data is difficult to interpret.

In such cases, the photographs shall clearly display the metric reference points and the location of the relevant area prior to any transmission of documentation to CLI.

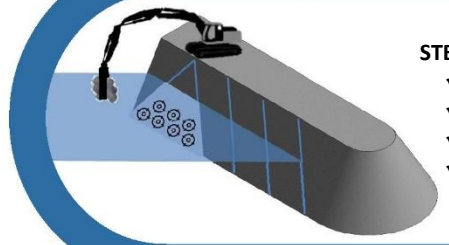
Point cloud

CLI shall use the point cloud to develop the 3D digital model of the artificial armour layer, which shall serve as the primary tool for certifying the compliance of the armour layer.

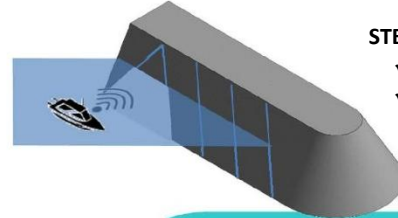
The selected equipment must be capable of producing a dense and high-quality cloud of georeferenced points (x, y, z). The data shall be post-processed by the LICENSEE prior to being provided to CLI.

COMPLIANCE CERTIFICATE IN 10 STEPS

FOR EACH SECTION



- STEP ④ The LICENSEE places units and records the parameters**
- ✓ Placement of units
 - ✓ Recording of as-built coordinates
 - ✓ Calculation of actual placement density
 - ✓ Taking photographs of the emerged section

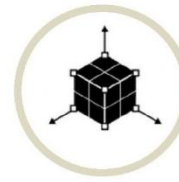


- STEP ⑤ LICENSEE executes the survey**
- ✓ Execution of surveys
 - ✓ Cleaning of the point cloud



- STEP ⑥ LICENSEE transfers data to CLI with:**
- ✓ ENGINEER underlayer approval
 - ✓ As-built coordinates
 - ✓ Effective density
 - ✓ Photos
 - ✓ Dense and clean cloud of georeferenced points (x, y, z)

PRELIMINARY CHECK BY CONTRACTOR BEFORE SENDING TO CLI



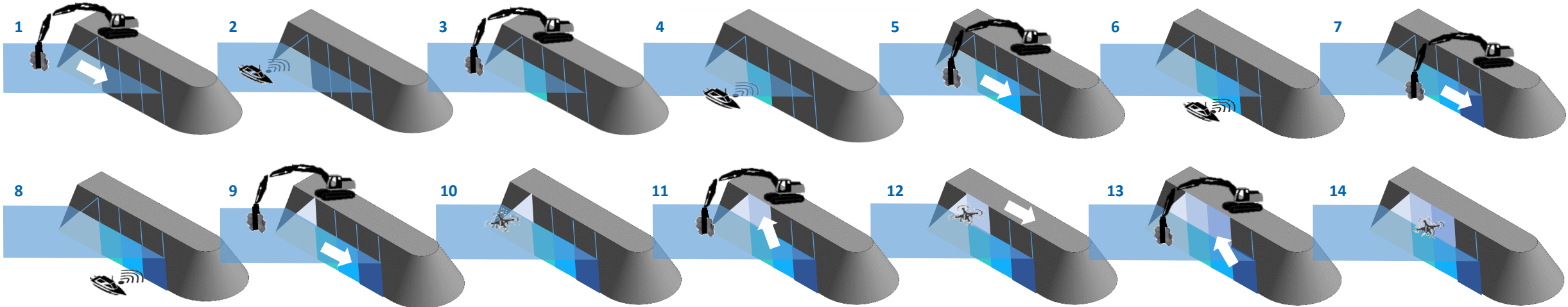
- STEP ⑦ CLI creates the 3D Digital Twin**
- ✓ CLI - Analysis of the point cloud quality
 - ✓ CLI - Conversion of the point cloud into a 3D digital twin



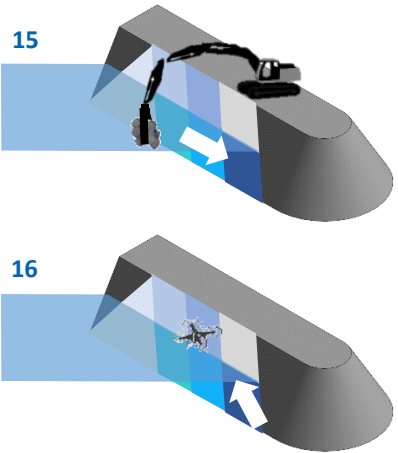
- STEP ⑧ Compliance Report**
- ✓ CLI analyzes the 3D digital twin
 - Observations on placement
 - Approval of the placement section
 - ✓ CLI issues the Compliance Report for the section

REPEAT FOR NEXT SECTION

COMPLIANCE CERTIFICATE IN 10 STEPS



STEP ④ to ⑧ Implementation of the armour layer and survey



COMPLIANCE CERTIFICATE IN 10 STEPS

Technical Analysis & Reports

The technical analyses of the 3D digital twin shall include:

Verification that all ACCROPODE™ II units have been correctly placed in terms of position, orientation, and interlocking. These analyses shall exclusively address compliance of placement with the Technical Information Document (TID) and shall exclude all other aspects (e.g., manufacturing, material quality control, sub-layer, etc.).

Such technical analyses shall be performed regularly based on predefined sections.

COMPLIANCE REPORT

For each section, the Compliance Report may have different statuses depending on the results of the 3D digital twin analysis:

APPROVED – Compliant with the Technical Information Document (TID) – Technical characteristics.

APPROVED WITH COMMENTS OR EXCLUDED AREAS – Recommendations – certain areas may be excluded.

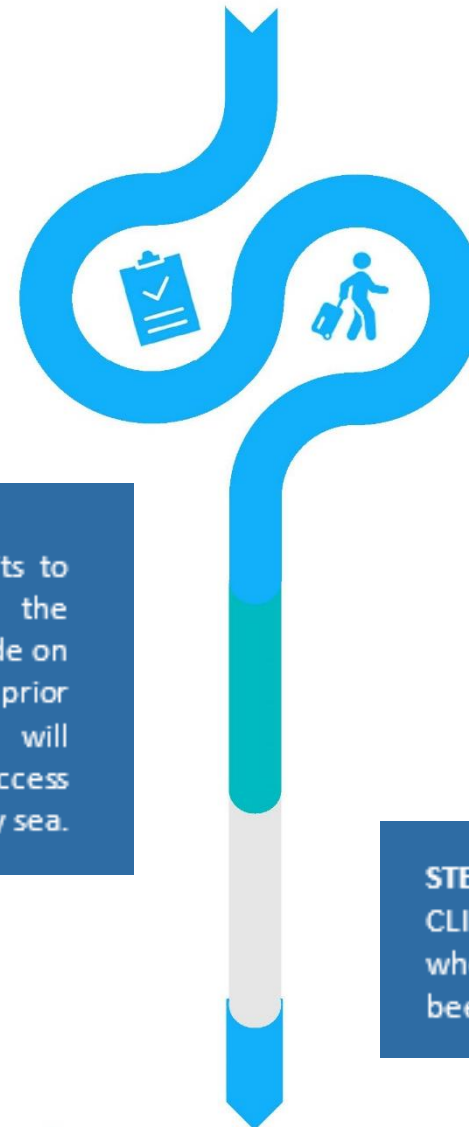
PENDING – MODIFICATIONS REQUIRED

Placement does not comply with technical specifications: CLI shall issue a list of comments with instructions for modifying the placement. The LICENSEE shall provide revised data to improve the report status.

EXCLUDED

Where placement does not comply with specifications or data is incomplete and prevents analysis, CLI shall issue a certificate including excluded areas.

If there are too many excluded points, CLI shall not issue a Compliance Certificate.



STEP ⑨ Site Visit

CLI has the right to perform site visits to verify the data supplied by the CONTRACTOR. These visits will be made on the initiative of CLI and without prior notification. The CONTRACTOR will provide all necessary resources and access for the armour layer visit, by land or by sea.

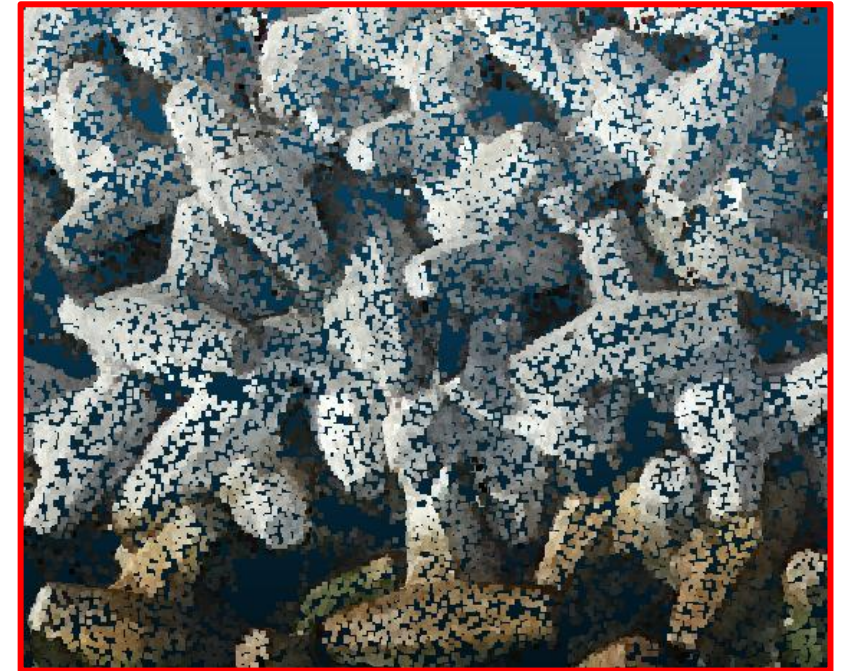


STEP ⑩ Compliance Certificate

CLI delivers the Compliance Certificate when all the Compliance Reports have been approved.

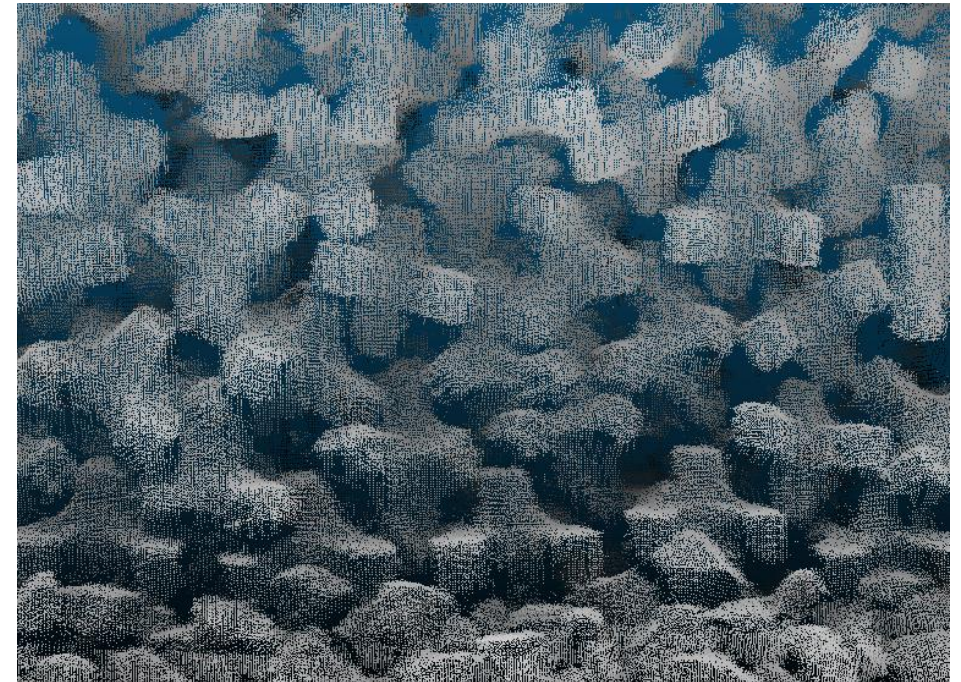
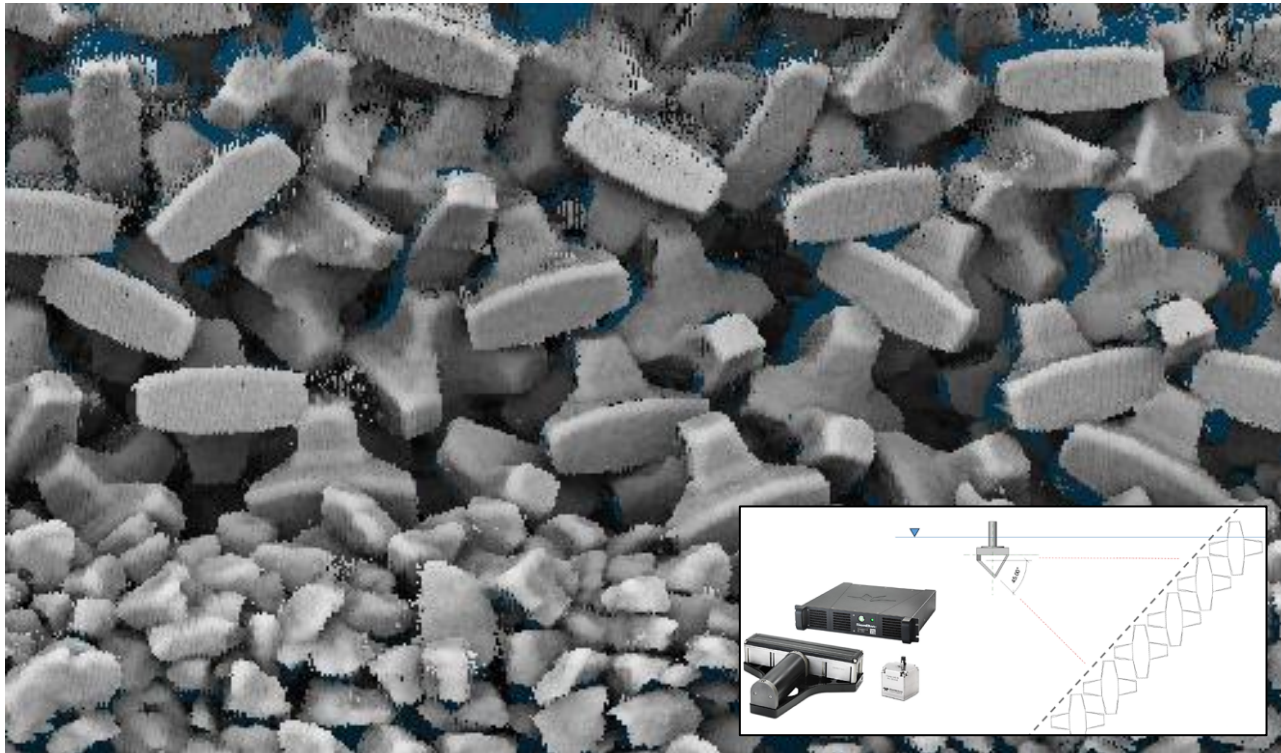
PROPOSED SURVEY EQUIPMENT

For the emerged part of the armour layer, a full dry scan survey using a drone (or a crane) equipped with a photogrammetric or TLS (terrestrial laser scanning) system to obtain a detailed georeferenced (x, y, z) cloud of points. The quality of the survey shall be enough to clearly identify the shape of each concrete unit in the final point cloud.



PROPOSED SURVEY EQUIPMENT

Data acquisition below water (armour and/or toe units) must be done by georeferenced multibeam echo sounder survey. The minimum requirement is a high performance multibeam sonar capable of a resolution of 250 to 500 points/m² (e.g., *Teledyne SeaBat T50-R*, or similar, with angle beam $\leq 0.5^\circ$ and 512 beams minimum. Fully frequency up to 420 kHz). This equipment can be installed on a vessel, on a ROV or on a long boom excavator.



COMPLIANCE CERTIFICATE REFERENCES

- ZIRKU UAE (Dive Inspection procedures) - 2016
- KUANTAN IJM-CHEC Package 1A (Dive inspection procedures) 2017
- KUANTAN IJM CHEC Package 1 (Dive inspection procedures) 2020
- HONG KONG AIRPORT 8 km-long revetment: ACCROPODE™ I units Photogrammetric procedure - 2020
- INDIAN OCEAN Confidential Project: ACCROPODE™ II units Multibeam and photogrammetric procedure- 2020-2023
- UAE: Khalifa Port Project ACCROPODE™ II Multibeam and photogrammetric procedure 2022
- UAE Shamal Port Project ACCROPODE™ II Multibeam and photogrammetric procedure 2023
- PERU – Port Project ACCROPODE™ I Multibeam and photogrammetric procedure 2023
- PORT GARDIAN France -Multibeam and photogrammetric procedure 2023
- INDIAN OCEAN India: Confidential project ACCROPODE™ II Multibeam and photogrammetric procedure 2023
- ACQASANTA Italie Multibeam and photogrammetric procedure 2024
- ARENELLA Italie Multibeam and photogrammetric procedure 2025
- MALFA Italie Multibeam and photogrammetric procedure 2023
- ZAKUM LOWER UAE Multibeam and photogrammetric procedure 2025
- LA CHATIERE France photogrammetric procedure Ongoing
- PACIFIC OCEAN USA Confidential project Multibeam and photogrammetric procedure on going