CASE STUDY

HYPERBARIC FUNCTION TESTING OF NEXXIS'S FRP ROV

CLIENT
Nexxis

TEST LOCATION
Matrix Composites & Engineering, Henderson WA

CHAMBER
The Kraken, Matrix Hyperbaric Common User Testing Facility

TIME PERIOD

April 2025

VALUE DELIVERED TO CLIENT

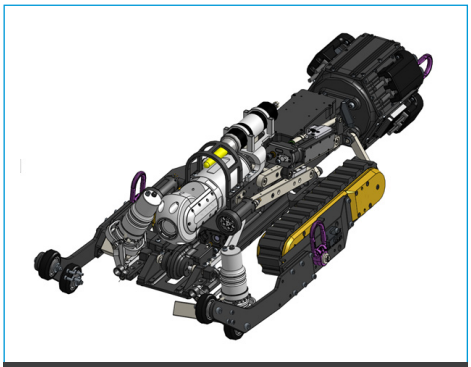
- Operational confidence
- Risk mitigation
- Specialised testing capabilities

"The Matrix common use facility was ideally located to allow us to carry out verification testing with our clients in a professional setting. The Matrix team were world-class and assisted us in meeting our project objectives."

Troy Smith
Chief Operating Officer, Nexxis

BACKGROUND

Nexxis, a leading provider of robotic inspection and technology solutions for challenging environments, required comprehensive functional validation of their 1.3m x 1.5m underwater remotely operated vehicle (ROV) crawler under hyperbaric pressure conditions. The ROV crawler, designed specifically for demanding subsea operations within offshore oil, gas, and industrial sectors, needed thorough testing of its electrical functionalities to ensure reliable operations and accurate subsea inspections.



3D representation of FRP ROV ready for testing in the Kraken hyperbaric test chamber.

THE OBJECTIVE

The objective was to validate the ROV crawler's integrity and functional performance under simulated subsea pressure conditions, specifically focusing on the electrical functionality of the Centralised Arms Probe (CAP) and Extended Arms Probe (EAP). The tests aimed to confirm the reliable operation of these critical components at intended depths.

THE CHALLENGE

Nexxis encountered significant challenges due to the ROV's substantial size and the requirement from their international end client to witness a full-system test under realistic subsea pressure conditions. This comprehensive validation demanded a large hyperbaric chamber capable of accommodating the entire ROV assembly, as well as modular flanges with bespoke penetrations to facilitate full electrical functionality testing. Without access to such specialised testing facilities, Nexxis would have faced considerable risks, including potential project delays, compromised system integrity, and client dissatisfaction, especially given the client's specific requirement to personally oversee the full testing process, traveling internationally for this purpose.

THE SOLUTION

Matrix Composites & Engineering's Hyperbaric Common User Testing Facility was uniquely equipped to meet Nexxis's complex testing requirements. Matrix provided a tailored solution by modifying blank flange with custom penetrations to precisely accommodate Nexxis required Subconn bulkheads. This bespoke setup enabled precise electrical cable connections to test the full functionality of the ROV under hyperbaric conditions.

LIGHTER | STRONGER | SMARTER

TEST DETAILS

- **Component tested:** Nexxis FRP ROV with Centralised Arms Probe (CAP) and Extended Arms Payload (EAP)
- **Facility:** Hyperbaric Common User Testing Facility
- **Test pressure:** 6.6 bar (simulated depth conditions)
- **Test medium:** Water with approximately 20% glycol
- **Test duration:** Pressure held for 60 minutes
- **Functional test:** Electrical activation and assessment of CAP and EAP functionalities under pressure.

The ROV crawler was securely mounted onto a dedicated equipment frame, with electrical connections facilitated through specially modified flange penetrations using Subconn bulkheads. Pre-test procedures included dry functional checks, confirming the equipment's electrical functionalities were fully operational before immersion. During hyperbaric testing, Matrix continuously monitored pressure and temperature, ensuring conditions remained consistent at 20 ± 0.5 °C. Nexxis's end client was present to witness the testing, underscoring the transparency and reliability of the validation process.

THE RESULT

The hyperbaric testing conclusively demonstrated the electrical functionality and structural integrity of the ROV crawler. Both CAP and EAP components performed flawlessly, as confirmed by electronic signals and detailed activation logs. The integrity of the entire system remained uncompromised throughout the test, with no leaks or structural issues observed.

VALUE DELIVERED

- **Operational confidence:** Provided definitive verification of electrical performance and robustness of the CAP and EAP systems, ensuring reliability during critical subsea inspection operations.
- **Risk mitigation:** Significantly reduced operational risks by confirming full assembly integrity and electrical functionality before deployment
- **Specialised testing capabilities:** Utilised Matrix's unique Hyperbaric Common User Facility and modular flange systems with bespoke penetrations, offering Nexxis unmatched testing capabilities within Australia