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INNVOTEK

INSPIRING INNOVATION

Amphibian

Robotic platform for inspection and maintenance of critical infrastructure.

Changing the future of NDT inspection for large offshore assets

Inspection and maintenance of critical offshore assets in offshore renewable energy, oil & gas, ship-care, or other industrial sectors, is expensive, with approximately **65% of all costs being operational.**

Inspection of assets is potentially hazardous and can put operators at great risk. It is a time-consuming process due to the large, complex nature of the infrastructure. Harsh environments, including the splash zone, working at height, toxic gas and confined spaces, make inspection even more challenging.

Robotics can offer a **safe alternative** to hazardous and reactive inspection conditions, especially for **offshore, underwater structures.**

Inspection robots can provide a real competitive advantage by performing tasks **safely, quickly and with great precision.** Single machines and teams of robots can deliver not just a visual check but also **structural assessment and immediate cleaning.** This enables the asset owner to acquire high-quality data for a lower cost, reduce risks to personnel, and optimise the maintenance schedule.

Key **features** of the platform

- SAFE CLIMBING ON CURVED FERROMAGNETIC SURFACES, INTERNAL AND EXTERNAL
- ALL WHEEL DRIVE WITH ACTIVE TRACTION CONTROL
- MULTI-SENSOR ENABLED LOCALISATION AND VISUALISATION
- REMOTE INSPECTION OF CRITICAL INFRASTRUCTURE
- MARINISED DESIGN FOR UNDERWATER OPERATION
- MOBILITY OVER WELD CAPS AND PLATE JOINTS
- CLEANING OF BIOFILM AND CORROSION
- AUTOMATED WELD FOLLOWING MODULE

Advanced inspection and **maintenance** made safe.

Amphibian is a robotic platform that enables remote access to large critical infrastructure, such as offshore assets, to carry out **inspection and maintenance.**

Amphibian is designed for **harsh marine environments** and can operate in both the splash zone and at depths of up to **60 metres in saltwater**.

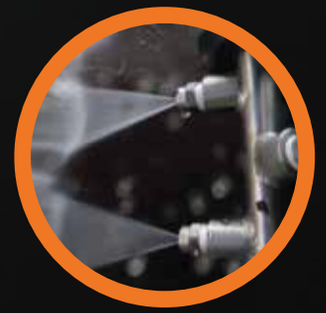
Amphibian is uniquely agile on curved and domed structures whilst carrying inspection and tooling payloads of over 25 kg. The robot's chassis design ensures conformance of the magnetic wheels to the surface, resulting in good traction and **constant adhesion**. The operator can drive Amphibian in **any direction** with complete confidence.

A set of powerful lights and a high-definition camera provide clear **visual** inspection. Amphibian is compatible with a suite of **advanced NDT sensors** that can be integrated to best meet the application requirements (e.g. corrosion mapping, weld inspection etc.). Furthermore, Amphibian can effectively remove marine biofouling using its modular **cleaning** system.

SHIP-CARE

OFFSHORE ENERGY

CHEMICAL



State-of-the-art robotic platform for high performance operations

Amphibian is compatible with a range of NDT systems, including for corrosion mapping and weld defect inspection

The integrated weld following system enables Amphibian to detect and autonomously track welds for improved inspection performance and reduced operator fatigue

The rugged waterproof design ensures reliable operation in harsh marine and industrial environments, including in saltwater

The HD cameras and high power lights provide an all-round view to enable precise positioning and visual inspection of the asset

The modular magnetic wheels provide constant adhesion with the climbing surface, and the rubberised tyre guarantees good traction without damage

The water jet-based cleaning system option can be utilised for removal of bio-fouling, corrosion and unwanted surface coatings during asset maintenance

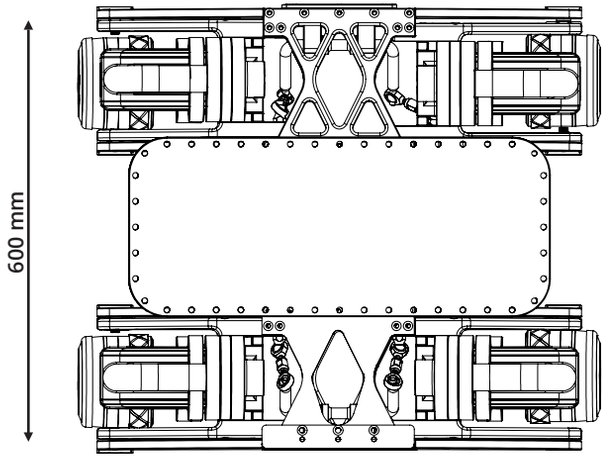
The articulated chassis allows the wheels to maintain surface contact no matter what the driving surface minimising the risk of a fall

Deployment: 2 people

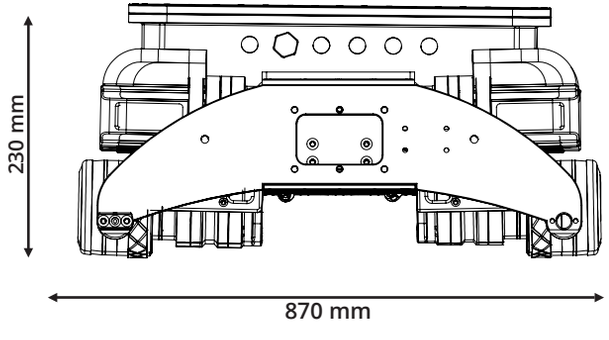
Control: 1 person

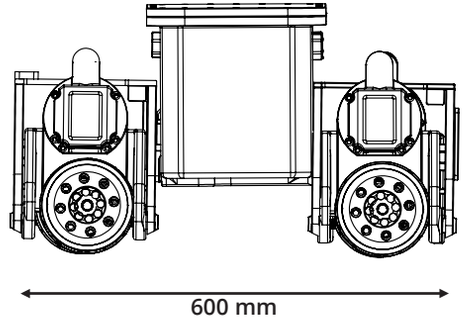
A compact and mobile assistant

Specification and dimensions



Dimensions	870 x 600 x 230 mm
Weight	42 kg (not including umbilical)
Payload	25 kg
Operation	Rated to 60 m water depth
Speed	Variable 0-50 mm/s
Power supply	110-240 Vac
Power and communications tether	Integrated 60 m standard, longer available upon request
Control	Command station with rugged PC, user interface and industrial joystick
Camera system	Forward And Rearward Facing
Video camera formats	HD 1080 p
NDT integration	A range of advanced NDT can be supported, including UT





Optional

Surface cleaning	High Pressure Water Jet Module
Tether control	Tether Management System
Automated Weld Following	Vision-based weld cap following system

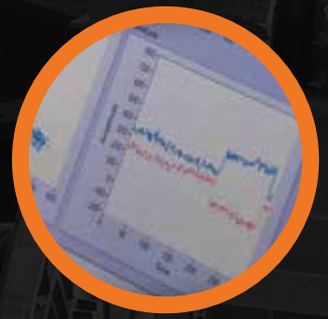
Inspection and cleaning **in one go**

Compatible with advanced NDT methods

We offer several configurations of the platform suitable for a wide range of applications, including **corrosion mapping, thickness measurement and weld inspection**. Amphibian can be configured to support both **ultrasonic** and **electromagnetic** industry standard solutions:

- UT (ultrasonic testing)
- PAUT (phased array ultrasonic testing)
- Pulsed Eddy Current Testing (PECT)

Furthermore, **bespoke NDT probe integration and actuation** is supported to suit customer requirements. The NDT data is accessed directly from the user interface and viewed in real time. Powerful data processing software provides rapid results.



Surface Cleaning Module

Amphibian can be operated with a high-pressure water jet cleaning module to clean surfaces of biofouling or corrosion. An array of nozzles direct high-pressure water at the contaminated surface in the direction of travel. This ensures fouling is removed prior to inspection to achieve best results. The water pressure can be adjusted depending on the type of fouling or to protect surface coatings.

Corrosion mapping: **Multichannel UT**

Multichannel ultrasonic testing (UT) is used for in-service detection of material loss and characterisation of corrosion.

Standard package

Configurations: 16, 32 & 64 channels
High channel count with sequential firing
100 MB/s with Gigabit Ethernet TCP/IP
Large receiver bandwidth from 10kHZ to 20 MHz

UT Software

Concerto is a UT data acquisition and analysis software designed specifically for wall thickness measurement and corrosion mapping, using either conventional multi-channel or phased array. Concerto's ease of use is coupled with extensive features: corrosion mapping with interface echo tracking, coating layers, adjustable gates in analysis, configurable views and color palettes, as well as simple, but effective analysis tools.

Training & support

- A full software training package is available
- Technical support for both software and hardware
- Application engineering support with data acquisition and analysis queries

Probe integration

Please contact our sales team to discuss your application requirements.

Weld inspection: **Phased Array UT**

Phased array ultrasonic testing (PAUT) is widely used to detect and size cracks and flaws.

Premium package

Configurations: 32/32, 64/64, 32/128, 64/128, 32/256, 64/256
FMC capable
14-Bit ADC: 100 MB/s with Gigabit Ethernet, low noise high resolution
Large Bandwidth: from 10 kHz to 20 MHz
Separated emit and receive
Pulse/Echo, Pitch/Catch, Through-Transmission

PAUT Software

To simplify your inspection, we offer you Prelude, a versatile phased array software that is suitable for any application. Prelude is a powerful and flexible software package for PAUT, providing real-time visualization and simple data analysis after completing your inspection. All displays represent corrected views, no need to go through complex settings. You can start a new inspection with just a few clicks.

Training & support

- A full software training package is available
- Technical support for both software and hardware
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Wall thickness monitoring: **PECT**

The Pulsed Eddy Current Testing (PECT) tool is for inspection of general corrosion of steel structures, including inspection through corrosion products and surface coatings on marine structures. It is Ideal for use as a high-speed screening tool and for repeat surveys.

Applications with Amphibian:

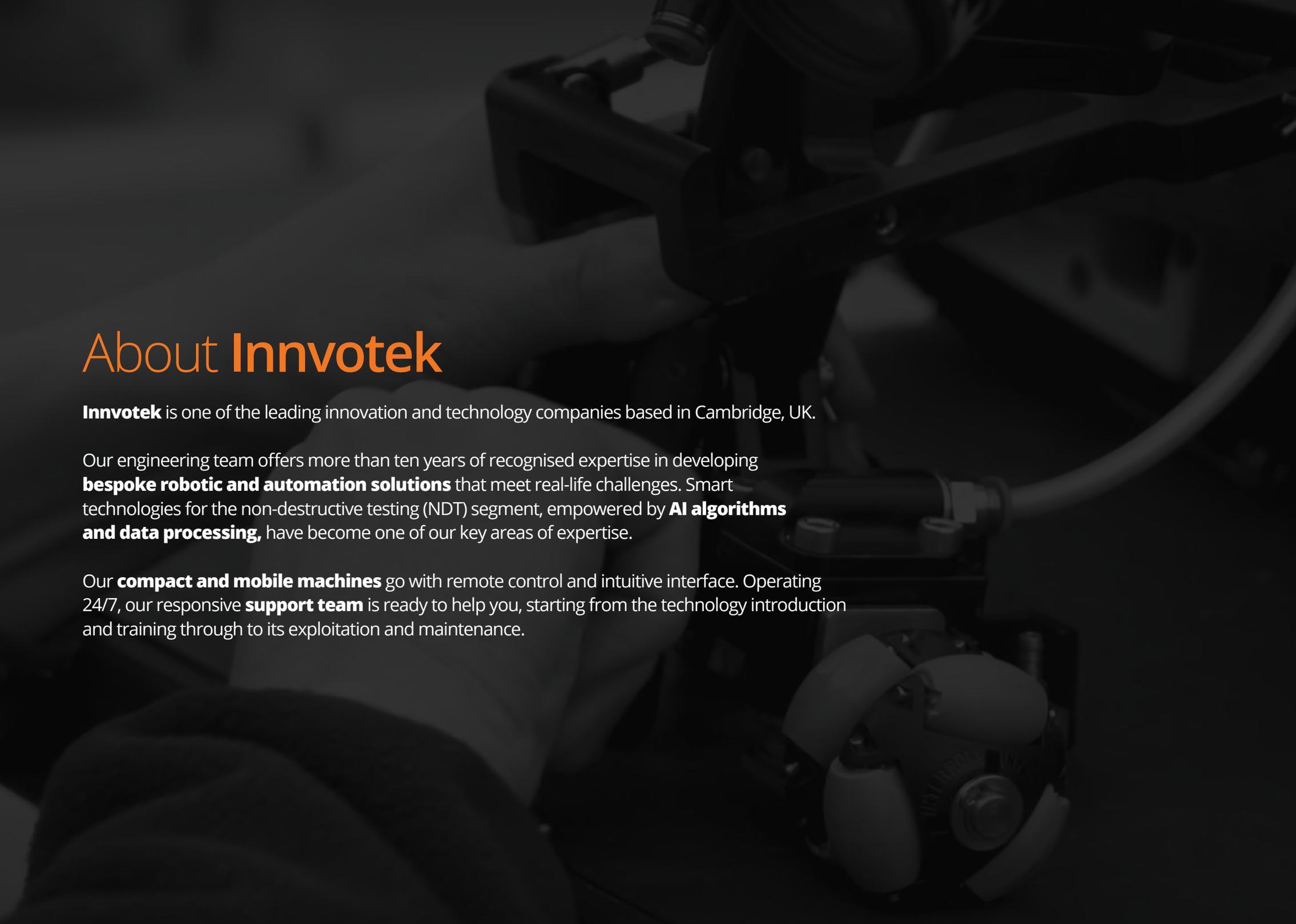
In-service inspection of remaining wall thickness in the splash zone e.g. risers, caissons, jetty piles, sheet piles, coffer dams & un-piggable pipelines.

Specifications

- For ferrous steel inspection
- Minimum wall thickness: 3 mm
- Maximum wall thickness: 50 mm
- Maximum insulation thickness: 250 mm
- Accuracy: 5% thickness
- Repeatability: 0.4% (excellent for repeat surveys)
- No surface preparation required; the robot works on any corroded or coated surface
- Tolerant to large probe misalignments with up to 30°
- Configuration: 1-8 channels

Training & support

- A comprehensive training package is available covering use of the software package; data acquisition, analysis and reporting; ASNDT approved
- Technical support for both software and hardware
- Application engineering support with data acquisition and analysis queries



About **Innvotek**

Innvotek is one of the leading innovation and technology companies based in Cambridge, UK.

Our engineering team offers more than ten years of recognised expertise in developing **bespoke robotic and automation solutions** that meet real-life challenges. Smart technologies for the non-destructive testing (NDT) segment, empowered by **AI algorithms and data processing,** have become one of our key areas of expertise.

Our **compact and mobile machines** go with remote control and intuitive interface. Operating 24/7, our responsive **support team** is ready to help you, starting from the technology introduction and training through to its exploitation and maintenance.

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