SILVERWING
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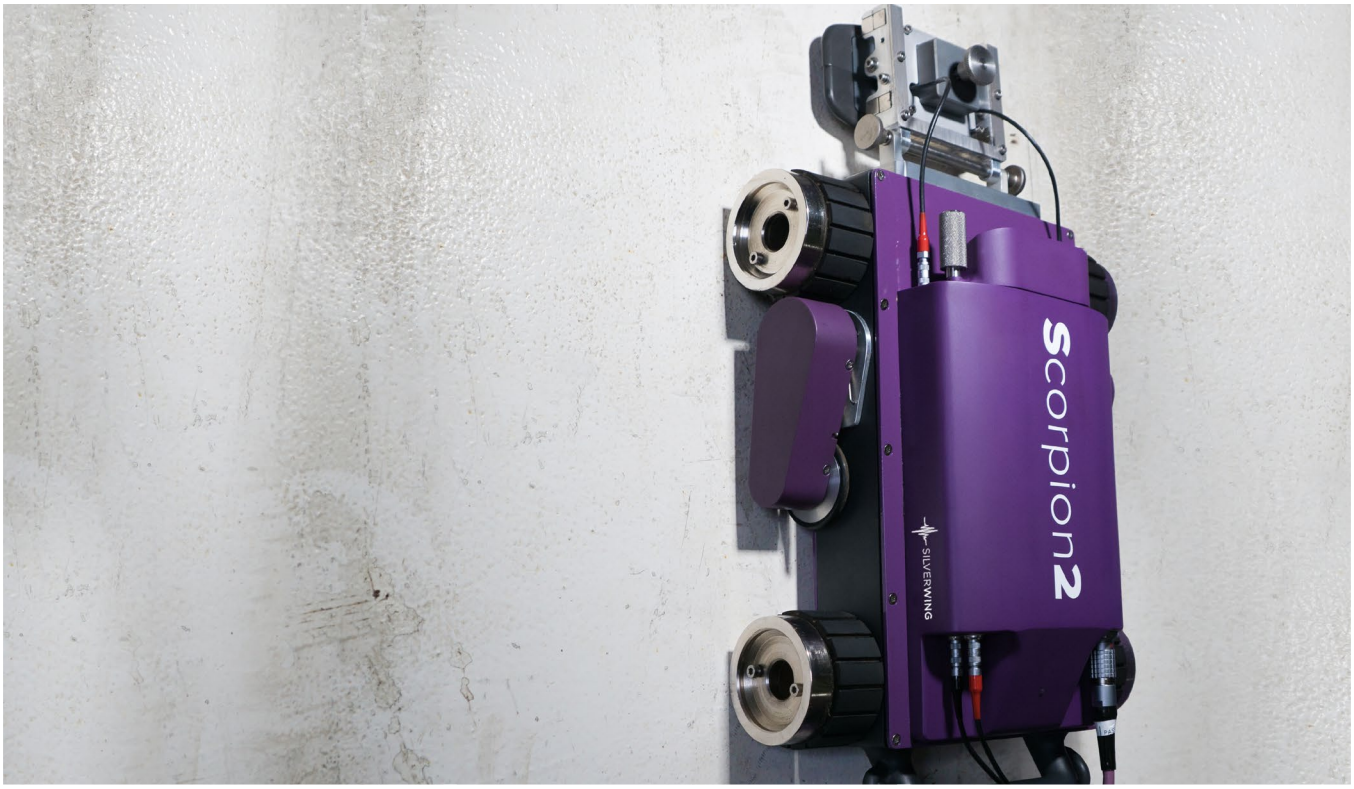
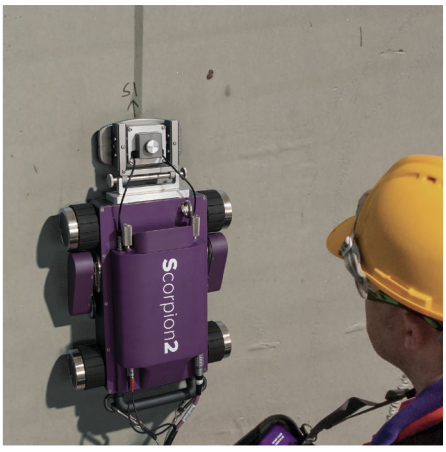
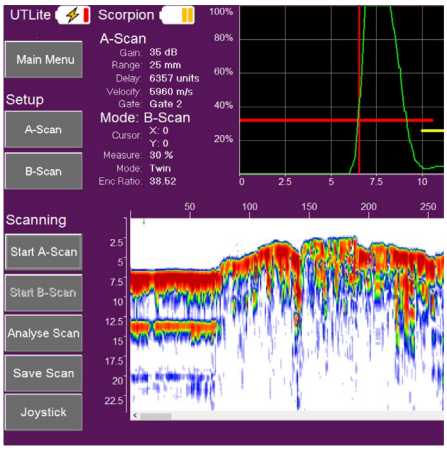
SCORPION2

Battery Powered Remote Access Crawler with Dry Coupled Ultrasonic Wheel Probe







TANKS

PIPES

VESSELS

> FULLY INTEGRATED AUTO UT B-SCAN CRAWLER

> DRY-COUPLED PROBE FOR EASE OF USE

> UP TO 150 MM/SEC INSPECTION SPEED

> BATTERY OPERATED

SCORPION2

BATTERY POWERED REMOTE ACCESS CRAWLER WITH A DRY COUPLED ULTRASONIC WHEEL PROBE.

The Scorpion2 dry coupled remote access ultrasonic crawler system brings major inspection efficiency improvements to above ground ferro-magnetic structures such as storage tanks, vessels and offshore installations.

The all-in-one solution has been developed with feedback from Silverwing's extensive Scorpion user base and support from industry leading robotics researchers at Strathclyde University.

Performance advantages include faster data collection, efficient scanning patterns, higher probability of detection and the ability to collect valuable measurements in critical locations enhancing RBI inspection programs.

The system has two operating modes and can record thickness measurements at a speed of up to 125 mm/sec in programmable mode and up to 150 mm/sec in manual mode, this brings a major inspection efficiently improvement which will translate into increased revenue for its users.

KEY FEATURES

- Up to 125 mm/sec programmable mode
- Up to 150 mm/sec manual mode
- Active steer for auto-correcting straight line driving
- Drive over 12 mm step even in damp conditions
- Dry contact probe - no couplant required
- Programmable scan length and pattern
- Inspect within 25 mm of weldments (HAZ)
- Manual joystick control
- 4 Permanent magnetic drive wheels
- Battery powered for easy use
- Part of the UTLite2 ultrasonic family
- 3 component system, Scorpion2, UTLite2 and umbilical

PROBE DESIGN

Silverwing's unique "Dry Coupled" ultrasonic wheel probe eliminates the need for traditional couplant or a constant water supply. The wheel probe performs like a standard twin ultrasonic probe, and can measure material thickness from 5 mm to 100 mm, including through paint.

The probe is enclosed in a gimballed probe carriage allowing it to ride over protruding objects whilst keeping it perpendicular to the inspection surface. The carriage also allows the system to record thickness measurements within 25 mm of a weld cap to inspect the critical heat affected zone (HAZ).

INSPECTION STANDARDS

Traditional techniques of random tank shell thickness measurements can be very misleading due to the low Probability of Detection (POD) and may lead to incomplete corrosion rate calculations. As recommended by EEMUA, the Scorpion2 records thickness measurements along a vertical line even in the critical Heat Affected Zone (HAZ) meaning a higher POD resulting in a more accurate corrosion assessment.

EEMUA states that walking on tank roofs can be hazardous if the condition is not known. The condition and thickness of the roof plates should be confirmed before access is permitted. The Scorpion2 can remotely record thickness measurements reducing the need for roof access.

BATTERY POWERED

The Scorpion2 system is supplied with four intelligent Li-ion batteries allowing for continuous on-site operation. (two for the Scorpion2 and two for the UTLite2). Each Scorpion2 battery can scan up to 700 metres from a full charge or the equivalent of 8 scans of a 40 metre high storage tank.

The Scorpion2 swappable battery is mounted on board the crawler removing the need for a separate battery pack on the ground thus reducing umbilical and overall system weight.

ACTIVE STEER

One of the challenges for crawlers is compensating for drift on high structures, especially in windy conditions where the umbilical can drag the unit offline. Active Steer solves this problem with the use of dual encoders to measure angle changes, then automatically corrects the scan path by controlling each of the four drive wheels independently.

Active Steer also allows for accurate positioning when turning the crawler through programmable angles making it easier and more efficient for the operator.

DRIVE WHEELS

The Scorpion2 uses four independently powered magnetic drive wheels with treaded tyres for ultimate grip in damp conditions. The treaded tyres give the Scorpion2 the advantage of being able to easily drive over 12 mm steps with less slippage compared with other systems on the market.

UTLite2 COMPATIBILITY

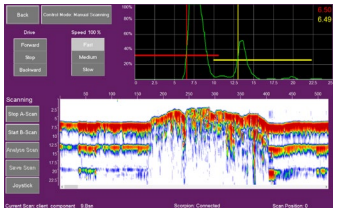
The Scorpion2 works seamlessly with the UTLite2 ultrasonic data acquisition unit. Simply connect the Scorpion2 to the UTLite2 via the umbilical cable and you're ready for your inspection.

The intuitive touch screen control software has been designed for the operator, large buttons and simple to use menus ensure easy crawler control and ultrasonic setup.

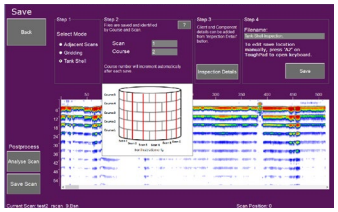
DATA CAPTURE SOFTWARE

The Scorpion2 B-scan software features several powerful data review, reporting and printing tools. Saved data can be reviewed at any time with active A-scan and B-scan displays. Placing the cursor over any part of the B-scan profile shows the A-scan trace for that specific section of the scan.

An adjustable reporting threshold indicator can be displayed over the B-scan profile, this helps to identify reportable defects at a glance and allows rapid analysis of the complete scan. The full amplitude B-scan mode helps to characterise wall loss which in turn allows for a more detailed post-inspection analysis and accurate corrosion assessment.



A & B-SCAN VIEW



SCAN EXPORT

CMAP REPORTING SOFTWARE

Silverwing's CMAP software is an innovative solution to managing today's complex inspection data. CMAP has the potential to save many hours on an average inspection with the ability to import, analyse and report inspection data collected by multiple vendors and multiple inspection techniques.

Users of CMAP can import and stitch together inspection data collected by the UTLite2 acquisition unit which includes the Scorpion2, R-scan and Thetascan as well as Silverwing's RMS2 and Floormap.

CMAP allows for the analysis of these various inspection datasets on one screen creating a complete view of an assets condition with full traceability back to raw inspection data.

TYPICAL APPLICATIONS

- Vertical Storage Tanks
  - Shell
  - Roof
  - Internal Support Stanchions
- Horizontal Storage Tanks
  - Shell
  - Dome Ends
- Pipelines
- Pressure Vessels
- Spherical Tanks
- Tank Trucks
- Offshore Structures
- Marine Vessels

TECHNICAL SPECIFICATION

SCORPION2	
Dimensions	L 463 mm (17.9”) x W 272 mm (10.5”) x H 117 mm (4.4”)
Crawler weight	8.8 Kg (19.4 lb) including battery
Umbilical cable length	50 metres (164 feet)
Umbilical weight	4.25 Kg (9.4 lb)
Adhesion	4 x Neodymium iron boron magnetic wheels
Drive	Active Steer 4 wheel independent 12V DC motor drive
Drive wheels	Treaded rubber compound
Max programmable inspection speed	125 mm/sec (5”/sec)
Max manual inspection speed	150 mm/sec (6”/sec)
Maximum step weld	12 mm (0.45”)
Transducer	5Mhz Dual Element Dry Couple
Near surface resolution	2.5 mm (0.1”)
Probe normalisation	Self-normalising probe
Power supply	14.4V, 6.2Ah, rechargeable smart Lithium ion battery pack. 2.5 hours continuous operation from fully charged
Battery charger	Dual bay – auto ranging 100 - 240VAC - 2.5 hours fast charge from flat. Two batteries supplied as standard
Minimum operating temperature	-10°C ambient
Maximum operating temperature	65°C ambient
Maximum surface temperature	80°C
Minimum inspection surface thickness	5 mm (0.2”)
Maximum inspection surface thickness	100 mm (4”)
Minimum external diameter longitudinal	2.0 metres (6.6 feet)
Minimum external diameter circumferential	3.0 metres (9.9 feet)
Minimum internal diameter longitudinal	4.0 metres (13.2 feet)
Minimum internal diameter circumferential	3.0 metres (9.9 feet)

UTLite2	
Pulser	-400 Volt Spike
Receiver gain	0 – 80 dB in 1 dB steps
Filters	Wideband (0.5 – 2 MHz), 1.5 – 3.5 MHz, 3.5 – 7.0 MHz, 6.5 – 12 MHz
Sample rate	50 MHz
Transducer mode	Single or dual via software
Interface	Touchscreen
Compatible devices	Scorpion2, R-Scan, ThetaScan
Scorpion2 guidance	Manual joystick for drive
Connectors	Encoder – 25 way D type socket, UT – 2 x Lemo (Tx & Rx), Scorpion2 umbilical connector, USB port for data transfer
Dimensions	L 338 mm (13.3”) x W 245 mm (9.6”) x H 135 mm (5.3”)
Weight	4.8 Kg (10.6 lb)
Battery / charger	3 hours operation from fully charged/ 2.5 hours fast charge from flat. Swappable batteries. Two batteries supplied as standard.

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