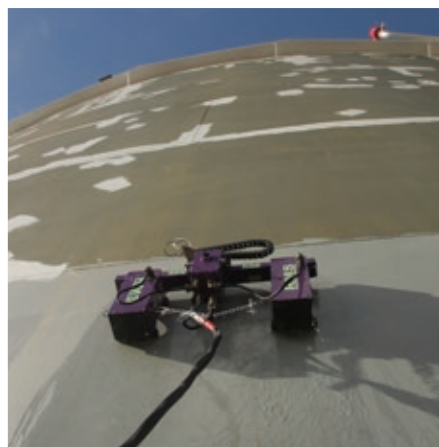
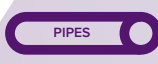


# RMS2

High Speed Remote Access C-Scan Corrosion Mapping System



TANKS



PIPES



VESSELS

- > FULLY INTEGRATED REMOTE C-SCAN SYSTEM
- > VERY HIGH PRODUCTIVITY 17 M<sup>2</sup>/8 HR SHIFT
- > VERY HIGH ACCURACY SCANNING
- > FULL OFF LINE ANALYSIS AND RE-PROCESSING

# RMS2 – RAPID MOTION SCANNER

## HIGH SPEED, AUTOMATED ULTRASONIC CORROSION MAPPING

The RMS2 is a high speed, high accuracy remote access ultrasonic corrosion mapping system designed to evaluate the condition of ferrous structures such as storage tanks, pipelines, pressure vessels and other critical equipment, supporting effective and safe operation.

The RMS2 can give 100% coverage in a band up to 1000 mm wide, significantly increasing Probability of Detection (POD) of corrosion, enabling engineers to determine the optimum repair strategy and improve risk life assessment (RLA) & risk based inspection (RBI) maintenance programs.

The RMS2 is extremely flexible with a range of scanning heads to suit different inspection requirements.

### KEY FEATURES

- > Very high speed for fast coverage of 2.63 m/hr (730 mm/s) with real time image display
- > High probability of detection with up to 0.5 mm scan grid
- > Wide range of applications up to 170 °C
- > Inspection material thickness up to 150 mm
- > 3D data view for internal/external profile
- > Can be used on any ferrous item from 6" OD to flat plate
- > Longitudinal scanning head for increased productivity on crude oil transfer lines, slug catchers and the like
- > Up to 50 metre long x 1 m wide scan feasible in one location
- > Field proven durability & reliability
- > Aid to reduce maintenance costs by minimising use of scaffolding
- > No paint removal required

### SCANNING HEADS

The RMS2-600 scanning head is designed to maximise scanning rates on large surface areas such as tank shells, pressure vessels and other structures.

The RMS2-450 scanning head is designed for operating circumferentially on curved surfaces such as pipelines or pressure vessels from 152 mm (6 inches) up to flat plate.

The RMS2-300 scanning head is designed as a general purpose scanner for inspecting areas with limited access, dished ends or other applications where smaller scan widths are required.

The latest additions to the range of RMS scanning heads are the RMSARC 24 -36 and 36-48, designed to operate longitudinally on pipe diameters from 24" to 48". The combination of longitudinal pipe scanning and 60° scan width brings a major improvement to inspection efficiency for pipeline applications while maintaining the high standard of data quality associated

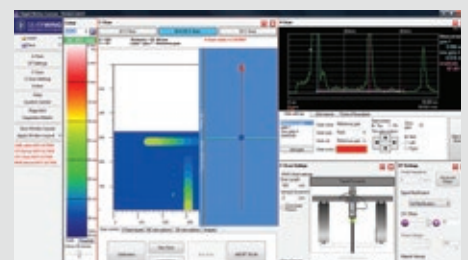


### DATA ACQUISITION SOFTWARE

The RMS software integrates scanner control, data capture, data analysis and reporting tools. The software shows a real-time display of the ultrasonic A-scan, C-scan, thickness measurement and positional data, with a maximum resolution of 0.5 mm x 0.5 mm. All of this information is recorded when a scan is saved.

The modular user interface, has been designed to hide and restore infrequently used controls, with a single mouse click, and save specific screen layouts for future use.

The ultrasonic controls are similar to those on a standard ultrasonic flaw detector so a trained ultrasonic operator can quickly become familiar with all functions.



## FLEXIBLE SOLUTION

All RMS scanning heads share the same ruggedised control unit and reporting software so different scanning heads can be used to meet inspection requirements.

The RMS2 Control Unit houses the power module, motion control system, ultrasonic pulser / receiver and video camera controller. All RMS2 scanning heads feature low profile tractor units incorporating high torque stepper motors and powerful magnetic drive wheels.

A single crystal immersion transducer is held in a gimbaled probe holder ensuring it remains perpendicular to the surface and allowing it to ride over weld caps & lap joints up to 8 mm high. A stainless steel wear plate prevents transducer damage when scanning over rough surfaces.

The immersion type transducer enables simultaneous mapping of both top surface and back wall corrosion, which is easily visualised using the 3D C-scan presentation, something unachievable in standard contact probe solutions. A range of transducer frequencies are available to suit specific material thicknesses, and when combined with the optional extended probe holders allow the RMS2 to inspect material up to 150 mm thick.

The scanning heads can be controlled with either a joystick or on screen controls in the RMS software. When the scanner mounted video camera is used, the image is displayed on screen aiding positioning of the crawler when operator view is obstructed.

As standard a 15 metre combination umbilical cable is used for ultrasonic data transfer, control instructions and couplant supply. For taller structures or large diameter vessels there is an optional 30 m umbilical cable.

## RMS2 DRIVE SYSTEM

The RMS2 Motion Control Unit allows RMS scanning heads to be used with third party OEM ultrasonic systems. This system houses the power module, motion control system and X / Y encoder outputs and is supplied with dedicated scanner control PC software but excludes UT hardware and data acquisition software. It can be upgraded by approved service centres to full RMS2 system.

## INSPECTION CAPABILITIES

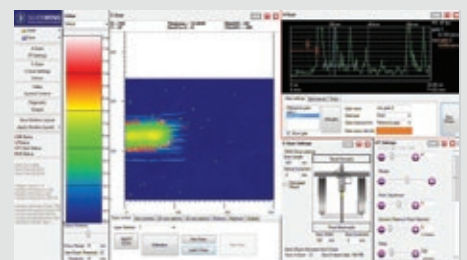
- > Localised / generalised pitting
- > General corrosion
- > Laminations
- > Hydrogen blistering
- > Hydrogen induced cracking (HIC)
- > Stress corrosion cracking (SCC)
- > De-bonding of internal liners
- > Internal paint coating defects



## C-SCAN LAYERS & MULTIPLE A-SCAN GATES

The software is designed around the concept of C-scan 'layers'. This allows the RMS operator to quickly switch between each of the multiple C-scan views generated. During a scan, the A-scan trace and resulting C-scan image are shown within the RMS software in real time.

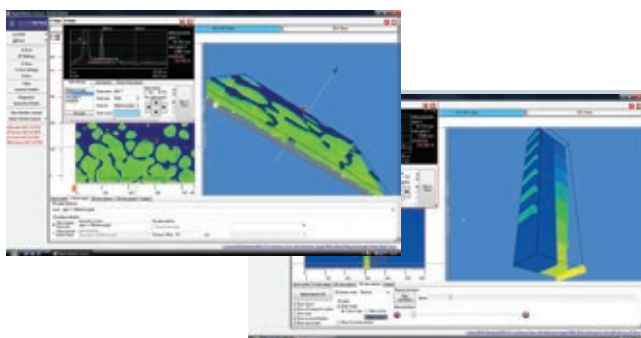
Multiple A-scan gates can be added to measure between several parts of the A-scan trace. This means it is possible to measure the signal amplitude, part thickness, internal surface profile and external surface profile simultaneously. After acquisition the scan can be re-analysed by adjusting gate settings to produce a more accurate C-scan image, or highlight particular indications. This powerful tool minimises the need for re-scanning due to changes in surface condition or minor set-up errors.





## SOFTWARE KEY FEATURES

- > Integrated scanner control, data acquisition, analysis and reporting tools
- > Real-time A-scan and C-Scan display during scan
- > Fully captured A-scan and gate configuration for post inspection analysis
- > Full scan replay with multiple gates
- > Near side (external) defect sizing
- > Far side (internal) defect sizing
- > Up to 20 A-scan gates - Several gate types:
  - > Peak
  - > Flank
  - > Fixed position (Can be used for top surface corrosion)
  - > Amplitude
- > Up to 19 C-scan layers for data review
- > Sizing tools, length, area, statistical
- > A-scan, B-scan, C-scan and 3D views
- > Export C-Scan data as .CSV files for MS excel

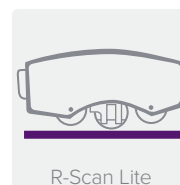


## THE SILVERWING SYSTEM

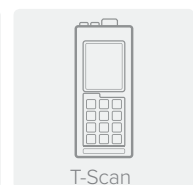
Silverwing produce a full range of equipment for corrosion inspection of storage tanks, vessels and pipe work. The product range includes manual and automated ultrasonic corrosion mapping, ultrasonic crawlers for thickness measurement and MFL tank floor inspection. By supplying a complete range we can offer unrivalled support, and ensure the highest quality inspection in the most efficient way. All our products are field proven by our in house teams and used by the most respected global inspection companies. For a complete overview contact our technical sales team.



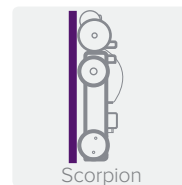
D-Scan



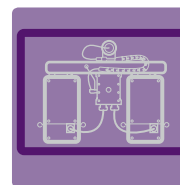
R-Scan Lite



T-Scan



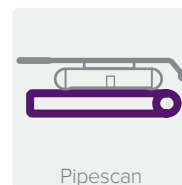
Scorpion



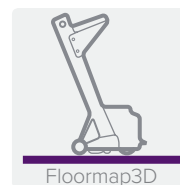
Thetascan



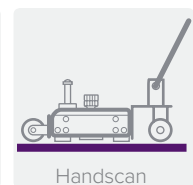
Thetascan



Pipescan



Floormap3D



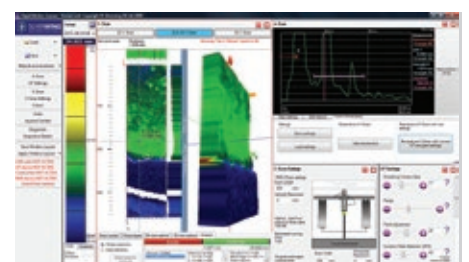
Handscan

For more information on Silverwing Systems please visit our web site: [www.silverwingndt.com](http://www.silverwingndt.com)

## POST INSPECTION ANALYSIS & REPORTING

The RMS software automatically stores the A-scan data, C-scan image and gate information. Once a scan has been completed, the data can be analysed using a range of display options including A-scan, B-scan, C-scan and 3D C-scan views. The X and Y position and the recorded thickness measurement are displayed next to the cursor while the cursor is moved or hovered over the C-scan image. A 2-axis B-scan thickness profile is displayed above, and to the side of the c-scan image.

C-scan layers can be used to display a rotating 3D C-scan view of the saved scan. This view shows the thickness of the part, and also the external surface profile, and the internal surface profile. All A-Scan, B-scan and C-scan views can be either printed directly from the software, or saved as digital images in order to create a detailed report.



## RMS2 600

Storage tank shells, horizontal tanks, pressure vessels, spheres, ship hulls, large structures

### PERFORMANCE

| AREA          | RESOLUTION | TIME      | COVERAGE PER HOUR    |
|---------------|------------|-----------|----------------------|
| 1000 x 600 mm | 10 x 10 mm | 2.35 min  | 13.94 m <sup>2</sup> |
| 1000 x 600 mm | 5 x 5 mm   | 5.09 min  | 6.99 m <sup>2</sup>  |
| 1000 x 600 mm | 2 x 2 mm   | 13.00 min | 2.77m <sup>2</sup>   |



RMS2 600

## RMS2 450

Pipelines, pressure vessels, horizontal tanks, other structures where circumferential is required

### PERFORMANCE

| AREA          | RESOLUTION | TIME      | COVERAGE PER HOUR    |
|---------------|------------|-----------|----------------------|
| 1000 x 450 mm | 10 x 10 mm | 2.12 min  | 12.27 m <sup>2</sup> |
| 1000 x 450 mm | 5 x 5 mm   | 4.30 min  | 6.00 m <sup>2</sup>  |
| 1000 x 450 mm | 2 x 2 mm   | 11.00 min | 2.45 m <sup>2</sup>  |



RMS2 450

## RMS2 300

Storage tank shells, horizontal storage tanks, pressure vessels, spheres, ship hulls, large structures

### PERFORMANCE

| AREA          | RESOLUTION | TIME     | COVERAGE PER HOUR   |
|---------------|------------|----------|---------------------|
| 1000 x 300 mm | 10 x 10 mm | 1.50 min | 9.82 m <sup>2</sup> |
| 1000 x 300 mm | 5 x 5 mm   | 3.39 min | 4.93 m <sup>2</sup> |
| 1000 x 300 mm | 2 x 2 mm   | 9.08 min | 1.97 m <sup>2</sup> |



RMS2 300

## RMS2 ARC 24 -36

Pipelines

### PERFORMANCE

| AREA          | RESOLUTION | TIME      | COVERAGE PER HOUR    |
|---------------|------------|-----------|----------------------|
| 1000 x 800 mm | 10 x 10 mm | 3.17 min  | 14.62 m <sup>2</sup> |
| 1000 x 800 mm | 5 x 5 mm   | 5.50 min  | 8.22 m <sup>2</sup>  |
| 1000 x 800 mm | 2 x 2 mm   | 13.50 min | 3.47 m <sup>2</sup>  |



RMS2 ARC 24-36

## RMS2 ARC 36-48

Pipelines

### PERFORMANCE

| AREA           | RESOLUTION | TIME      | COVERAGE PER HOUR    |
|----------------|------------|-----------|----------------------|
| 1000 x 1000 mm | 10 x 10 mm | 3.47 min  | 17.29 m <sup>2</sup> |
| 1000 x 1000 mm | 5 x 5 mm   | 7.36 min  | 8.15 m <sup>2</sup>  |
| 1000 x 1000 mm | 2 x 2 mm   | 18.59 min | 3.23 m <sup>2</sup>  |



RMS2 ARC 36-48

## ULTRASONIC TECHNICAL SPECIFICATION

|                    |   |
|--------------------|---|
| Pulse voltage      | -40 to -300, 256 steps                              |
| Pulse width        | 50 ns to 320 ns in 20 ns step                       |
| Damping            | 500Ω  |
| Receiver gain      | 0 dB to 80 dB in 0.1 dB increments                  |
| Filter             | 0.6 MHz to 18 MHz fixed                             |
| Waveform           | Full rectify, + half rectify, - half rectify, or RF |
| Sampling rate      | 50 MHz  |
| Resolution         | 8 bits (0 to 255)                                   |
| Waveform length    | 1 to 8190   |
| Trigger source     | +external, -external, internal or software          |
| Transducer range   | 1 to 10 MHz   |
| Post trigger delay | 0 to 16,370 samples in 1 sample step                |

## PROBE SPECIFICATION

5 MHz 50 mm focus - Thickness range 6 – 12.5 mm, (0.25" to 0.5")

5 MHz 75 mm focus - Thickness range 12.5 – 50 mm (0.5" to 2")

### Optional Transducer Specification

10 MHz 40 mm focus - Thickness range 1 – 6 mm, ( 0.04" to 0.25")

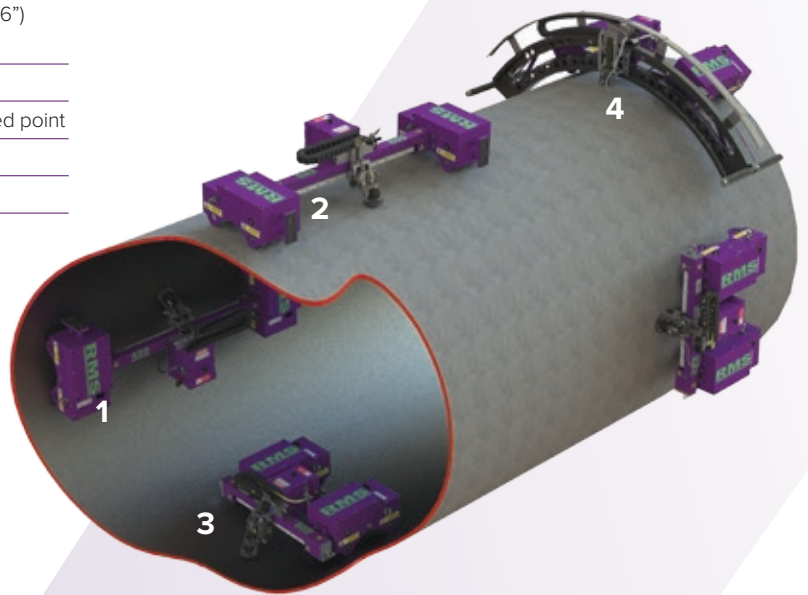
2.5 MHz 75 mm un-focused - Thickness range 50 – 150 mm ( 2" to 6")

5 MHz dual - 2 mm to 100 mm (0.08" to 4"), requires adapter

Other Available on request

## COMMON SCANNER SPECIFICATION

|                        |  |
|------------------------|--|
| Scan grid              | 0.5 to 150 mm in 1 mm steps (0.02" to 6")<br>independent X and Y |
| Max scan length        | 60 m (200 ft) at 10 mm (0.4") grid                               |
| Auto- position         | Scanner movement to origin or selected point                     |
| Scanner identification | Automatic  |
| Scanner control        | Joystick controller and software                                 |



## SCANNER COMPARISON

|   |                              | RMS2 600 |        | RMS2 450 |        | RMS2 300 |        | RMS2 ARC 24-36 |        | RMS2 ARC 36-48 |        |
|---|------------------------------|----------|--------|----------|--------|----------|--------|----------------|--------|----------------|--------|
|   |                              | meters   | inches | meters   | inches | meters   | inches | meters         | inches | meters         | inches |
| 1 | Min Internal circumferential | 2        | 79     | 1        | 40     | 2        | 79     | N/A            | N/A    | N/A            | N/A    |
| 2 | Min External circumferential | 0.65     | 26     | 0.15     | 6      | 0.65     | 26     | N/A            | N/A    | N/A            | N/A    |
| 3 | Min Internal longitudinal    | 5.6      | 221    | N/A      | N/A    | 1.65     | 65     | N/A            | N/A    | N/A            | N/A    |
| 4 | Min External longitudinal    | 5.5      | 217    | N/A      | N/A    | 1.40     | 56     | 0.6 - 0.9      | 24-36  | 0.9 - 1.2      | 36-48  |
|   | Flat Plate                   | ✓        |        | ✓        |        | ✓        |        | N/A            |        | N/A            |        |

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