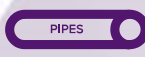


RMS2

High Speed, Remote Access C-Scan Defect Detection
and Corrosion Mapping System



- > REMOTE ACCESS CORROSION MAPPING SYSTEM
- > VERY HIGH PRODUCTIVITY 17 M² / 8 HR SHIFT
- > VERY HIGH ACCURACY SCANNING
- > DATA ANALYSIS AND REPORTING WITH CMAP

RMS2 – RAPID MOTION SCANNER

HIGH SPEED, REMOTE ACCESS 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 efficient inspection programme that support integrity management processes to ensure 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 defects and corrosion, enabling engineers to determine the optimum repair strategy and improve remaining 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)
- > Real-time A-scan and C-scan display
- > Detect top, below and far surface mechanical defects
- > Scanner controlled with either a joystick or on screen controls
- > High probability of detection with up to 0.5 mm scan grid
- > Wide range of applications up to 200°C
- > Inspect material thickness up to 280 mm
- > Scanner mounted camera to assist with positioning
- > 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 scan session
- > Field proven durability, reliability and accuracy
- > 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, vessel heads or other applications where smaller scan widths are required.

The RMS2 ARC 24 -36 and RMS2 ARC 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 and slugcatcher applications while maintaining the high standard of data quality associated with the RMS2.



RWP-57 RUGGED WATER PUMP

RMS2 systems are supplied with an RWP-57 ruggedised water pump. The 3 chamber diaphragm pump includes automatic power switching (100 to 240 VAC - 50-60Hz). The pump is capable of delivering 5.7 litres per minute at a height of 30 metres. The flow rate is electronically controlled and can be finely adjusted to minimise water consumption.

The RWP-57 includes several safety and operational features, a thermal overload protection will switch off the pump in the event of it becoming over heated. An audible alarm is sound in the event of no water being pumped alerting the operator of an issue.



FLEXIBLE SOLUTION

All RMS2 scanning heads share the same high performance system controller so different scanning heads can be utilised depending on the inspection requirements.

The steerable tractor units incorporate high torque stepper motors and powerful magnetic drive wheels ensuring the scanner remains fixed to the inspection surface even whilst inverted.

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



IMMERSION TRANSDUCER

The immersion type transducer enables simultaneous mapping of both near side 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 and focal lengths are available to suit specific material thicknesses from 2 mm, and when combined with the optional extended probe holders allow the RMS2 to inspect material up to 150 mm thick.

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.

ACQUISITION AND ANALYSIS SOFTWARE

The RMS2 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.



C-SCAN LAYERS & MULTIPLE A-SCAN GATES

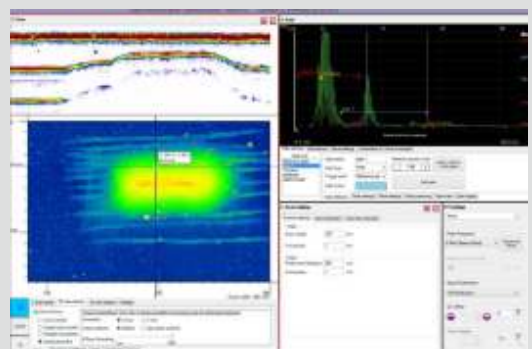
The software is designed around the concept of C-scan 'layers'. This allows the RMS operator to quickly switch between each of the multiple C-scan views generated. During a scan, the A-scan trace and resulting C-scan image are shown within the RMS software in real time.

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.

B-SCAN AMPLITUDE

The B-scan amplitude view shows the B-scan profile in both X and Y dimensions at a selected point of the C-scan. Using the B-scan amplitude view, the operator can easily identify any defects or inclusions.

C-scans provide an effective method for viewing general wall thinning and larger defects, but indication for small pits and inclusions can often be difficult to see due to their small surface area. By reviewing acquisitions in B-scan mode these potentially critical indications can be quickly identified and sized. The software also has a stacked B-scan mode to aid with identification of stepwise cracking and defects not aligned with the X and Y scanning directions.

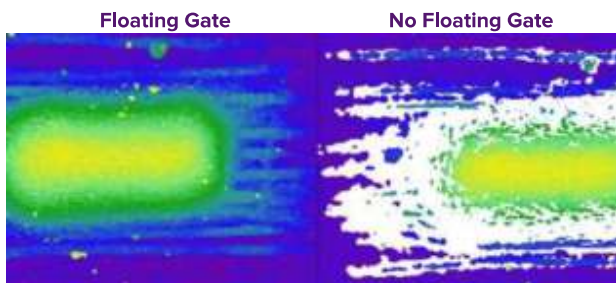




A-SCAN PROCESSING & FLOATING GATES

RMS A-scan waveform processing is fully digital, both in real time during a scan and during post processing. The system records A-scans in raw RF unfiltered form, which can then be processed afterwards, including rectification, filtering, wave smoothing and noise reject. This minimises the set up on site and avoids re-scanning due to incorrect ultrasonic setup.

Another new feature to the RMS2 software is floating flank gates. The floating gate "tracks" to the same % of the signal amplitude. This allows signals to be picked up which are much lower in amplitude improving the accuracy and increasing the efficiency of data analysis and reporting with greater inspection confidence.



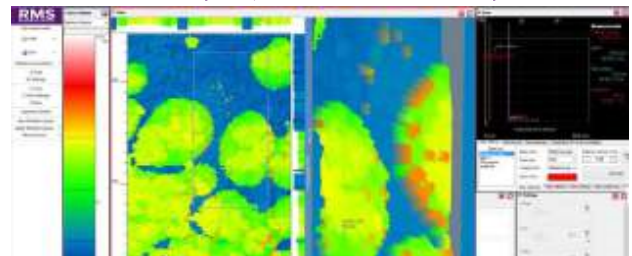
DESKTOP ANALYSIS SOFTWARE

Supplied with RMS is a windows based desktop analysis application. This replicates the RMS user interface and can be used to analyse and reprocess acquired data offline, enabling the RMS to continue scanning on site and sharing of data with off site specialists. The software can be used to:

- > Load in scans.
- > Perform analysis in 2D and 3D.
- > Add and adjust gates
- > Adjust A-scan rectification, filtering and smoothing.
- > Re-analyse scan, 20% faster than previous version.
- > Save scans.

SOFTWARE KEY FEATURES

- > Integrated scanner control, data acquisition, analysis and reporting tools.
- > Floating gates for greater accuracy and improved data collection.
- > Real-time A-scan and C-Scan display.
- > Dedicated desktop analysis software.
- > Fully captured A-scan and gate configuration for post inspection analysis.
- > Full offline analysis and reprocessing with multiple gates.
- > Increased re-analysis speed for efficient data analysis.



- > 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.
- > Import and automatically stitch scans together in CMAP inspection management suite.

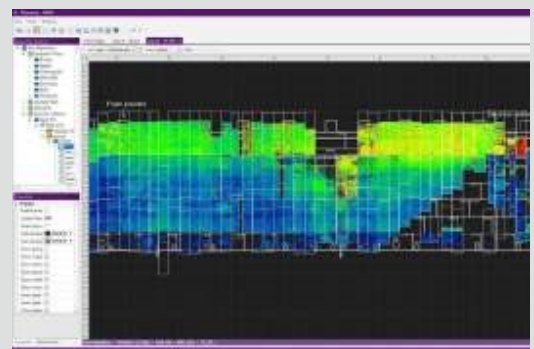
CMAP REPORTING

CMAP can import data from Silverwing's range of inspection systems building up an overall view of an inspection irrespective of the plant item being scanned e.g. storage tank shell or roof, pressure vessel, road tanker or marine vessel to name a few.

RMS2 data can be automatically positioned and "stitched" together based on scan co-ordinates, this significantly reduces time in analysing inspection data.

CMAP also contains dimension tools to annotate defect areas. These dimension markers can overlap different scans and be used for defect sizing, or adding positional information.

For more information on CMAP please visit our website or view the CMAP brochure.



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	1:53 min	9.56 m ²
1000 x 300 mm	5 x 5 mm	3:47 min	4.76 m ²
1000 x 300 mm	2 x 2 mm	9:27 min	1.90 m ²



RMS2 300

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	1:54 min	14:21 m ²
1000 x 450 mm	5 x 5 mm	3:17 min	8:22 m ²
1000 x 450 mm	2 x 2 mm	7:13 min	3:74 m ²



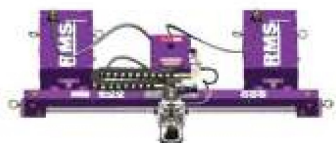
RMS2 450

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	2:42 min	13.37 m ²
1000 x 600 mm	5 x 5 mm	5:25 min	6.65 m ²
1000 x 600 mm	2 x 2 mm	13:32 min	2.66m ²



RMS2 600

RMS2 ARC 24 -36

Pipelines, slugcatchers

PERFORMANCE

AREA	RESOLUTION	TIME	COVERAGE PER HOUR
1000 x 800 mm	10 x 10 mm	2:56 min	16.36 m ²
1000 x 800 mm	5 x 5 mm	5:41 min	8.45 m ²
1000 x 800 mm	2 x 2 mm	13:37min	3.53 m ²



RMS2 ARC 24-36

RMS2 ARC 36-48

Pipelines, slugcatchers

PERFORMANCE

AREA	RESOLUTION	TIME	COVERAGE PER HOUR
1000 x 1000 mm	10 x 10 mm	3:10 min	19.95 m ²
1000 x 1000 mm	5 x 5 mm	5:56 min	10.11 m ²
1000 x 1000 mm	2 x 2 mm	13:42 min	4.38 m ²



RMS2 ARC 36-48

ULTRASONIC TECHNICAL SPECIFICATION

Pulse voltage	34.2 to 300
Pulse width	50 ns to 530 ns
Damping	500Ω
Receiver gain	-20 db to 80 db
Bandwidth	0 MHz to 25 MHz
Waveform	Full rectified, + half rectified, - half rectified or RF
Range	4.8m in steel with a velocity of 5920 m/s
Transmitter mode	Single, dual
Transducer range	2.5 to 10 MHz
Reject	Baseline compression
Post trigger delay	0 to 3.2 ms, 20ns step

COMMON SCANNER SPECIFICATION

Scan grid	0.5 to 50 mm in 1 mm steps (0.02" to 2") independent X and Y
Maximum scan length	60 m (200 ft) at 10 mm (0.4") grid
Maximum scan speed	730 mm/s
Auto - position	Scanner movement to origin or selected point
Scanner identification	Automatic
Scanner control	Joystick controller and software
Umbilical cable	15 metre (optional 30 metre)
Temperature range	Up to 200°C
Power requirements	100 to 240 VAC - 50-60Hz

INSPECTION CAPABILITIES

Localised / generalised pitting
General corrosion and erosion
Laminations
Internal coating failures or dis-bonding
Hydrogen blistering (HB)
Hydrogen induced cracking (HIC)

SCANNER COMPARISON

		RMS2 600		RMS2 450		RMS2 300		RMS2 ARC 24-36		RMS2 ARC 36-48	
		metres	inches	metres	inches	metres	inches	metres	inches	metres	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	

TRANSDUCER 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 non-focused - Thickness range 2" to 6" (50 – 150 mm)
5 MHz dual - 2 mm to 100 mm (0.08" to 4"), requires adapter
Others Available on request

Transducer Holder Range

Standard - Maximum plate thickness 100 mm
Extended - Maximum plate thickness 280 mm

