










# Product Catalogue



# Wavemaker® G4



The Wavemaker® G4 builds upon the proven success of the previous generations of Wavemaker® instruments. It contains 32 transducer channels for interfacing with all of GUL's transduction systems. It also contains a range of peripherals to ensure quality guided wave data are collected quickly and efficiently.

- |   |   |   |
|---|---|---|
|  32 Data Channels         |  Internal & Hot Swap Battery |  Boost Function (400 V)  |
|  Fast Ethernet Collection |  7" LCD Touch Screen         |  Built-In GPS            |
|  Wireless Capabilities    |  On-Board Diagnostics        |  Operator Identification |

## Available Configurations:

### Base



This instrument is suitable for all standard frequency pipe and rail applications.

### Full

This instrument has all the functionalities of the Base Wavemaker® G4 and capabilities for high frequency applications.

**Additional software licenses can be added on.**

## Supplied with:

- |   |   |   |
|---|---|---|
| <br>WavePro™ License | <br>2 x 3m LEMO® Cables <sup>[1]</sup> | <br>USB Cable      |
| <br>Mains Charger    | <br>Soft Bag                           | <br>Ethernet Cable |

## Optional:













- Laptop computer with pre-installed WavePro™
- Wide range of LEMO® cables
- EFC Processing Licence
- In-car charger
- Absolute Calibration software
- Warranty extension options

[1] 1 x Straight, 1 x 90° Angled Connector

# Wavemaker® G4<sup>mini</sup>



The latest Wavemaker® G4<sup>mini</sup> offers all of the traditional Wavemaker® features and some new ones in a small (22x30x13 cm) and lightweight package. It also has the boost function option (400V) for maximum energy transfer into the pipes and boasts a 12-hour battery life.

|   |   |   |
|---|---|---|
|  Lightweight 4.5 kg / 9.9 lbs |  Internal & Hot Swap Battery |  Boost Function (400 V)      |
|  16 Data Channels             |  7" LCD Touch Screen         |  Fast Ethernet Collection    |
|  High Speed Data Acquisition  |  On-Board Diagnostics        |  Built-In GPS                |
|  Extended Frequency Range     |  Operator Identification     |  Wireless Option (Accessory) |

## Available Configurations:

### Base

Base level instrument compatible with the EFC Solid, EFC Inflatable, and Compact® rings; suitable for the most common screening applications.

**Additional software licenses can be added on.**

### Full

This instrument can be used with all pipe and tube transduction and monitoring systems produced by GUL.

## Supplied with:



WavePro™ License



2 x 2m LEMO® Cables



USB Cable



Mains Charger



Soft Bag

## Optional:

- Laptop computer with pre-installed WavePro™
- Software modules for G4<sup>mini</sup> Base
- Wide range of LEMO® cables
- EFC Processing Licence
- In-car charger
- Absolute Calibration software
- Warranty extension options
- LAN cable adapter

# WavePro4™ Software



The WavePro4™ guided wave analysis software runs on a Windows® based operating system and interfaces with the Wavemaker® G4 and G4<sup>mini</sup> instrument.

The software assists with the collection of data, the validation and analysis of the data, and the reporting of the results. Its many features simplify and speed up the inspectors tasks while exploiting the full potential of guided wave screening, using GUL's large variety of transduction systems. The software continues to evolve to bring new features that enhance the capabilities of guided wave screening.

A perpetual licence for use of the software is included in the price of the Wavemaker® G4 & G4<sup>mini</sup>.



Windows® 7, 8 & 10



Multiple Connection Interface Options



User Friendly



Rapid Data Processing



Quick Schematic



Report Generator



Seamless Frequency Sweeping

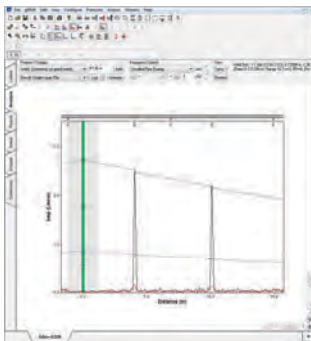


Advanced Data Quality Checks



Routine Software Updates

## Basic Features



### Amplitude Scan (A-Scan)

The main features of the A-Scan are the Distance-Amplitude Correction (DAC) curves, symmetric (black) signals and the non-symmetric (red) signals.

These features provide information about the type of features or defects, including their location along the inspected pipe length and an estimated cross-sectional change.

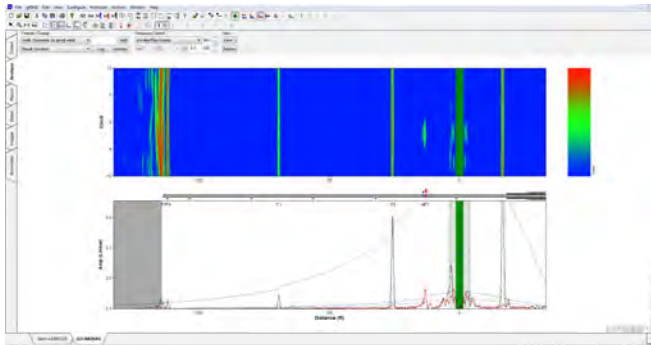


### Report Generator

Once the data has been analysed by a trained inspector, the data can be automatically compiled into a single report which would include the A-Scans, reflection annotations and operator notes.

The report can be output to either PDF, Word Document or Excel Spreadsheet format for flexibility.

## EFC Processing Licence



## Unrolled Pipe Display (C-Scan)

Enhanced Focusing Capability (EFC) Processing Licence activates the advanced post-processing data analysis which involves generating a digital image of the unrolled pipe (C-Scan). Through the C-Scan, the defects and pipe features can be easily located, including their orientation around the pipe circumference. The C-Scan is most effective when used with GUL's newer transducer rings. The example in the figure above demonstrates how a defect can be easily visualised and located on the pipe using the C-Scan.



Wavemaker® G4 / G4mini

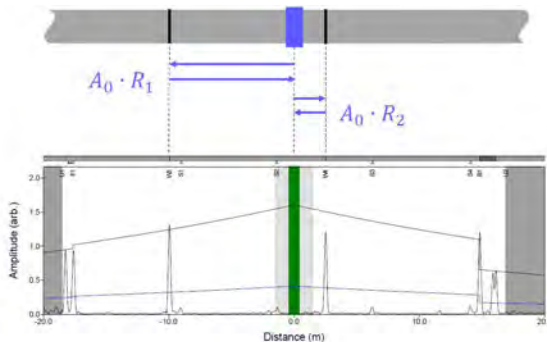


Synthetic Focusing



Orientation of Features

## Absolute Calibration Licence



## A-Scan with Absolute Calibration &amp; Simulated Reverberation

The absolute calibration licence activates the processing functionality required for automatic amplitude calibration and reverberation simulation. It calculates the DAC amplitude levels, resulting in accurate assessment of indications. The software checks whether absolute calibration is valid for a given guided wave result. The simulated reverberation feature will also assist our operators with the identification of false echoes through the use of advanced signal processing.



Wavemaker® G4 / G4mini



Amplitude Calibration

Simulation of  
Reverberation Echoes

# Compact® EFC Rings



The Compact® ring is the latest addition to the GUL guided wave transduction system which has been designed to be lightweight and low profile. This new system has been completely re-engineered to build on everything that has been done before, while reducing weight by 35%, axial width by 30%, and radial height clearance to under 38mm.

This is an inspection system designed to tackle a wide range of inspection challenges including:

- Bare / Painted Pipes
- Sleeved or Unsleeved Road Crossing Pipes
- Buried Pipes



Pneumatic Loading



Ring Joining



Smart Sensors



Latest Connector Technology

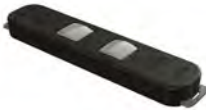


Lightweight



Spring-Lock Latch

## Available Transducer Types:



EC-30

2-row transducer modules with 30mm spacing for medium frequency inspection.



EC-42

2-row transducer modules with 42mm spacing for low frequency inspection.



EC-Trio

3-row transducer modules with 42mm and 21mm spacing for inspection across an ultra wide band frequency range without having to swap modules.

## Specifications:

|                                   | Compact                            |
|-----------------------------------|------------------------------------|
| Number of Channels                | 16                                 |
| Nominal Pipe Size (NPS)           | 6" to 24"                          |
| Operating Temperature             | -40°C to 150°C<br>-40°F to 302°F   |
| Radial Clearance                  | 1.5 inches (38 mm)                 |
| Transduction System Compatibility | Wavemaker® G4 & G4 <sup>mini</sup> |



# EFC Solid Rings



The solid transducer rings are typically used for standard screening of pipes with nominal size between 2 and 8 inches in diameter. The rings are attached to the pipe by tightening the two large handles which push the spring loaded transducers onto the pipe to obtain good shear contact.

Standard rings have 2 rows of transducers to transmit torsional wave modes. Customised rings can be specially produced in other sizes or with 4 rows of transducers to allow for inspection using both longitudinal and torsional guided wave modes.



Spring Loaded Transducers



Precision Milled Body



Ergonomic  
Fastening Handles

## Available Models:

### LITE

Spring-loaded transducer ring for inspection of pipes up to 6" diameter. Key application areas include:

- Bare / Painted Pipes
- Sleeved / Unsleeved Road Crossing Pipes
- Buried Pipes

### HT

Similar to LITE solid ring but specifically designed to inspect higher temperature pipes (< 350°C). Key application areas are the same as the ones listed for LITE rings but also include:

- High Temperature Pipes

## Specifications:

|                                   | LITE                               | HT                               |
|-----------------------------------|------------------------------------|----------------------------------|
| Number of Channels                | 8 or 16                            | 8 or 16                          |
| Nominal Pipe Size (NPS)           | 2" to 8"                           | 2" to 8"                         |
| Operating Temperature             | -40°C to 150°C<br>-40°F to 302°F   | -40°C to 350°C<br>-40°F to 662°F |
| Radial Clearance                  | 3 inches (76 mm)                   |                                  |
| Transduction System Compatibility | Wavemaker® G4 & G4 <sup>mini</sup> |                                  |

# EFC Inflatable Rings



These transducer rings are designed to provide effective inspection capability, particularly for larger diameter pipes. Pneumatic pressure is used to press transducers modules (which are mounted onto this ring) against the pipe wall. These modules are fully interchangeable between inflatable collars of all sizes.

For sizes greater than 24-inch diameter, two smaller inflatable type rings can be linked together as detailed in a specific procedure for joining rings. Non-standard sizes (up to 60 inch) and 8-channel (non-EFC) rings can be produced to special order.



Pneumatic Loading



Ring Joining



Screw-Lock Latch

## Available Transducer Types:



Standard

2-row transducer modules with a single fixed spacing for medium frequency inspection. Key application areas include:

- Bare / Painted Pipes
- Sleeved / Unsleeved Road Crossing Pipes



Adjustable

2-row adjustable transducer modules with four transducer spacings to inspect across a wide band of frequency range. Key application areas are the same as the ones listed for Standard transducers but also include:

- Buried Pipes
- Pipes with large numbers of welded supports
- Inspections for Localised Pitting

## Specifications:

|                                   | EFC                                |
|-----------------------------------|------------------------------------|
| Number of Channels                | 16                                 |
| Nominal Pipe Size (NPS)           | 6" to 36"                          |
| Operating Temperature             | -40°C to 150°C<br>-40°F to 302°F   |
| Radial Clearance                  | 2.5 inches (63 mm)                 |
| Transduction System Compatibility | Wavemaker® G4 & G4 <sup>mini</sup> |



# HT Inflatable Rings



High Temperature (HT) rings and modules have EFC performance with the added capability of testing pipes operating at up to 350°C provided that the ring is removed from the pipe within 15 minutes of being applied.

In order to carry out the guided wave inspection, only a 50-cm (20-inch) wide strip of insulation needs to be removed. No couplant is required.



Pneumatic Loading



Ring Joining



Screw-Lock Latch



Smart Sensors



High Temperature Operation

## Available Transducer Types:

NEW DESIGN



HT

2-row adjustable transducer modules with two different spacings to inspect across a wide band of frequency range. Key application areas include:

- Bare Pipes
- Painted Pipes
- Sleeved or Unsleeved Road Crossing Pipes
- Buried Pipes
- High Temperature Pipes

NEW DESIGN



Adjustable

2-row adjustable transducer modules with four transducer spacings to inspect across a wide band of frequency range. Key application areas are the same as the ones listed for Standard transducers but also include:

- Buried Pipes
- Pipes with large numbers of welded supports
- Inspections for Localised Pitting

## Specifications:

|                                   | HT Modules                         | Adjustable Modules               |
|-----------------------------------|------------------------------------|----------------------------------|
| Number of Channels                | 16                                 | 16                               |
| Nominal Pipe Size (NPS)           | 6" to 36"                          | 6" to 36"                        |
| Operating Temperature             | -40°C to 350°C<br>-40°F to 662°F   | -40°C to 150°C<br>-40°F to 302°F |
| Radial Clearance                  | 2.5 inches (63 mm)                 |                                  |
| Transduction System Compatibility | Wavemaker® G4 & G4 <sup>mini</sup> |                                  |

# HD Solid Rings



The High Definition (HD) solid ring have EFC performance and utilises the high frequency range available with the Wavemaker® G4 with the medium frequency option (LF+MF option) and G4<sup>mini</sup> for applications where higher sensitivity and resolution are required. Such applications typically include interface penetrations, supports and localised pitting.



Spring Loaded Transducers



Precision Milled Body



Ergonomic Fastening Handles



High Frequency Operation Capable



High Temperature Version Available

## Available Models:

### HD

Spring-loaded transducer ring for inspection of pipes with up to 6" diameter at a high frequency range. Key application areas include:

- Bare / Painted Pipes
- Sleeved / Unsleeved Road Crossing Pipes
- Buried Pipes
- Pipes with large numbers of welded supports
- Concrete Anchor Supports
- Inspections for Localised Pitting

### HD-HT

Similar to HD solid ring but specifically designed to inspect higher temperature pipes (< 350°C). Key application areas include:

- Bare / Painted Pipes
- Sleeved / Unsleeved Road Crossing Pipes
- Buried Pipes
- Pipes with large numbers of welded supports
- Concrete Anchor Supports
- Inspections for Localised Pitting
- High Temperature Pipes

## Specifications:

|                                   | HD  | HD-HT                            |
|-----------------------------------|---|----------------------------------|
| Number of Channels                | 8 or 16                                     | 8 or 16                          |
| Nominal Pipe Size (NPS)           | 2" to 6"                                    | 2" to 6"                         |
| Operating Temperature             | -40°C to 150°C<br>-40°F to 302°F            | -40°C to 350°C<br>-40°F to 662°F |
| Radial Clearance                  | 2 inches (50 mm)                            |                                  |
| Transduction System Compatibility | Wavemaker® G4 & Licensed G4 <sup>mini</sup> |                                  |

# HD Inflatable Rings



The HD inflatable ring has been developed for the same applications as the HD solid ring where higher sensitivity and resolution are required, and pipe sizes are larger than 6 inches.

When mounted with HD transducers, the use of this type of transducer ring requires the Wavemaker® G4 with the medium frequency option (LF+MF option), or the Wavemaker® G4<sup>mini</sup>.



Pneumatic Loading



Ring Joining



Spring-Lock Latch



Smart Sensors



High Frequency  
Operation Capable



Enhanced Circumferential  
Sensitivity

## Available Transducer Types:

NEW  
DESIGN



HD

2-row fixed space transducer modules with four transducers per module to inspect at a high frequency range. Key application areas include:

- Bare / Painted Pipes
- Sleeved or Unsleeved Road Crossing Pipes
- Pipes with large numbers of welded supports
- Concrete Anchor Supports
- Inspections for Localised Pitting

NEW  
DESIGN



Adjustable

2-row adjustable transducer modules with four transducer spacings to inspect across a wide band of frequency range. Key application areas are the same as the ones listed for Standard transducers but also include:

- Buried Pipes
- Pipes with large numbers of welded supports
- Inspections for Localised Pitting

## Specifications:

|                                   | HD   |
|-----------------------------------|--|
| Number of Channels                | 16   |
| Nominal Pipe Size (NPS)           | 6" to 36"                                      |
| Operating Temperature             | -40°C to 150°C<br>-40°F to 302°F               |
| Radial Clearance                  | 2.5 inches (63 mm)                             |
| Transduction System Compatibility | Wavemaker® G4 &<br>Licensed G4 <sup>mini</sup> |

# Claw Transducers



The extendable small diameter transducer or "Claw" is able to fit between closely spaced tubes where conventional rings cannot fit.

There is also a remote access option where the tool head is attached to a 2-metre-long extension arm that allows inspection of difficult to access tubes or pipes.

Different transducer spacing options are available.



Spring Loaded Transducers



Precision CNC Milled Body



Ergonomic Fastening Handles



High Frequency Operation Capable



High Temperature Version Available



Tube Applications

## Available Models:

### Claw

Extendable claw transducers suitable for low frequency guided wave inspection of:

- Boiler Tubes
- Heater Tubes
- Furnace Tubes

### Claw-HT

Similar to the Claw but specifically designed to inspect higher temperature pipes and tubes (< 350°C). Key application areas include:

- Boiler Tubes
- Heater Tubes
- Furnace Tubes

## Specifications:

|                                   | Claw  | Claw-HT                          |
|-----------------------------------|---|----------------------------------|
| Number of Channels                | 8   | 8                                |
| Nominal Pipe Size (NPS)           | ¾" to 2.5"                                  | ¾" to 2.5"                       |
| Operating Temperature             | -40°C to 250°C<br>-40°F to 482°F            | -40°C to 350°C<br>-40°F to 662°F |
| Radial Clearance                  | 1.5 inches (38 mm)                          |                                  |
| Transduction System Compatibility | Wavemaker® G4 & Licensed G4 <sup>mini</sup> |                                  |

# Low Profile Rings (Slinky)

NEW  
DESIGN



The ultra low profile ring or “Slinky” was specifically designed to be able to fit around pipes that have a very limited radial clearance, like those commonly found in culverts or pipe racks. Typically less than 25 mm of clearance is required to be able to mount the rings.

Due to their design, the low profile rings cover a smaller pipe size range than the traditional solid rings. The standard low profile rings are configured for API nominal pipe sizes (within an API 5L tolerance).

These ultra low profile transducer rings are suitable for low clearance inspection of:

- Bare / Painted Pipes
- Sleeved Pipes
- Insulated Pipes



Low Profile



Precision Cast Body



Ergonomic  
Handles

## Available Transducer Types:



Green

2-row transducer modules with a single fixed spacing for high frequency inspection.



Blue

2-row transducer modules with a single fixed spacing for medium frequency inspection.



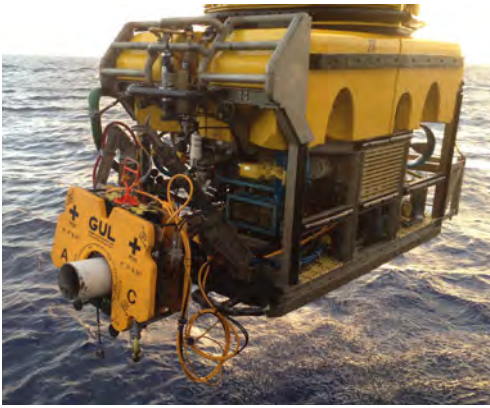
Red

2-row transducer modules with a single fixed spacing for low frequency inspection.

## Specifications:

|                                   | Slinky                                      |
|-----------------------------------|---|
| Number of Channels                | 8 or 16                                     |
| Nominal Pipe Size (NPS)           | 2" to 8"                                    |
| Operating Temperature             | -40°C to 120°C<br>-40°F to 248°F            |
| Radial Clearance                  | 1 inch (25 mm)                              |
| Transduction System Compatibility | Wavemaker® G4 & Licensed G4 <sup>mini</sup> |

# Subsea GWT



With the experience gained from many inspections in both the North Sea and the Gulf of Mexico, GUL's Subsea GWT equipment has evolved into a reliable modular system.

GUL Subsea rings are easily adjusted to fit different pipe sizes, and are available for both ROV or diver deployment.

The advantages of using the Sub-Sea rings include:

- Screening unpiggable sections of line for internal or external corrosion/erosion.
- Screening under weight coat and insulation with minimal cleaning and excavation.
- On-site analysis allows the ROV to perform follow up indications.

## Available Deployment Types:



**ROV Deployed**

A Subsea G4<sup>mini</sup> is mounted on the ROV. A hydraulic connection is used for opening and closing the ring. The test is carried out from the ROV control room.



**Diver Deployed**

The test is controlled via an umbilical from a topside interface box to the Wavemaker instrument. The rings are installed on a clean section of pipe by 1 or 2 divers using a mechanical clamping mechanism.

## Specifications:

|                                   | ROV  | Diver  |
|-----------------------------------|--|--|
| Number of Channels                | 12   | 12   |
| Nominal Pipe Size (NPS)           | 6" to 10"                                    | 4" to 26"  |
| Operating Depth (below sea level) | Down to 3,000 msw                            | Any diver depth  |
| Transduction System Compatibility | Wavemaker®<br>Subsea G4 <sup>mini</sup> only | Wavemaker® G4 (< 50m depth)<br>Subsea G4 <sup>mini</sup> (> 50m depth) |



# G-Scan



The G-Scan is a long range, rapid rail inspection system which is deployed on rail tracks during normal operation. This system uses low frequency guided waves which can travel along the rail and detect defects, such as corrosion, at any location throughout the section including the foot of the rail. The G-Scan is only compatible with the Wavemaker® G4 (32 channels required).

The G-Scan is ideally suited for low frequency guided wave inspection of:

- Level crossings
- Tunnels
- General rail screening
- Rail welds of all kinds

## Principle of Operation:

A structure can support many guided wave modes at any given frequency. Each mode carries the guided wave energy in different parts of the rail cross section. Using several modes simultaneously, the entire rail cross section can be inspected in a single test. In addition, by examining which mode is reflected from a defect, it is possible to determine in what part of the rail cross section the defect is located.



Figure 1 - Example of guided wave mode shapes with energy concentrated in the foot (left) and web (right) of the rail respectively.

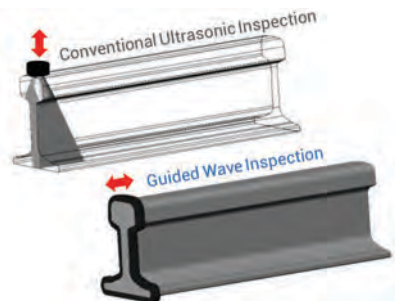


Figure 2 - Unlike conventional ultrasonic inspection, guided waves provide 100% volumetric inspection and can inspect tens of metres in a single test.

## Specifications:

|                                   |                                  |
|-----------------------------------|----------------------------------|
|                                   | G-Scan                           |
| Number of Channels                | 26                               |
| Available Rail Sizes              | CEN60, CEN56, CEN54, CEN50       |
| Operating Temperature             | -40°C to 120°C<br>-40°F to 248°F |
| Transduction System Compatibility | Wavemaker® G4                    |

# QSR1<sup>®</sup>



The QSR1<sup>®</sup> is GUL's innovative quantitative short range (QSR) device, incorporating the latest guided wave technology and hardware.

The system is designed to semi-automatically scan predefined sections of straight pipelines, for example the location of a support to determine the extent of corrosion under pipe supports (CUPS).

The QSR1<sup>®</sup> provides a quantitative measure of the average wall, as well as the remaining pipe wall thickness in areas of interest.

This QSR1<sup>®</sup> also has the added compatibility to operate with GUL's cloud-based platform.



Lightweight 9 kg / 19.8 lbs



Robust Design



Battery Operation



High Speed Data Acquisition



7" LCD Touch Screen



Operator Identification



Semi-Automated Scanning



Extended Frequency Range



Built-In GPS

## Specifications:

### QSR1

Nominal Pipe Size (NPS)

8" to 24" (DN 200 to 600)

Pipe Thickness

6 mm to 13 mm (¼" to ½")

Operating Temperature

-20°C to 70°C  
-4°F to 160°F

Communications

USB, LAN

Clearance

Varies according to diameter.  
Special frames available for limited clearance.

## Supplied with:

## Optional:



Software Licence



Mains Charger



USB Cable



Ethernet Cable

- Laptop computer
- In-car charger
- Warranty extension options

# WaveProQSR™ Software



The WaveProQSR™ software controls the real time configuration and collection of data. After collection it validates and analyses the data, allowing the user to report the results.

WaveProQSR™ runs on a Windows® based operating system and interfaces with the QSR1® instrument via USB or Ethernet connection.

The software continues to evolve to enhance the capabilities and expand the applications of guided wave scanning.



Windows® 7, 8 & 10



Automated Configuration



Rapid Data Processing



Multiple Connection  
Interface Options



Advanced  
Data Quality Checks



Reporting & Exporting  
Functions



User Friendly



Routine Software Updates

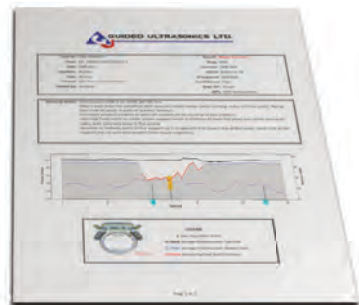
## Basic Features



### Automated Configuration

The WaveProQSR™ routines automatically optimise the QSR1® configuration for the detected pipe diameter, pipe wall thickness, and coating. These routines minimize configuration errors and setup time.

As the system scans, the software continuously adapts to collect the optimum data set for each location along the pipe.



### Reporting & Exporting

The system records the average wall thickness of the top and bottom paths, as well as the minimum wall thickness for each axial location.

This defect profile forms the base of the report and can also be exported to a spreadsheet for further FFS calculations.

# gPIMS<sup>®</sup> Monitoring

In many situations, the cost of accessing a pipe is much higher than the cost of inspection. This access cost can make repeat inspections with removable rings prohibitively expensive.

gPIMS<sup>®</sup> - Guided Wave Permanently Installed Monitoring Sensors - are an environmentally robust range of sensors developed to be easily bonded onto the pipe, sealed and then left in place. A cable connects the gPIMS<sup>®</sup> sensor to a connection box that can be located in a convenient, easy to access location.

By performing repeat inspections and comparing the results to previous inspections, operators can monitor for any change in the condition of the pipe. Frequent data collection significantly improves sensitivity and reduces false call rates compared to conventional guided wave testing.

- |  |                    |   |                                   |   |  |
|--|--------------------|---|-----------------------------------|---|--|
|  | Low Profile        |  | Efficient Installation            |  | Dual Capability<br><i>(Local Thickness Monitoring)</i> |
|  | Advanced Materials |  | ATEX / IECEx<br>version available |  | GUL Trunk <sup>®</sup>                                 |
|  | Smart Sensors      |  | Environmentally Protected         |  | Save Costs   |

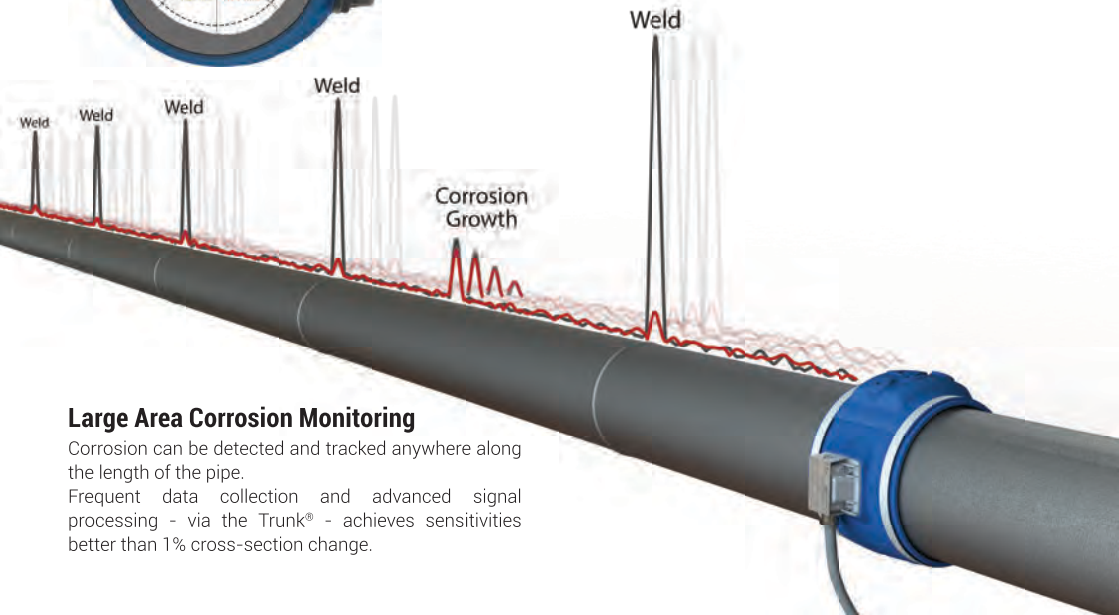
## Dual Capability



### Local Thickness Monitoring

The wall thickness underneath the sensor can be tracked in 8 segments around the circumference of the pipe.

The guided wave method used by the gPIMS<sup>®</sup> is tolerant of rough corrosion surfaces and is accurate to within tens of microns.



### Large Area Corrosion Monitoring

Corrosion can be detected and tracked anywhere along the length of the pipe.

Frequent data collection and advanced signal processing - via the Trunk<sup>®</sup> - achieves sensitivities better than 1% cross-section change.

Available Collection Options:



**gPIMS Mini Collector**

Instrument specifically configured for repeat testing, automatically detecting gPIMS® data collection settings so it can be used by operators with minimal training.



**NEW!**

**Auto Collector**

gPIMS® autonomous collector which enables frequent data collection and wireless transmission for increased sensitivity and reliability.

Available Sensor Models:



**EFC**

A 16-channel gPIMS® ring kit with enhanced characteristics for applications in higher consequence areas.



**EX**

An ATEX/IECEx certified 16-channel gPIMS® ring kit for use in restricted areas where hazardous atmospheres may be present.

Specifications:

|                                   | EFC                                      | EX   |
|-----------------------------------|--|--|
| Nominal Pipe Size (NPS)           | 6" to 48"                                | 6" to 24"  |
| Operating Temperature             |  | -40°C to 130°C<br>-40°F to 266°F   |
| Radial Clearance                  |  | 1 inch (25 mm)   |
| Transduction System Compatibility | gPIMS® Collector,<br>Licensed Wavemaker® | gPIMS® Collector, Licensed Wavemaker®<br>connected via a certified interface |

# GWT Training & Qualifications



## Level 1 Pipe

Suitable for NDT inspectors new to the field of Guided Wave Testing (GWT) (40 hours).

### Course Content:

- Level 1 guided wave theory
- Introduction to Wavemaker® system
- Introduction to WavePro™ Software
- Selection of test parameters
- Basic data interpretation
- Basic reporting

### Requirements:

- Experienced Level 2 UT technician, or
- Degree or HNC in a technical subject



## Level 2 SP

Advanced application specific training course for the inspection of supports and process pipework (40 hours).

### Course Content:

- Advanced equipment configuration
- Advanced data collection
- Advanced calibration
- Inspection of supports
- Inspection of welds & pipe fittings
- Detailed review of Level 1 work

### Requirements:

- Level 1 Pipe qualification
- 6 months of on-site experience



## Level 2 XB

Advanced application specific training course for the inspection of road crossings and buried pipes (40 hours).

### Course Content:

- Advanced data interpretation
- Advanced data collection protocols
- GWT of buried pipes
- GWT of pipes under road crossings
- Pitch & catch configuration
- Combining transducer rings

### Requirements:

- Level 1 Pipe qualification
- 6 months of on-site experience



## Level 2 PM

Advanced application specific training course for the installation of the gPIMS® corrosion monitoring system (32 hours).

**Course Content:**

- Introduction to gPIMS®
- Guided wave monitoring
- Installation of gPIMS®
- Practical session

**Requirements:**

- Level 1 Pipe qualification
- 6 months of on-site experience



## Level 1 QSR

**NEW**

Suitable for Level 2 NDT inspectors new to the field of Guided Wave Testing (GWT) (24 hours).

**Course Content:**

- Guided wave theory
- Introduction to QSR1® scanning system
- Introduction to WaveProQSR™ Software
- Data Collection Procedures
- Basic data analysis
- Basic reporting

**Requirements:**

- Experienced Level 2 UT technician, or
- Degree or HNC in a technical subject



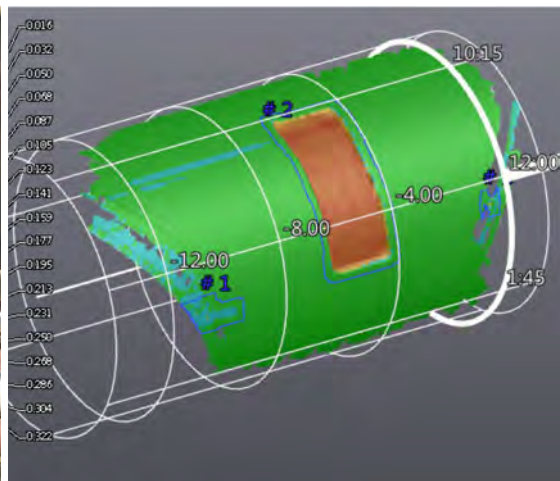
## Appreciation Course

One-day introductory level course which aims to provide an introduction to the guided wave testing (GWT) method and to the screening of pipes using the GUL Wavemaker® system.

**Course Content:**

- Introduction to Guided Ultrasonics Ltd.
- Guided Wave Testing Basics
- Guided Wave Monitoring
- Guided Wave Inspection Savings
- GUL Training and Support
- Guided Wave Testing Case Studies





# Services and Consultancy

## Services

GUL operates an equipment rental business to assist our existing clients in the delivery of top quality inspection services. We provide equipment calibration and maintenance services to ensure that our clients' equipment are always performing optimally. Our customers can count on our dedicated team of technicians to provide prompt and competitive equipment repair services.

## Consultancy

Our clients can benefit from the extensive experience GUL has gathered in the field of guided waves over decades. Inspection procedure development, signal data review and advanced numerical modelling are among the consultancy services which we can provide. Our many high-profile industry research and development projects have enabled us to confidently handle bespoke customer requirements. Our experts are available to provide on and off-site support around the world.

## Cloud-Based Services

Trunk® is GUL's latest hybrid cloud-based platform that seamlessly translate guided wave measurements from your plant assets to your desktop or mobile device. It is a secure, scalable, interconnected ecosystem designed to deliver guided wave inspection data management and interpretation as a service. From sensor to boardroom, Trunk® is the industrial edge-to-cloud platform which provides reliable intelligence even in the most rough and rugged environments.

## At a Glance

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### Services

- Rental
- Repairs
- Calibration
- Maintenance

### Consultancy

- Data review
- Procedure development
- Modelling
- Bespoke developments
- On and off-site support

### Cloud-Based Services

- Edge computing
- Data management
- Data interpretation
- Secure data storage
- Powerful analytics
- Audit & Data review



**GUIDED ULTRASONICS LTD.**

**Global Leader in Guided Wave Technology**

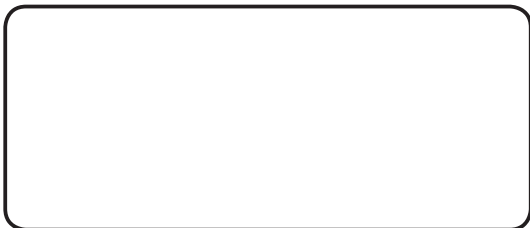
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For more information, please visit us at:

[www.guided-ultrasonics.com](http://www.guided-ultrasonics.com)



Wavemaker House,  
The Ham, Brentford, TW8 8HQ  
United Kingdom

E-mail: [info@guided-ultrasonics.com](mailto:info@guided-ultrasonics.com)  
Training: [training@guided-ultrasonics.com](mailto:training@guided-ultrasonics.com)  
Website: [www.guided-ultrasonics.com](http://www.guided-ultrasonics.com)  
Telephone: +44 845 605 0227