ETHER NDE

ETi-300/350

Advanced Eddy Current Tube Inspection Solutions

- A comprehensive end-to-end tube inspection solution.
- Excellent battery life of up to 15hrs.
- Constant Sample Rate of 16 KHz across all Channels
- High impact resistant aluminium enclosure designed to meet IP66.
- 2-year warranty as standard.
- Optional EThercover 5-year extended warranty.
- ETherMap intuitive user interface for tube inspection data capture.
- TMR Tube Mapping software, map from schematics or photographs.
- TMR Automated Reporting software, easy to use and customizable.
- ETi-350 delivers the ETi-300 and laptop, housed in a site-rugged Peli-Case 1550.

Delivering an end to end solution

Realising that the inspection process is more than just recording data the **ETi-300** was conceived to be part of a software suite to improve on-site work flow and lead to rapid and accurate reporting.
As part of the Tube Inspection suite of solutions we offer:
TMR Mapping which allows tube map templates to be created to enable inspection planning using either photographs, drawings or rapid manual entry.
EThermap is the Data Analysis software for the ETi-300.
TMR Reporting processes the analysed data and turns it into a meaningful and informative report

ETi-300

The **ETi-300** is an advanced eddy current tube testing instrument for inspecting non-ferrous tubing from the inner diameter (ID), developed by EThermap NDE to perform in the most demanding of environments whilst delivering outstanding inspection results and reporting functionality.

Eddy Current testing has long been acknowledged as the fastest, most efficient and effective inspection method to inspect the large quantity of non-ferrous tubes present in a typical heat exchanger.

The **ETi-300** instrument and the suite of analysis and reporting software is ideal for heat exchanger and condenser inspection applications within Power Generation, Transportation, Petrochemical and Oil and Gas industries.

Key Features

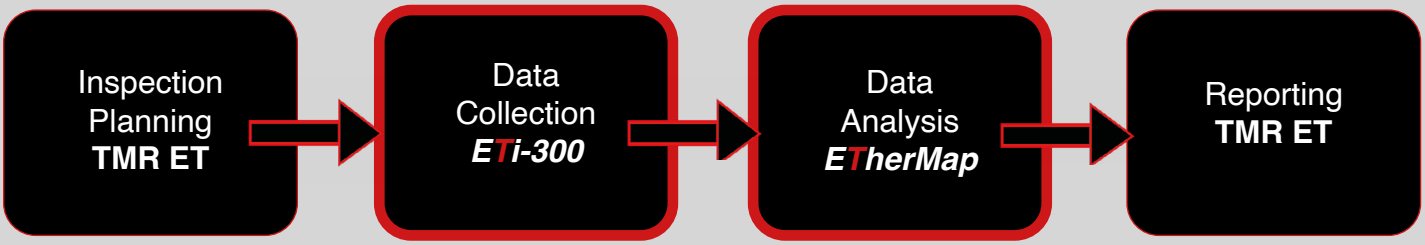
• Outstanding Performance
• The extremely wide test frequency range 10Hz-12.8 MHz giving maximum flexibility in designing a test configuration no matter what the material or wall thickness.
• Our hardware is well known for having the very best signal to noise, widest balance range and low frequency performance all leading to improved defect detection.
• The fully configurable and automatic mixing system ensures that the optimum setup is easy to achieve.
• The constant sample rate of 16,000 samples per second, over all channels, ensures very high maximum probe pull back speed.
• Digital data transfer to the Analysis PC via the full speed USB 2.0 ensures consistent and accurate signal quality.
• The battery system delivers 15 hrs battery life requiring a 2.5 hrs charge to replenish (a short 1hr charge gives 6hrs additional battery life).

Rugged Design

The **ETi-300** has been designed for the typically demanding tube testing environment we know our customers experience.
Starting with the sealed and fanless unit, rated to IP66, which prevents dust and water ingress leading to improved reliability and reduced replacement costs.

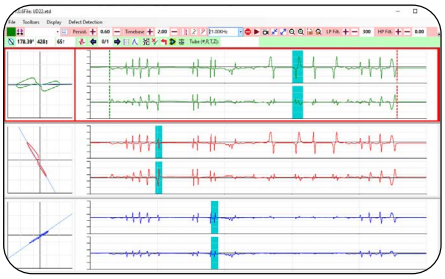
Constructed within a heavy duty cast and extruded aluminium enclosure with silicone elastomer corner protectors that will ensure protection from the knocks and drops associated with the harsh environment that our customers expect the **ETi-300** to perform in.

However the ruggedness does not come at the cost of increased weight (2.8kg/6.2lb) or size (214x90x342mm – 8.5x3.6x13.5ins). The latter is about the size of 2 packs of 500 sheet photocopier paper but half the weight.

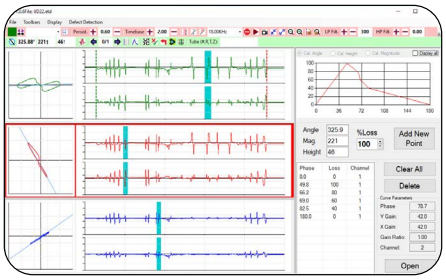


ETherMap

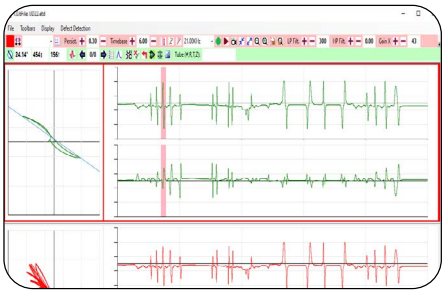
ETherMap is not only the data analysis tool but also the main user interface to the head-less (no screen) instrument. This versatile software developed to be directly connected to our latest instruments where it can control and receive live inspection data in the field, or work with previously recorded data. EtherMap is an intuitive user interface for the ETi 300 operator, capable of processing and analysing data on its own or as an integral part of our end-to-end offering with TMR. When integrated with TMR the user can go all the way from Tube Map design, inspection, analysis to report generation



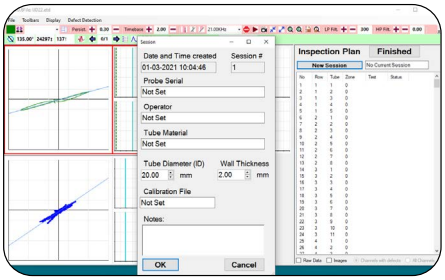
Main Analysis
Tube inspection data is shown on a strip chart with the highlighted areas shown on the Phase Plane area (to the left of the strip chart). Parameters of a LIVE inspection can be changed via the toolbar (Frequency, Gain, Filters, Phase).



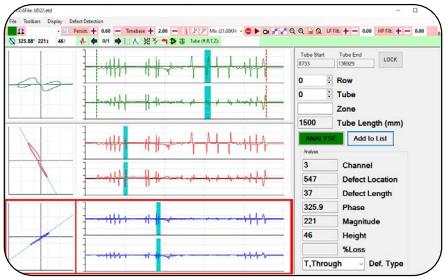
Cal Curves
The Cal Curve window is opened up on the right hand side. It allows the creation of Calibration Curves and then the analysis window will use these to estimate the size and type of a defect. These curves can be created for any of the channels of data and can be based on the parameters of Height and Magnitude as well as the usual Phase.



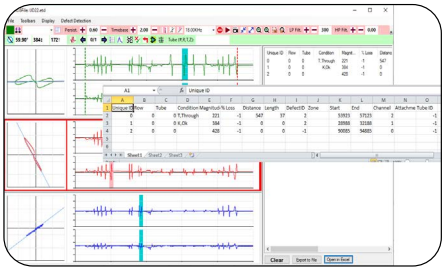
Easy Zoom & Angle Configuration
Shows that windows can be displayed vertically as well as horizontally and that the PhasePlane area can be made larger. A “line of best fit” is automatically added to the PhasePlane from which the Angle, Magnitude and Height are automatically calculated. These numbers are used to either manually or automatically identify defect severities from a Cal Curve.



Sessions & Tube Maps
If using a predefined inspection (from Talcyon TMR software for example), the list of tubes is imported. Also, a Session is then created to contain the inspection parameters.



Tube Analysis
The Tube Analysis window opens up on the right hand side where the details of a defect (highlighted by the turquoise strip on the graph) can be edited and logged.



Export to Excel
If ETherMap is being used without TMR, all defect data can be exported to Excel to then simply be integrated in to a report.

ETi-300 SPECIFICATION		
Operating Modes	Eddy Current Modes	Eddy Current Single Probe Frequency
		Eddy Current Dual Probe Frequency
		Eddy Current 1 Probe up to 4 Channels (e.g. 3 Frequencies Bridge Differential and 1 Frequency Absolute or 2 Frequencies Bridge Differential and 2 Frequencies Absolute).
		Eddy Current 2 Probe up to 2 Channels each (e.g. Dual Probe each with Dual Frequency Bridge Differential).
Probe	Connectors	12-Way LEMO 2B (Absolute, Bridge, Reflection, Rotary)
		12-Way LEMO 2B (Bridge, Reflection)
		BNC - Absolute
		Simultaneous probe operation using x2 LEMO 12 way
	Rotary	600-3000 rpm. EThер Mercury Drive (ADR002), Hocking 33A100, Rohmann MR3, SR1 and SR2 Drive (special adapter needed)
Frequency	Multi-Frequency	10Hz - 12.8MHz (no limit on frequency, all channels)
Gain	Overall	-18 to + 104dB, 0.1, 1 and 6dB steps
	Input	0dB or 12dB
	Drive	0dB, 6dB and 10dB (0dB reference 1mW into 50 ohm).
	Max X/Y Ratio	+/-100.0 dB
Phase	Range	0.0-359.9°, 0.1° steps
Filters	Sample Rate	Constant 16kHz overall over 4 times X/Y pairs
	High Pass	DC to 2kHz or Low Pass Filter, which ever is lower in 1Hz steps. Plus variable adaptive balance drift compensation 0.01 - 0.5 Hz (6 steps).
	Low Pass	1Hz to 4kHz or a quarter of the lowest test frequency, which ever is lower in 1 Hz steps.
Balance Load	Manual	14 internal balance loads; 2.2μH, 6.0μH, 7.0μH, 8.2μH, 12μH, 15μH, 18μH, 22μH, 30μH, 47μH, 82μH, 330μH, 820μH and 3,300μH
	Automatic	Optimised balance load selection.
Mix Channel	Frequency	Full frequency range available on all channels
	Number of Mixers	8 maximum user definable configuration.
	operations	Automatic or Manual
	Mix Gain	X/Y -18 to +18dB
	Mix Phase	0.0-359.9°, 0.1° steps
Connectivity	USB	Full speed USB 2.0 12.5 MB/s
	I/O	8 way LEMO 4 configurable TTL Level with 5v eg encoder input
Power	External	100-240 v 50-60Hz 30 Watts
	Battery	Internal 7.2V nominal @ 3100mAh = 22.32 watt.hr
	Running Time	Up to 15 hours with a 2MHz Pencil Probe 30%, up to 8 hours with a Rotary Drive 50% duty cycle.
	Charging Time	2.5 hrs. charge time, Simultaneous charge and operation
	Power On Self-test	The systems performs a self-test on start up.
Physical	Weight Including Internal Battery	2.8kg (6.17lbs)
	Size (w x h x d)	214 x 90 x 342 mm (8.5 x 3.6 x 13.5 inches)
	Material	High impact-resistant Aluminium enclosure with tough silicon elastomer edge protection.
	Operating Temperature	-20 to +60 °C (-5 to 140°F)
	Storage Temperature	Storage for up to 12 months -20 to +35 °C (-5 to 95°F). Nominal +20°C (68°F)
	IP Rating	IP66
Verification Level		The system includes on delviery a 2 year validity Verification Level 2, detailed function check and calibration as per ISO 15548-1:2013

Internal Diameter Probes, Connectors, Adapters,

ID Bobbin Probes:

Ether NDE design and manufacture a wide range of ID (Internal Diameter) Differential Bobbin probes:

- Probe diameters from 7.5 to 150mm, available in 0.1mm steps
- Dis-connectable and integral probe cables
- Cable lengths from 3 to 30 metres
- Frequency range from 2.7 kHz to 1MHz, centre frequencies 2.7, 10, 24, 76, 190, 400kHz.

When ordering ID probes, allow 0.8 to 1.5mm less than the tube diameter, this should be good for typical tube condition and manufacturing tolerances. Where tolerances are poor allow for greater clearance, tape can be used were necessary to reduce probe 'wobble'.

ASME Calibration Tubes
(covering most chillers and heat exchangers)

ASME Calibration Standards provide an effective means to ensure your probes and equipment are functioning properly, please go to www.asme.org to learn more.

- Available from 9.525mm (0.375") to 76.2mm (3.0")
- Available in a large assortment of alloys
- NIST Certified
- Supply the material and we can get them machined for you
- Plate simulators also available

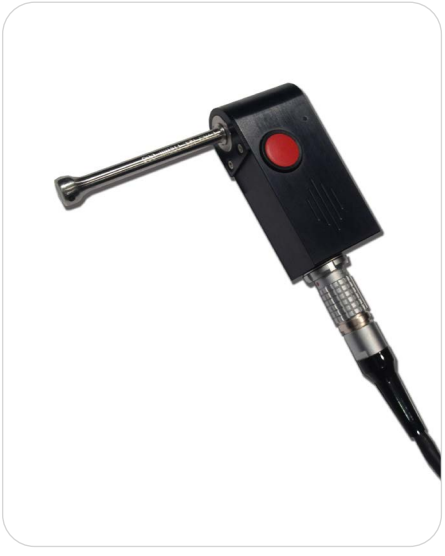
Encircling Coils

A large array of Absolute, Bridge and Reflection encircling probes are available for the inspection of tubes from the OD (Outside Diameter) .

Mercury Mini Rotating Drive

Rotary inspection is also being used increasingly in the power generation industry for the inspection of bolt-holes countersinks and high-speed surface inspection.

Perfect for tight spaces, the Mercury Rotary Drive is designed and manufactured in-house. Featuring a clearly visible alarm LED and a camera thread mounting to facilitate easy attachment to an inspection fixture.

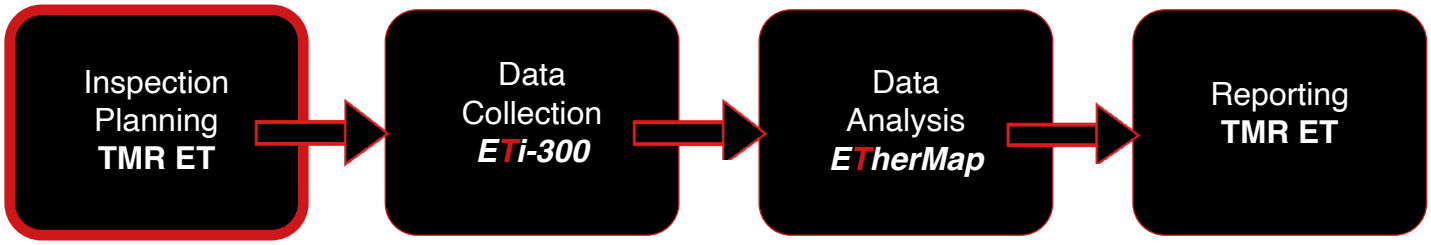


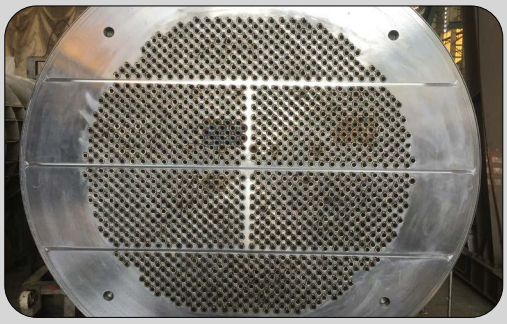
Please go to www.ethernde.com/probes to see our full range of eddy current probes and accessories.

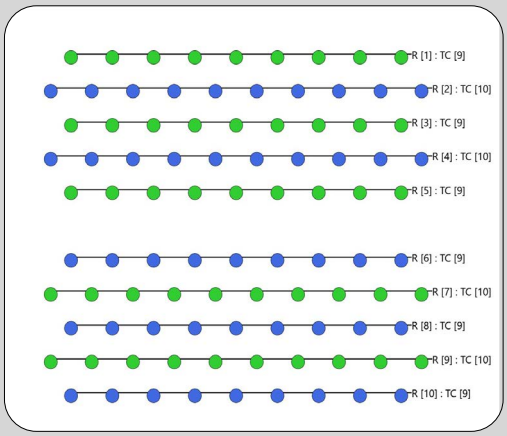
Adapters

To use older or third party probes to connect to the ETi-300, EThер NDE offer:

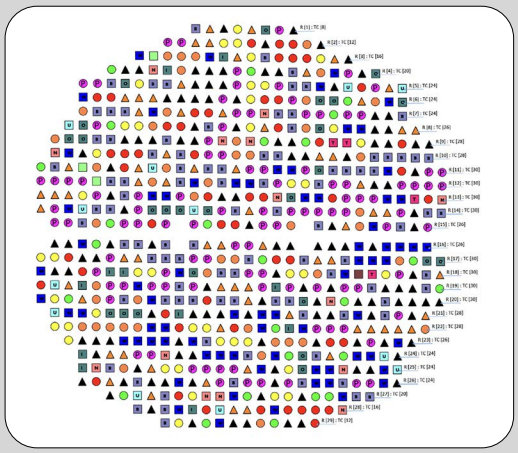
- ALL12-Z04SB – Accessory, Adapter, 12-Way Lemo to 4-Way Amphenol (ZETEC Bridge Probes)
- ALL12-J06P – Accessory, Adapter, 12-Way Lemo to 6-Way Jaeger (HOCKING Bridge/Reflection Probes)







Pre-Inspection Craft Mode



TMR Final Tube Inspection Report

Key Features

- Intuitive interface - start mapping with ease with multiple methods of inputs.
- Map using a photograph or technical drawing.
- Manual mapping using rows and columns
- Automated mapping. Manual editing is available to fine tune output.
- Custom map building using Grid (angle, row & column). 30°/45°/60°/90°
- Line select rows of mapped tubes.
- Mirroring technique.
- Mini map.

TMR ET*
ADVANCED TUBE MAPPING SOFTWARE

In order to offer the best user experience when it comes to tube map design and report generation Ether NDE have teamed up with Talcyon Pte Ltd, to deliver advanced Tube Mapping Software (TMR) which is second to none in its features and ease-of-use.

Tube Mapping Software (TMR) is a solution designed specifically to produce an accurate layout and labelling of tubes on a tube sheet. Collectively needed for tube inspection and maintenance reporting, TMR offers user-friendly features that allow companies to carry out their reporting faster and more efficiently.

The user-friendly advanced software has been intuitively designed with the operator and tube inspection task in mind; to re-inforce this a quick tutorial is also available.

How it works?

Map Tube Sheet

Upload a photograph or schematic diagram of the tube sheet into the software. Create a map of the tube sheet. Automatically assign a number to each of the tube openings. A tube sheet gives the software a graphic representation. As such, it will help you track which tubes have already been measured – empowering you to work efficiently.

Set-up Inspection Parameters

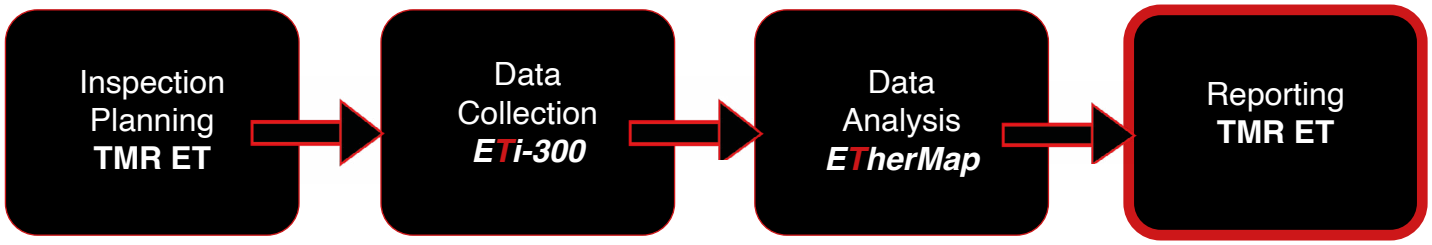
Set the inspection parameters based on the physical attributes of the tubes. This includes the tube length, diameter, and wall thickness.

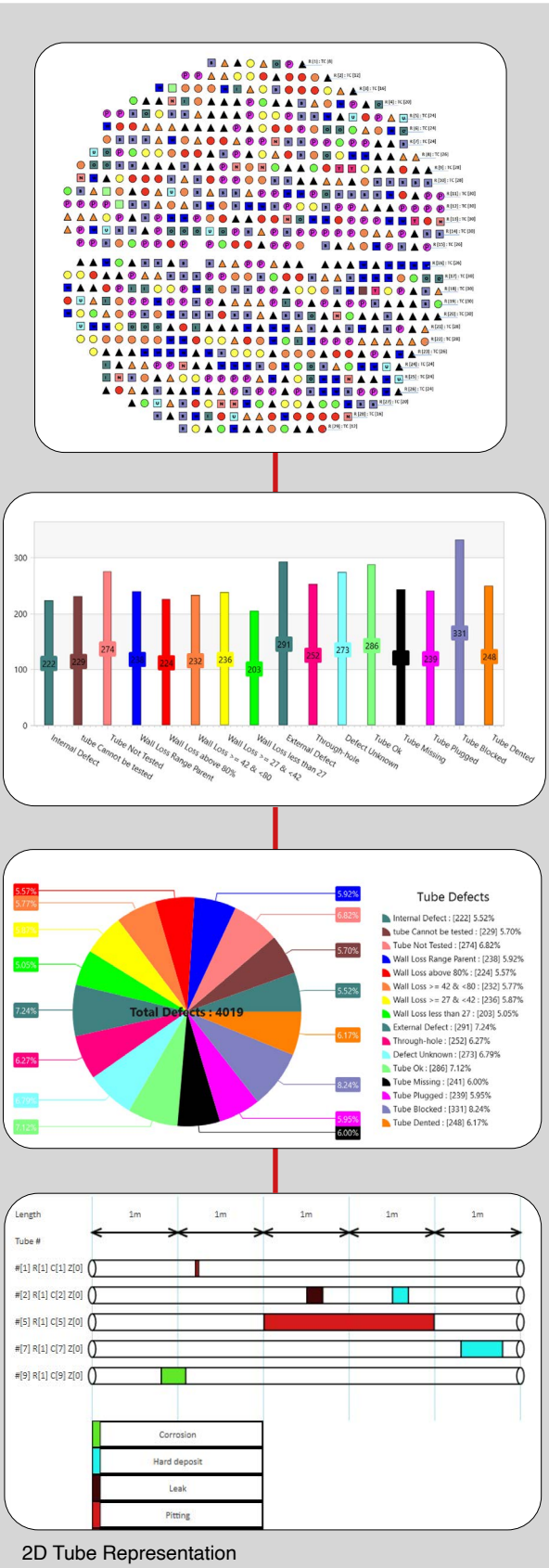
Edit Graphical Representation

Make sure all tubes are detected and correctly mapped. Manual editing can be carried out in this step to increase accuracy. If some tubes are left undetected, you may select ‘Add tubes’ to add the tubes that are not detected by the software. Similarly, you shall select the ‘Delete Tube’ option to delete tubes that were falsely detected by the software.

Tube ordering

- Order the tubes by row-column attributes.
- Define the direction of ordering by simply selecting two adjacent tubes.
- Once done, click Order Tubes and each tube will be ordered by Row (R), Column (C), Zone (Z) and respective Tube Number (N).





2D Tube Representation

**TMR ET Software under Licence from Talcyon Pte*

TMR ET*
Automated Report Creation

A fast reporting software designed to manage data gathered from inspections, with the capability to present inspection data in easy-to-read formats. Reports are generated by using simple user interface, whilst fully-customisable reporting and output is easily configurable by the operator.

Save Time using Report Templates
Users can drag & drop the required data building blocks from the right panel directly onto the report template on the left panel of the software.

Create bespoke and unique reports
Fully customise report templates with ease using intuitive and user-friendly features, to suit your needs and task.

Easy Integration
Compatible with various database formats inspectors are able to organise data and create reports immediately.

Key Features
Dashboard - No coding required
Build your own dashboard with graphical representation of data using graphs and charts and create a general conclusion that summarises all the information.

Create routine or ad-hoc reports
The reporting software allows users to display information precisely as they would they want it to look. Report data is easily modified without having to start from scratch if deliverables need to change.

Data Visualisation
Visual data delivery can be emphasised using graphs and charts available within the TMR software.

2D Tube Representation
TMR has the functionality to display a 2-Dimensional view of various tubes and the defects within them. This allows any common areas of concern to be seen easily.

Interactive Reporting
Smart filters and simple user experience with the drag-and-drop features allows users to only show the most important data in the report.

ETi-350

The ETi-350 now delivers to the operator all the functionality of the ETi-300, with an on-board laptop, housed within a rugged Peli-Case offering total protection, delivering the complete inspection package ready for on-site use.

Peli 1550 Case Specification:
External Dimensions
Length: 525 mm
Width: 435 mm
Depth: 216 mm

2 year warranty.

STEELCHECK

- Dedicated one method tube inspection unit.
- 3 Channel Flux Leakage Tube Testing System for discrimination of OD, ID Defects and Wall Thinning.
- Ideal for Ferrous Tubing Especially Fin Fan Tubes.
- Internal Data Logging System with PC Application for Desktop Reporting.
- Compact rugged site proven enclosure.
- Daylight readable display.
- 8 hours battery life on one charge.
- 2 year warranty.

ETHERCOVER

EXTENDED WARRANTY & SUPPORT

What does it include?

- **In addition to the standard 2 years warranty, a further 3 years warranty (5 years in total).**
- **Free of charge Annual re-calibration and "Health Check" for four years commencing at the end of Year 1.**
- **Two free of charge battery swaps within the 5 year period.**
- **Guaranteed fast repair.**
- **Free of charge software upgrades within the 5 year period.**

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