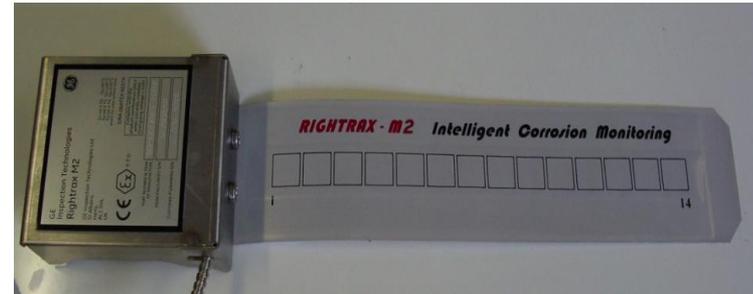


Product overview

The RIGHTRAX System



RIGHTRAX Wall thickness monitoring system components - An introduction



GE imagination at work



1998 Awards for
Technical Achievement



Rightrax Intelligent Monitoring

M2 Flexible Ultrasonic Sensor



Certified to ATEX 06ATEX4037X

Fit and Forget (Maintenance free)

The M2 Sensor has the following key features

Non Intrusive can be installed on live plant

Self adhesive for simple installation
Providing a high temperature permanent Ultrasonic coupling (-25 Deg C to + 120 Deg C)

Built in calibration sensor

Built in identification chip

Built in Temperature sensor

14 sensors in one flexible strip

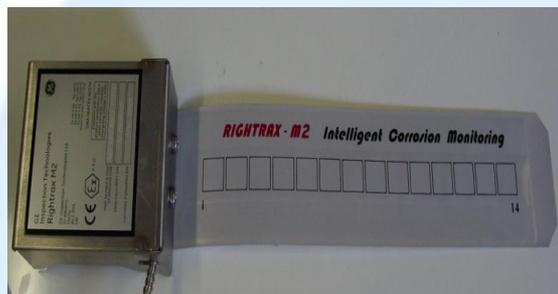
Operation via a single high temperature coaxial armoured cable

Will support extension cables up to 70 mtrs long

Once installed can be coated in any material normally used by the user to protect the Pipe or Vessel IE: Insulating materials, Fire proofing Materials and Pipeline coatings

RIGHTRAX System components

The M2 Sensor



Certified to:- ATEX

SIRA Cert no:- 06ATEX4037X

EMC Certified

BY: 3 C TEST Ltd

M2 Sensor shown bonded to a 6" Pipe

The RIGHTRAX M2 sensor is designed to monitor the plant wall thickness at its installed location using fourteen discrete embedded sensors located uniformly along the flexible strip. It features a built in temperature sensor, user memory area and an internal calibration reference. It utilizes standard ultrasonic pulse echo techniques that are applied in a novel way.

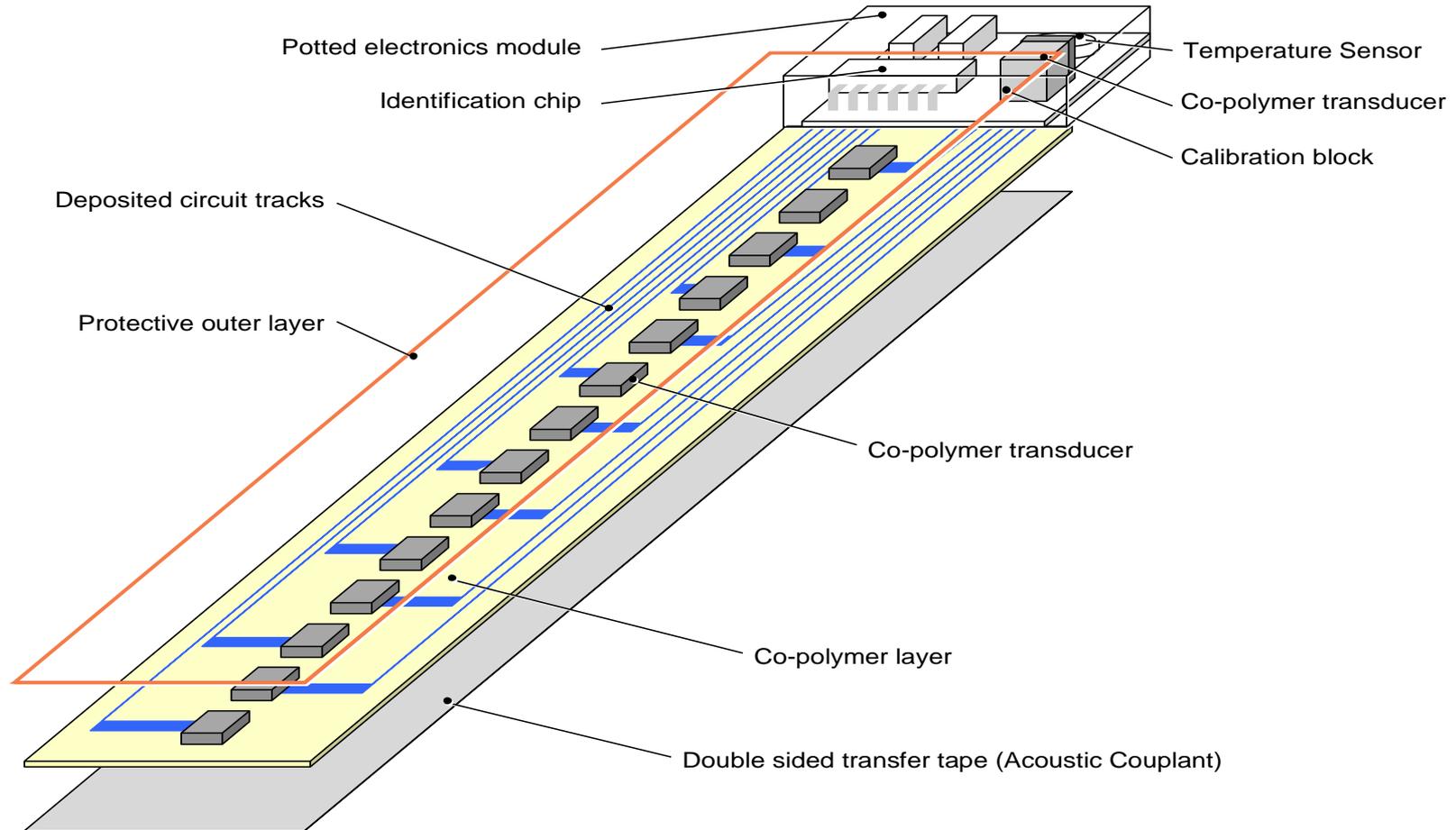
Fit and forget!



GE imagination at work

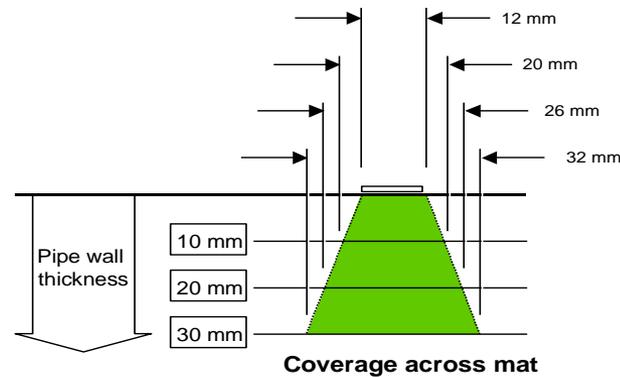
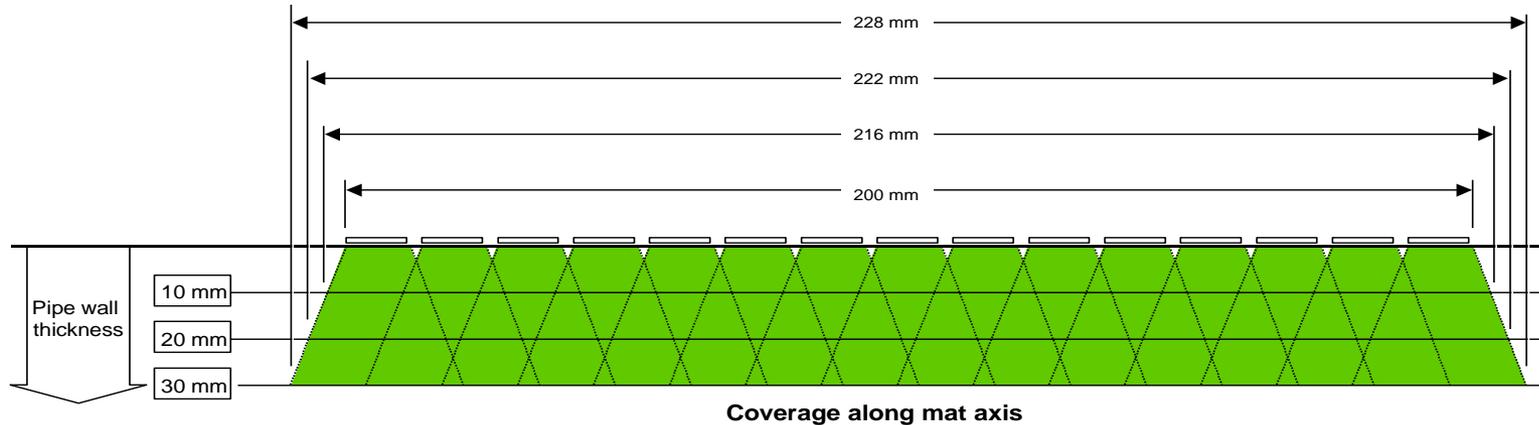
Rightrax Intelligent Monitoring M2 SENSOR

M2 Sensor make up



Rightrax Intelligent Monitoring SENSOR COVERAGE

M2 Coverage (Beam Spread)



Rightrax Intelligent Monitoring

DL1 Data Logger (portable)



DL1 Data Logger has the following key features

The Data Logger enables the user to take direct wall thickness readings displayed in mm from the M2 Sensor

The DL1 is able to access multiple M2,s on the same cable (multiplexed) currently up to 10 sensors

The DL1 has the features of an Ultrasonic Flaw detector but can be operated by unskilled personnel

It can store data records from up to 100 sensors before uploading is required

The DL1 can display the rectified and unrectified A-Scans for scrutiny

RS232 interface for connection to a PC for download and control

The DL1 is currently available in two options for both Manual data collection (as above) and for fixed installations (Automated remote sites) utilizing Ethernet or Radio modems for Data transmission

Data can be uploaded to CMDA (Corrosion Monitoring Data Analyser)

RIGHTRAX System components

The DL1 Datalogger



Available as a portable unit
(used under a permit system)



Or inside a cast iron flameproof enclosure (
hazardous area use)

Certified to:-

ATMS System is ATEX certified,

**ATMS System EMC Certified
BY 3 C TEST Ltd**

The DL1 datalogger performs ultrasonic measurement analysis on connected M2 sensors. Unlike conventional methods the measurement process is fully automatic and requires no special skills in its use. The DL1 data logger is available in two versions, a portable hand carry unit and a fixed installation option for continuous on line monitoring in remote and hazardous locations. The data logger is supported by several desktop applications for further download and data analysis if required. In addition an OPC server is now available



GE imagination at work

RIGHTRAX System components

The DL1 Line driver



Available mounted within a 19" rack mount enclosure

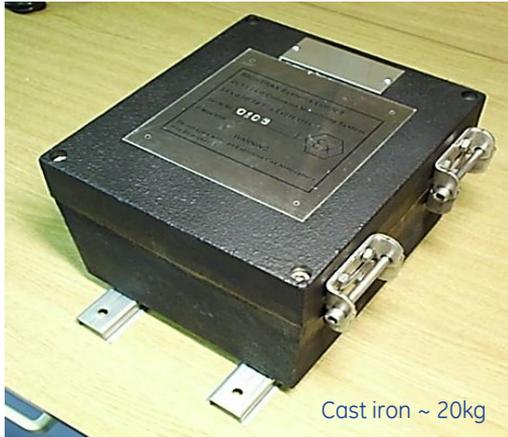


Or a 316 Stainless steel wall mounted enclosure

The Line driver powers and communicates with the DL1 datalogger and M2 Multiplexer pre-installed inside the large DL1 enclosure located within the hazardous area of the plant. The line driver is placed within the control room or other nominated safe area. In most cases the Line driver is fitted with a Single Board Computer (SBC) which is used to manage the operation of the system using proprietary software pre installed. It is normally supplied in a 19" rack mount enclosure or an optional wall mounted cabinet can be supplied on request



RIGHTRAX System components



The M2 jointing enclosure

The purpose of this enclosure is to enable an M2 sensor standard coaxial cable to be extended by up to 70 Meters when used with approved armoured coaxial extension cables. This provides a very flexible installation solution on site.

(this is a component approved enclosure for hazardous Area use)



The large DL1 enclosure

Its purpose is to contain the DL1 data logger and the M2 10 way multiplexer within a hazardous environment providing a continuous measurement capability while avoiding the need for a permit system to be in operation.

(this is a component approved enclosure for hazardous Area use)



RIGHTRAX System components



The M2 Multiplexer

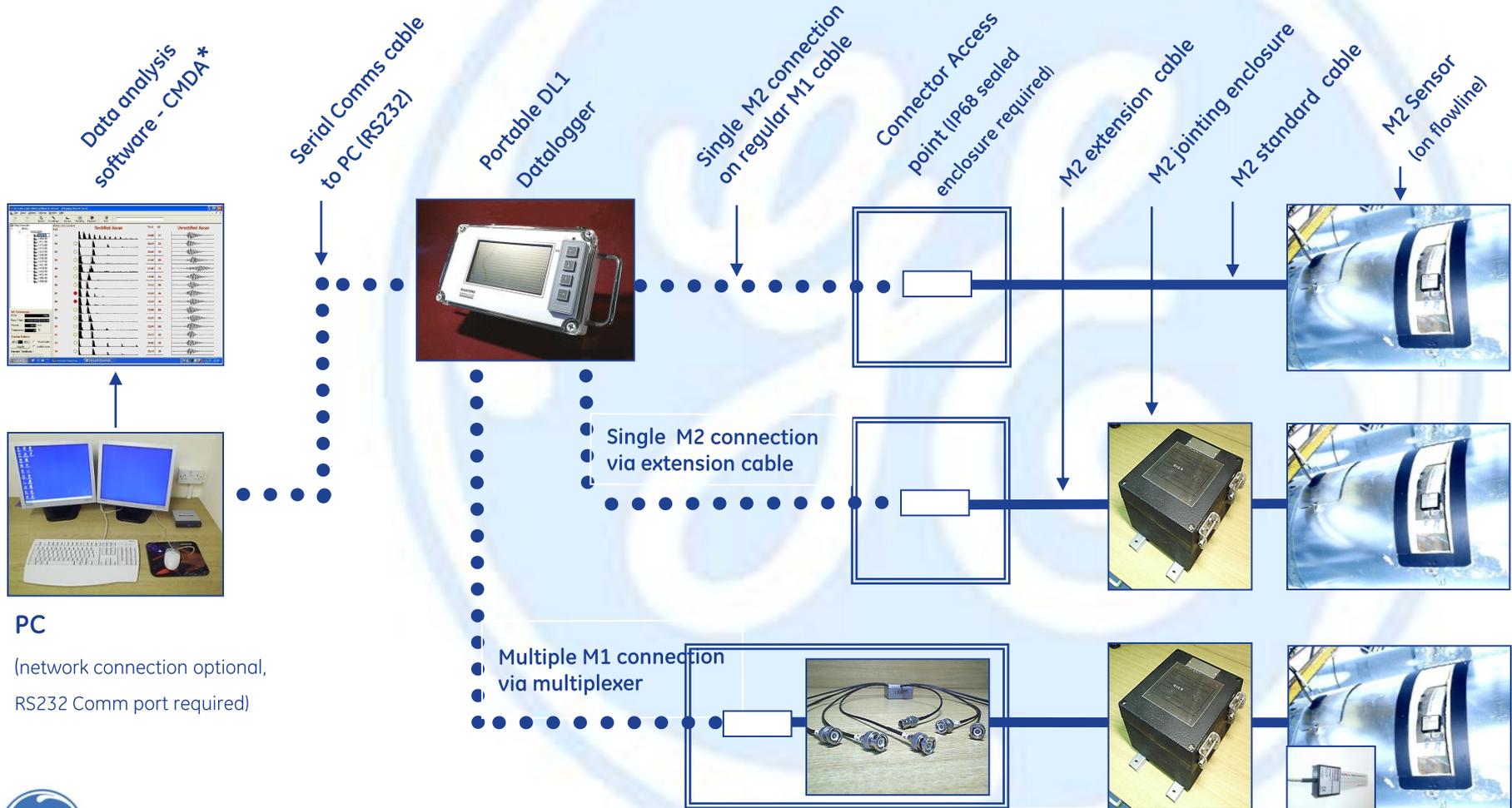
The M2 multiplexer is designed to enable multiple M2 sensors to be connected to a single DL1 Datalogger. Up to 10 M2 sensors can be interrogated using this add on module. (Inset shows the large enclosure that houses the multiplexer)



System connection options

Optional
Required ———

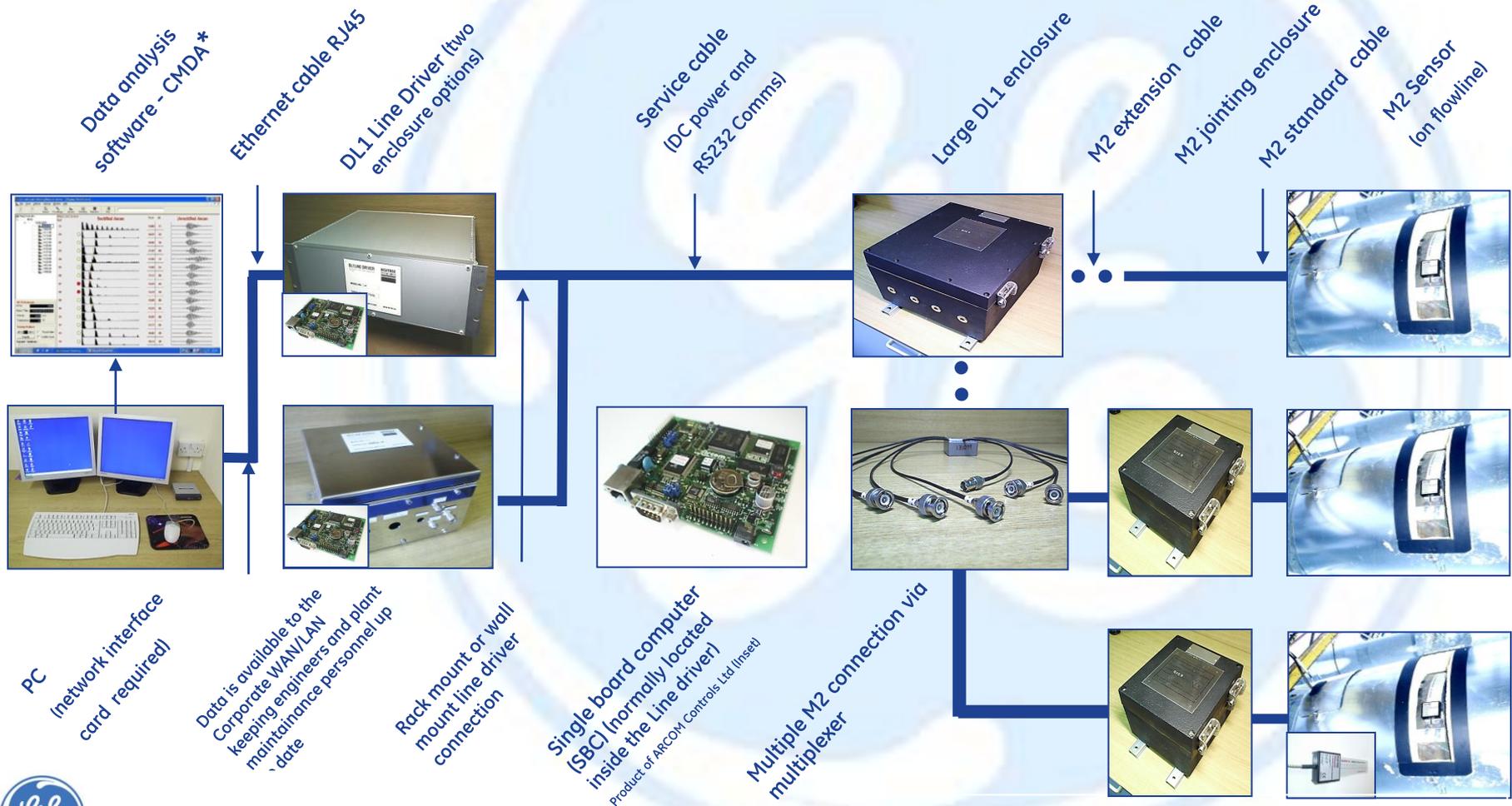
Manual Data collection using a portable DL1 Datalogger



System connection options

Optional
Required _____

Hazardous Area fully automated arrangement (typical)



* CMDA is a Product of INFOPOLE Software design & consultancy BV

Key Applications (source BP)

- Seawater injection
- Flow lines (oil, water, gas)
- Aquifer Water
- Unstabilised Crude Oil
- Hydrocarbon Gas
- Effluent Water
- Storage vessels with separated water bottom

Rightrax Intelligent Monitoring

Presentation showing Actual projects
for



Rightrax Intelligent Monitoring

Typical Installations



M2 sensors Fitted on Pipelines prior to insulation being reinstated



Multiple M2 Sensors fitted to subterranean Pipeline Prior to coating reinstatement and back filling



Hot Installation continuous @ 120 to 130 deg C prior to heat shield replacement

Actual project example

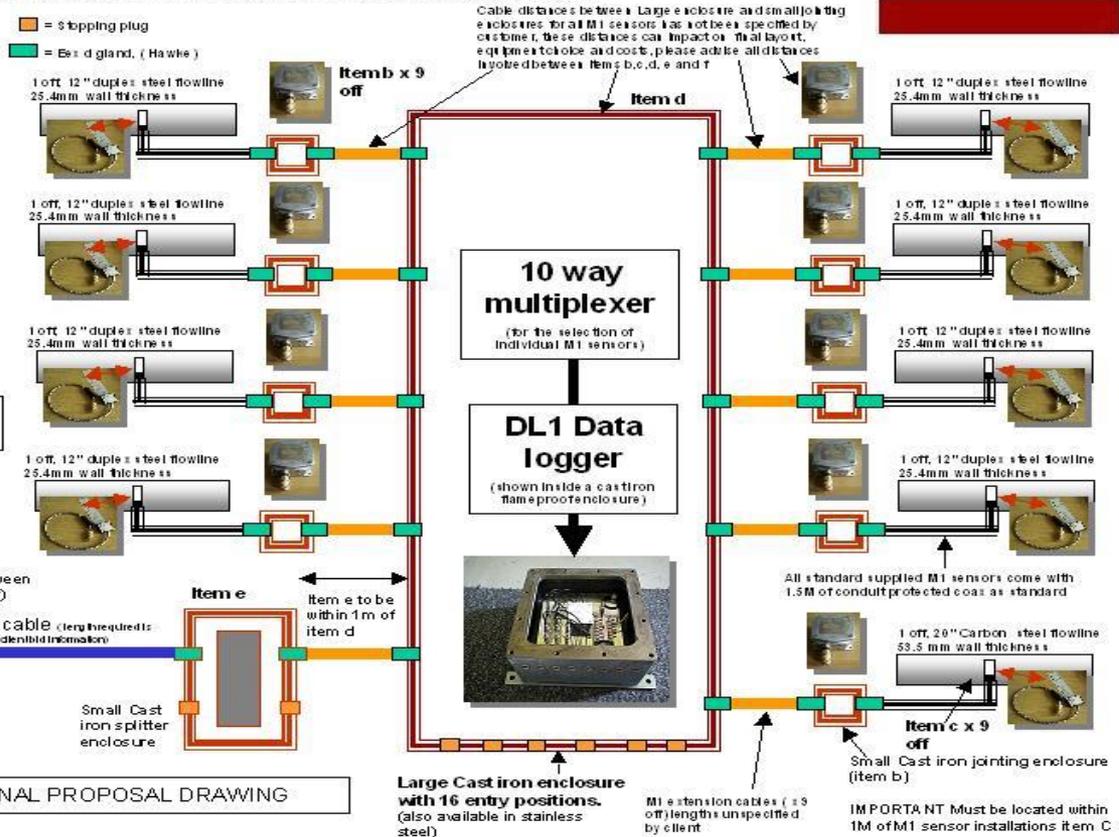
Utilising additional system alarms



Arrangement to instrument the Total-Fina-Elf Dalla FPSO Topside with a permanently installed ultrasonic wall thickness monitoring system that utilises 9 off M1 sensors connected to a combined multiplexer / fixed DL1 datalogger. The data logger is operated using a line driver located inside a 19" rack further controlled using an industrial PC running Rightrax control software located on the industrial PC. The collected data can be archived to the industrial PC for local analysis display and printing. PLEASE NOTE: ICS S is not supported in this concept drawing, all unknown information identified in this drawing and support documents is required to finalise the quotation.

RIGHTRAX
SYSTEMS LIMITED

drwg ref:- Dalla FPSO Topside RTX Schematic, Compilation:- RIGHTRAX SYSTEMS LTD SEP 2003



TO Total-Fina-Elf infrastructure

No interface currently available to clients ICS S system, specification other than "serial type" has not been defined to Rightrax pre tender, will involve additional costs subject to ICS S system specification being made available)

IMPORTANT
Our limit of supply, system self contained and demonstrated to work at this point, independently of the ICS S



19" free standing rack complete with lockable glass fronted door dimensions 800w x 800d x 2000 mm ht + 100mm ht plyth (not shown)



19" Rack mounted Industrial PC (located in A)

Local USB connected color printer

RS232 Commport (used by Rightrax for communication between Industrial PC and the Line driver)



19" Rack mounted line driver (located in A)



Service cable (10m required) unspecified in identifiable information

Small Cast iron splitter enclosure



GE imagination at work

Rightrax Intelligent Monitoring

A RIGHTRAX Automated offshore system (Picture Courtesy of SHELL Brunei) with data retrieval onshore via Ethernet directly to the Corrosion engineers

Showing installed M2 sensors

Rightrax Splitter Box

Rightrax Junction Box Housing

D11 Datalogger And 10 Way Multiplexer

Rightrax service cable to LCR



M2 Sensors

A RIGHTRAX Installation site showing Installed Sensors Prior to The Customers Paint and Insulation being applied to the piping system



Automated offshore



Rightrax Intelligent Monitoring HOTON

A selection of pictures from the BP HOTON Project



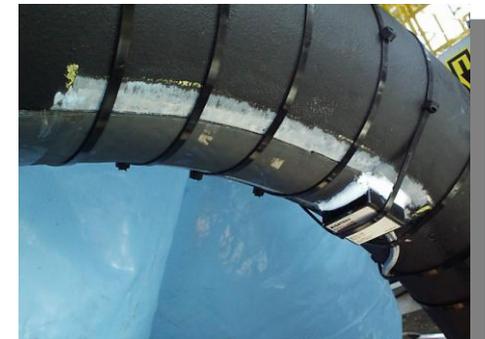
An M2 sensor fitted with armouring to the cable and a hazardous area gland



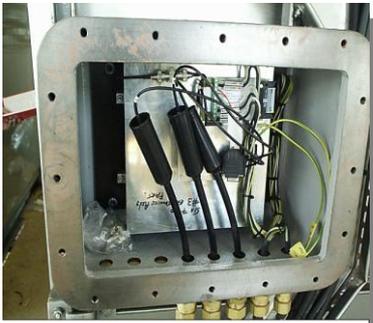
A small hazardous area enclosure for connecting the M2 to extension cables



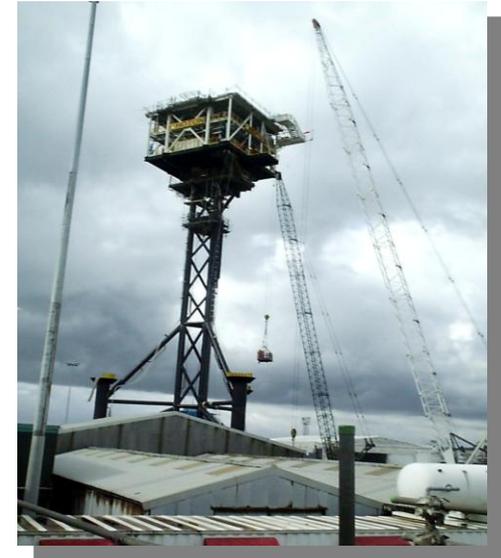
A flowline showing an M2 fitted to the inner bend radius



The M2 in clearer view



The large hazardous area enclosure containing a fixed DL1, multiplexer and a single board computer that provides data collection, control and data transfer via the BP Ethernet Network on the unmanned HOTON platform in the Southern North Sea



The HOTON platform at SLP Engineering in Lowestoft

Rightrax Intelligent Monitoring ELF



Petroleum (Brunei)
Unmanned Platform

**M2 and Multiplexer Installation
On a Platform Riser**

**DL1 Datalogger Interrogates all the sensors
via the Multiplexer**

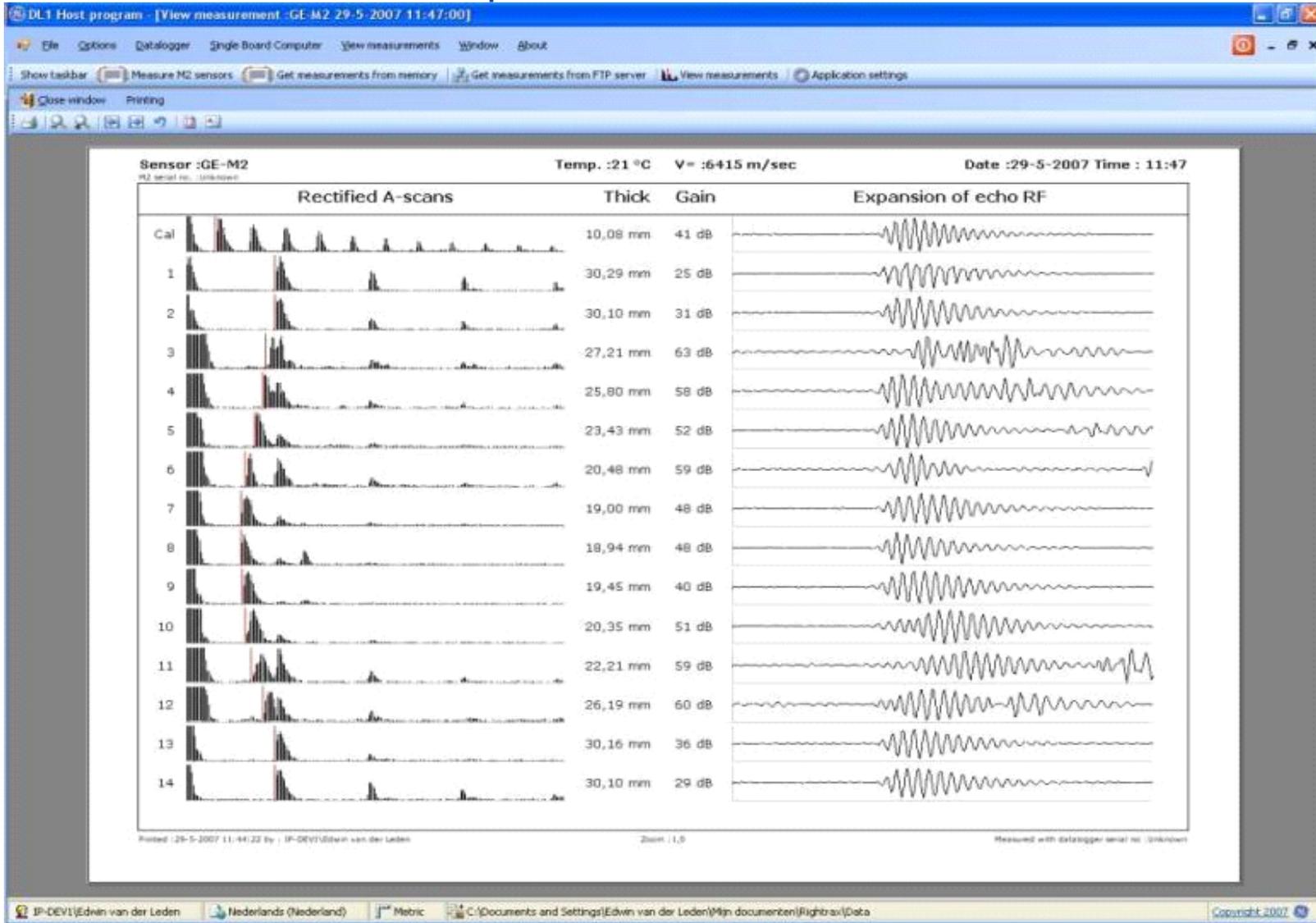


**DL1 Monitors a single M2 Sensor as
The flowline comes ashore.**



Rightrax Intelligent Monitoring Data Display

Example of Data collected from The DL1



Data Display Continued

The Data once uploaded to a PC is automatically stored in an Excel Database as Displayed below

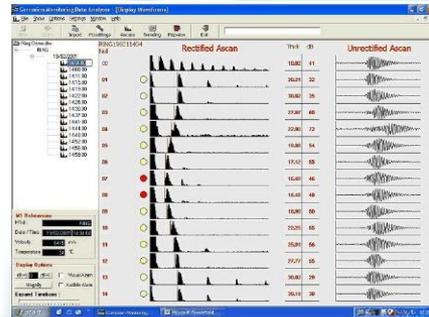
It displays the M2 ID , Date of Measurement, Time of Measurement, the Thickness in mm

XT-641	5940																
Date	Interval(m)	Thick(mm)															
		EI(01)	EI(02)	EI(03)	EI(04)	EI(05)	EI(06)	EI(07)	EI(08)	EI(09)	EI(10)	EI(11)	EI(12)	EI(13)	EI(14)	Cal	
18/05/2004 08:49	0	21.56	21.67	21.62	21.56	21.44	21.5	21.67	21.79	21.79	21.79	21.38	21.32	21.38	21.5	9.96	
18/05/2004 08:49	0	21.56	21.67	21.62	21.56	21.44	21.5	21.67	21.79	21.79	21.79	21.38	21.32	21.38	21.5	9.96	
07/12/2004 11:28	292479	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.67	21.44	21.32	21.38	21.56	10.02	
07/12/2004 11:31	292482	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.67	21.44	21.32	21.38	21.38	10.02	
07/12/2004 11:41	292492	21.62	21.67	21.67	21.62	21.5	21.38	21.73	21.85	21.79	21.85	21.44	21.32	21.38	21.56	10.02	
07/12/2004 11:51	292502	21.67	21.73	21.73	21.67	21.56	21.62	21.79	21.91	21.85	21.73	21.5	21.38	21.44	21.44	10.02	
07/12/2004 12:01	292512	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.67	21.44	21.32	21.38	21.56	10.02	
07/12/2004 12:11	292522	21.62	21.67	21.5	21.62	21.5	21.56	21.73	21.85	21.79	21.67	21.44	21.32	21.38	21.56	10.02	
07/12/2004 12:21	292532	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.67	21.44	21.32	21.38	21.56	10.02	
07/12/2004 12:31	292542	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.79	21.44	21.32	21.38	21.56	10.02	
07/12/2004 12:41	292552	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.67	21.44	21.32	21.38	21.56	10.02	
07/12/2004 12:51	292562	21.67	21.73	21.73	21.67	21.56	21.62	21.79	21.91	21.85	21.73	21.5	21.38	21.44	21.5	10.02	
07/12/2004 13:01	292572	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.85	21.44	21.32	21.38	21.56	10.02	
07/12/2004 13:06	292577	21.62	21.67	21.67	21.62	21.5	21.56	21.73	21.85	21.79	21.67	21.44	21.32	21.38	21.56	10.02	
01/08/2005 14:27	633938	21.62	21.67	21.67	21.62	21.5	21.56	21.85	21.85	21.79	21.67	21.44	21.32	21.38	21.56	10.02	
10/11/2005 09:42	779093	21.56	21.62	21.62	21.56	21.44	21.5	21.67	21.79	21.73	21.62	21.38	21.26	21.32	21.5	9.96	
10/11/2005 09:52	779103	21.5	21.56	21.56	21.5	21.38	21.44	21.62	21.73	21.67	21.56	21.32	21.2	21.26	21.32	10.02	
10/11/2005 10:02	779113	21.56	21.62	21.62	21.56	21.44	21.5	21.67	21.79	21.73	21.62	21.38	21.26	21.32	21.5	9.96	

System data display and analysis tools

Using MS Windows® compatible software CMDA®

Specially designed to work with the Rightrax System

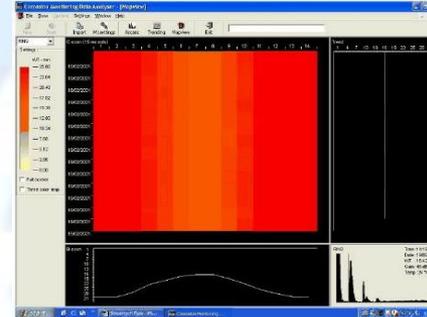


The A scan display

The screen shot shows the ultrasonic A scan traces collected from an eroded pipe sample.

The software can provide detailed data for analysis by the plant operator if required.

Data analysis software - CMDA*

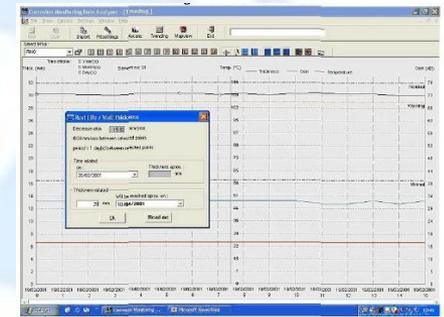


The Mapview display

The screen shot shows a "contour map" of the inspected surface across the complete mat for the total time span of the installed sensor.

Colour represents thickness, it is therefore easy for the operator to discriminate any anomalies or trends emerging in the detected thickness data

Data analysis software - CMDA*



The Trending display

The screen shot shows an analysis tool used as an aid to predicting the remaining wall thickness as a function of time, it is based upon the trends in the data collected since the installation of the sensors.

NOTE

It is an aid only since other factors beyond the control of the system can influence plant life expectancy and its results should be considered as an approximate guide only

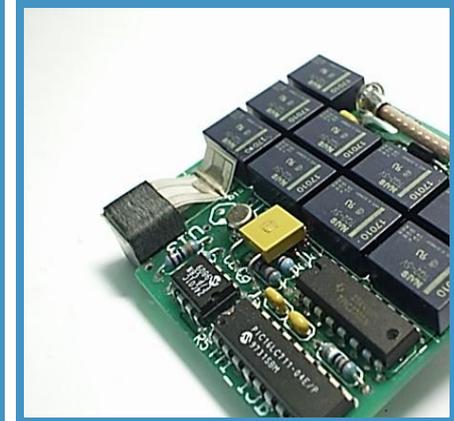
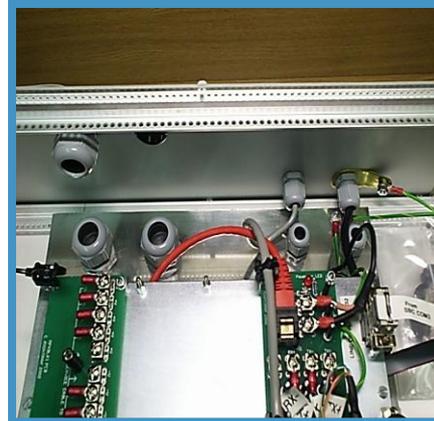
Data analysis software - CMDA*



GE imagination at work

* CMDA is a Product of INFOPOLE Software design & consultancy BV

GE Permanently Installed sensor solutions - Wall thickness monitoring the smart way!



GE Permanently Installed sensor solutions - Wall thickness monitoring the smart way!



GE imagination at work



GE imagination at work