SEPS

SPECIAL SERVICES FOR PIPELINES

... when the quality matters!

INSPECTION, SCANNING AND MAPPING OF CORROSION OF PIPES, PRESSURE VESSELS, TANKS AND STEEL STRUCTURES

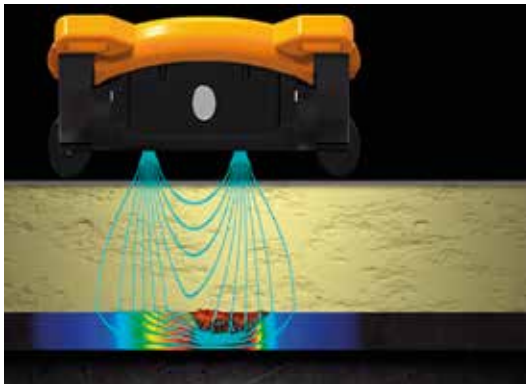
INSPECTION, SCANNING AND MAPPING OF CORROSION
OF PIPES, PRESSURE VESSELS, TANKS AND STEEL STRUCTURES USING THE PULSED EDDY CURRENT

To inspect the corrosion or material loss especially under insulation without a need of its removal we use a technology based on measuring of **Pulsed Eddy Current Array - PECA™** or **Pulsed Eddy Current - PEC.**

They are fast NDT screening methods that we use for **quick inspection (scanning and mapping) of residual wall thickness of a pipelines, pressure vessels, tanks or other steel structures.**

The method of Pulsed Eddy Current Array measuring (PECA™ or PEC), is an advanced electromagnetic NDT technology ideal for quick detection of material losses (corrosion) especially under insulation (coating) or fireproofing.

The probe sends magnetic pulses to the scanned material creating a secondary magnetic field in the material and then measures its decay time.



The measured change of the magnetic field decay time indicates a change of the measured volume of the material that means a change in thickness.

Advantages of use:

- **High inspection speed** with real-time readings, thickness measurement and reporting capabilities
- **Scanning area with 457mm working width** of six-channel array probe **in single-pass shortens the inspection time**
- Detect **internal and external corrosion** or defects
- **Inspection without shutdown**
- No need for direct contact with the surface of the inspected material
- **No surface preparation** needed
- **Measuring through thermal insulation,** fireproofing, coating, concrete, etc
- **Corrosion process monitoring** under composite wrap repair etc.

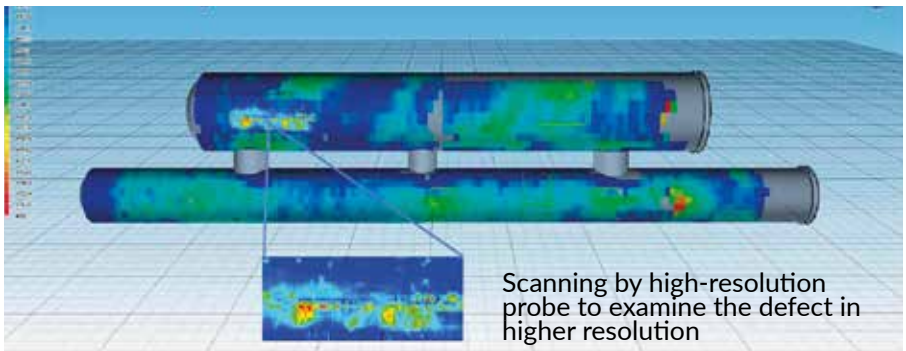
The inspection (scanning) is **performed on the in-service assets,** with no need for shutdown.

The vibrations limit the use. The examined object must not vibrate during the measuring process.

It is not necessary to remove or adapt the insulation or coating for the inspection.

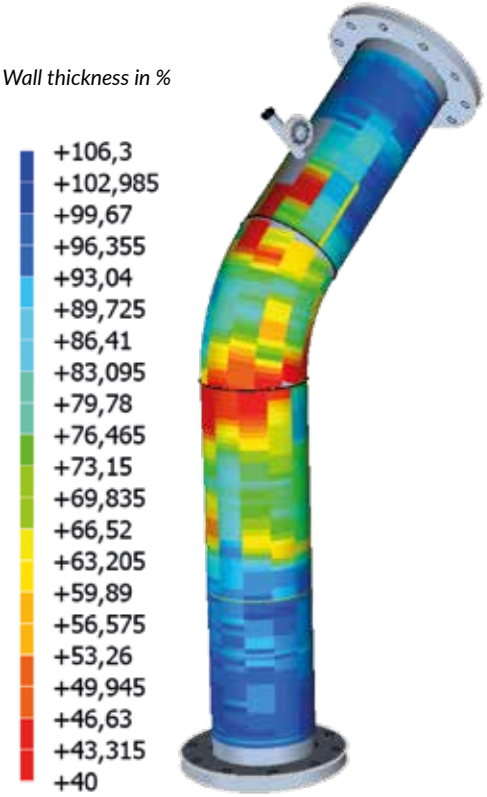
The probe performs the so-called **volumetric measurement,** which is then **converted to the average residual wall thickness.**

The corrosion or other defects are graphically represented as a **map of material losses** on the model of the scanned object. To create a model and to get it visualized in 3D, we use visualization software enabling to get **"a quick overview" of the situation** and to decide on the next step.



Scanning by high-resolution probe to examine the defect in higher resolution

Wall thickness in %



CORROSION **INSPECTION AND MAPPING**

We use the Pulsed Eddy Current Array measurement method (PECA™, PEC) to inspect steel structures, pipes, tubes, pressure vessels and tanks for the detection of material losses (like corrosion and other defects) without operational shutdown:

- Under insulation (CUI)
- Under fireproofing (CUF)
- Measured through coating or insulation
- Covered by concrete
- Under the composite wrap

INSPECTION OF **CORROSION UNDER INSULATION**

Examples of typical application:

- Insulated and non-insulated pipes
- Insulated and non-insulated tanks, columns, heaters, boilers
- Spherical tank legs
- Other steel structures where is a need to detect material losses quickly

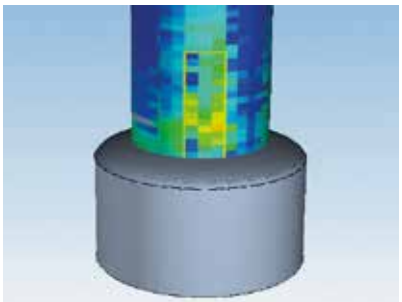
INSPECTION BY PECA™ (PEC) METHOD

Scope of use:

- Inspection of steel structures made of ferromagnetic steel such as pipes, tubes, vessels, tanks, plates, supports etc.
- Wall thickness of the inspected material from 3 mm up to 100 mm
- Inspection without shutdown
- Inspection through insulation or coating thickness up to 300 mm
- Inspection through aluminium, stainless or galvanized steel weather jackets
- Minimum pipe diameter 2“ (50mm), maximum diameter is not limited
- Inspection through insulation even at high temperatures (from -150°C to 500°C)

Typical examples of inspections:

- Measurement of the remaining wall thickness of pipes, vessels, tanks, plates and other steel structures
- Measurement of the remaining wall thickness on highly corroded parts that cannot be cleaned for the other type of the inspection method (UT) due to the risk of wall perforation during cleaning
- Flow Accelerated Corrosion (FAC) measurement
- Inspection of internal or external corrosion
- Inspection while asset in-service
- Assessment of the internal corrosion growth under the composite wrap repair
- Detection of material change
- Corrosion measurement in the area of the tank‘s annular ring and other applications



PECA™ (PEC) WORKING PRINCIPLE

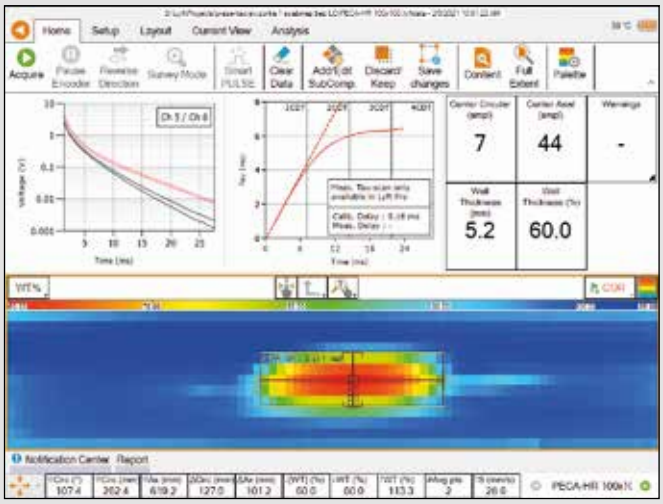
Pulsed Eddy Current Array (PECA™, PEC) is an advanced electromagnetic inspection method used in detecting metal loss (corrosion and other defects) in ferrous materials typically hidden under layers of coating, insulation or fireproofing.

We use PECA™ six-channel array probe for scanning area with 457mm working width, PECA™ Hi-Resolution probe for the higher resolution of the defect features and set of standard single PEC probes.

To generate and capture PEC, first, a magnetic field is created by an electrical current in the coils of the probe. It penetrates through any non-conductive insulation (concrete, insulation with weather jacket etc.) and stabilizes in the component thickness.

Then, the emission is cut off. This abrupt change induces eddy currents that will be captured by the probe. The instrument (Eddyfi Lyft®) measures the decay rate and an advanced signal processing algorithm translates the electromagnetic signal into an average thickness reading over the footprint of the probe.

All phases subsequently follow one another in fragment of a second, followed by interpreting results on high-quality multi-touch screen.

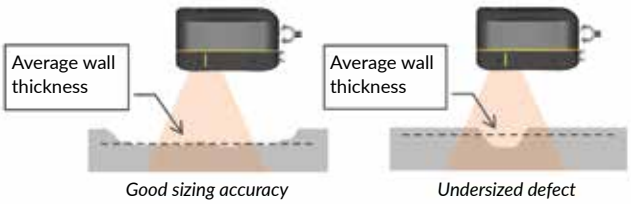


The measured thickness values are relative, representing the wall thickness change (loss of material) at the examined structure, calculated using the reference material thickness from the place where the probe was calibrated.

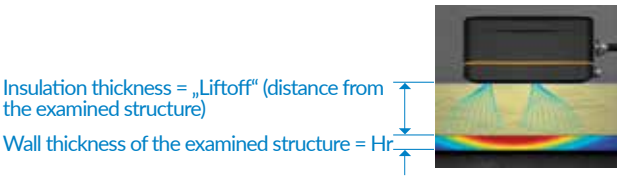
The thicker the material, the longer the secondary magnetic field decay time.

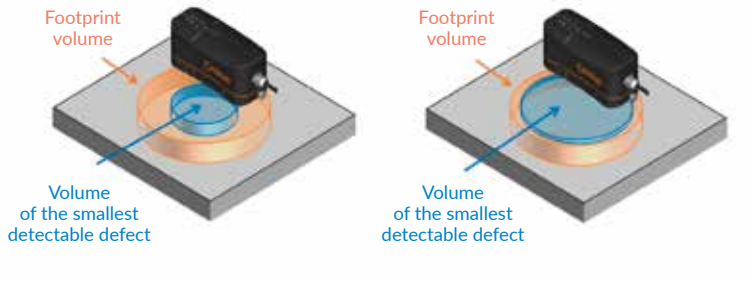
The decay time depends not only on the material thickness, but also on its conductivity (ability to conduct electric current) and permeability (degree of magnetization of the measured material).

Pulsed Eddy Current Array (PECA™, PEC) method determines the average wall thickness at the examined location that corresponds to the effective area of the probe sensor (so-called „footprint“). As a result, the method is used for corrosion inspection (metal loss), but small isolated (separate) pits or even a complete perforation of the wall cannot be detected.



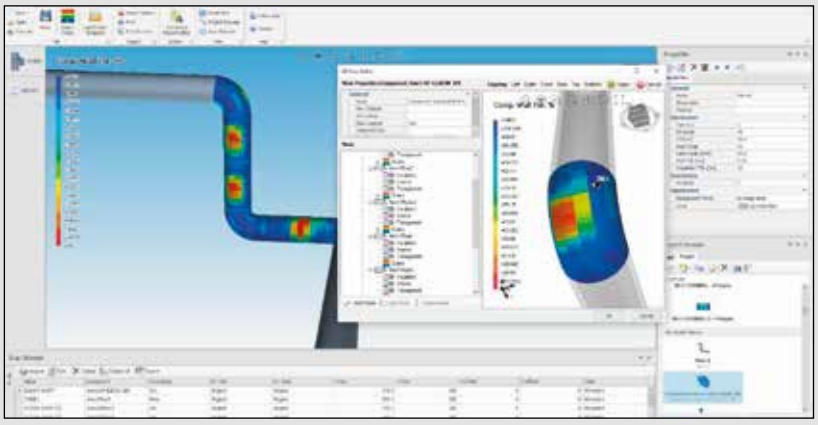
The accuracy of the inspection results depends mainly on the wall thickness of the measured structure, its remaining thickness, the area of metal loss and the distance of the probe from the measured material (the so-called „Liftoff“).



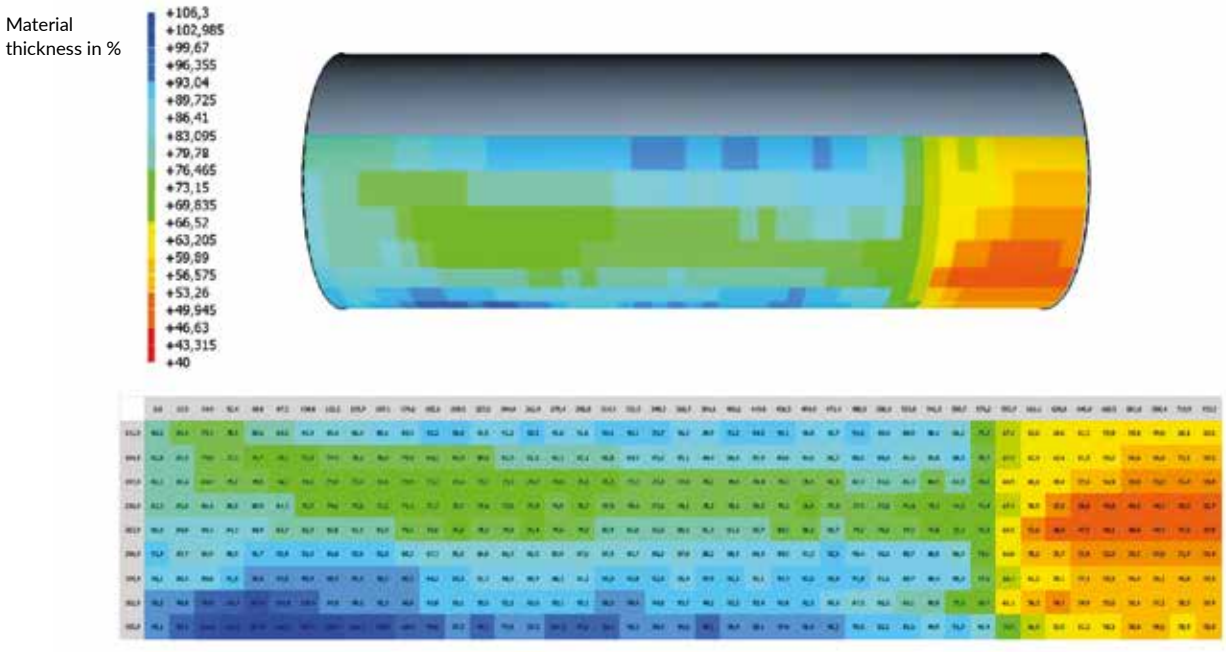


FINAL INSPECTION REPORT

The inspection results are assessed in a report that contains the remaining wall thickness values in mm and in % of the remaining wall thickness as well as the colour “map” of these values.



We use visualization software for displaying the corrosion map (map of material losses or residual wall thicknesses) on a 3D model of the inspected object, thus enabling to obtain a quick overview of the potential defects.



Do you need to inspect a pipeline, vessel, tank or other steel structure without shutdown? Feel free to contact us! We will perform an **inspection and condition assessment satisfying your needs.**

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DEFECTOSCOPY – NDT AND **COMPLEX SOLUTIONS FOR INTEGRITY INSPECTIONS**

SAFETY • QUALITY • RELIABILITY

- Corrosion mapping and monitoring of pipes, pressure vessels, tanks and other steel structures
- High temperature wall thickness measurement
- Inspections and tests by advanced NDT methods:
  - TOFD, Phased Array, EMAT
  - LRUT, Guided Waves
  - PECA™, PEC
  - EC, PSEC, IRIS, MFL
  - Acoustic emission and others
- Mapping and monitoring of remaining wall thickness:
  - Corrosion under insulation
  - Corrosion under fireproofing
  - Corrosion under composite repair
  - Over corrosion scabs and blisters
- Inspection and defect assessment of pipelines, tanks, pressure vessels and steel structures
- Positive material identification (PMI) and chemical analysis of metals using mobile optical emission spectrometer (OES) for on-site measurement
- NDT/NDE (defectoscopy) field services by mobile NDT laboratory accredited according to EN ISO/IEC 17025: VT, UT, UTT, MT, PT, RT
- On-site hardness testing of steel materials and welds
- Tubing inspection and assessment of fired heaters, heat exchangers and condensers
- Localization and verification of defects identified by inline inspection (in-ditch verification)
- Defects assessment
- Reliability and service life assessment of pipes and steel structures
- Online leak sealing
- Repairs of damaged valves, pipes, and welds while pipeline remains in service
- Pipeline cut-outs and replacement of piping components without shutdown
- Hot tapping (pressure tapping) to pipes, tanks and pressure vessels
- Pipeline relocations, repairs and tie-ins on the in-service pipelines without shutdown by pipeline plugging and bypassing
- Pipeline cleaning
- Stress tests and pressure tests
- Pipeline drying
- Pipeline decommissioning and decontamination before repairs or shutdowns by mobile nitrogen generators

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