SCT

Stress
Concentration
Tomography

3-D LINE LOCATING LTD.
Buried Pipeline & Utility Locating Services

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WHAT IS STRESS CONCENTRATION TOMOGRAPHY (SCT)?

3-D Line Locating Ltd. offers a non-invasive inspection service based on Stress Concentration Tomography (SCT). SCT collects the magnetic data of a target pipeline and then analyzes it for self magnetic-flux leakages in the pipeline wall, which are known as Stress Cocentration Zones (SCZs). SCT possesses a sophisticated detection algorithm that defines the location of SCZs to sub-metre accuracy. It also reports the estimated stress the SCZs cause on the pipeline wall both in Mpa and as a percentage of the pipeline material SMYS. These stress values are then ranked in accordance with the guidelines specified in ASME B31. Using this stress-profile information, integrity managers can make informed decisions regarding the safe operation of their pipelines, including whether or not specific areas are in need of repair.

WHAT ARE THE PRINCIPLE BENEFITS?

SCT has many commercial and technical benefits in comparison to other non-invasive integrity techniques.

1. SCT reports the presence of all defects in any orientation causing stress magnetisation in the pipeline wall. This includes corrosion, cracks, dents, sagging and twisting.

2. SCT requires no pre-inspection preparation of the pipeline or modification to operating parameters. Neither is excavation for contact NDT required in the process workflow. Consequently there are no hidden costs to drive up the quoted cost of inspection.

3. SCT can be used in conjunction with ILI for monitoring the development of stress caused by defects within specific sections of a long pipeline. Through the periodic measurement of defect growth, excavations and repairs can be scheduled more efficiently and disruption to service and revenue dramatically reduced.

4. SCT can be used in conjunction with other non-invasive methods such as DCVG and CIPS as a solution to confirm if damage to the coating and/or current leakage has led to damage to the pipe wall.

5. SCT can be used to map the pipeline route to sub metre accuracy, accurately identify the location of casings, pipeline diameter changes and to distinguish between longitudinal weld and seamless construction.

6 SCT fieldwork and analysis is quick and efficient. The speed of a field survey is determined by a technician's walking speed, and UNISCAN Tools is fully automated software. As result, preliminary results can be delivered prior to demobilization and the most dangerous defects identified rapidly.

WHAT ARE THE LIMITATIONS?

Although an emerging technology, it has now been accepted as commercially viable by several large pipeline owners in Europe. Moreover, the pipleing inspection industry worldwide has credited SCT as a legitimate technique by creating a new term for it: LSM (Large Standoff Magnetometry). We are hopeful that the current technical limitations facing SCT are not final: the technology is constantly being improved and new potentialities discovered.

ENVIRONMENTAL LIMITATIONS

1 UNISCAN has a GNSS component, and consequently it cannot inspect areas where no GNSS coverage is available, such as inside buildings or within densely wooded areas.

2 UNISCAN requires that field operators walk directly above the pipeline route. Therefore SCT cannot inspect above-ground pipelines that are too small to walk over, or sections of pipelines that pass under above-ground obstacles such as walls, rivers or buildings.

3 SCT cannot be used in environments where temperature exceeds the operating capacity of the electronic components (-25 to 45 degrees centigrade).

TECHNICAL LIMITATIONS

1. SCT is restricted to detecting SCZs and does not report the type of defect causing it. However, we are making good progress in developing mathematical models for defect-characterization.

2. SCT can only inspect pipelines constructed from ferro-magnetic materials.

3. Pipeline diameter is a limiting factor, and SCT has been designed to inspect larger diameter transmission lines. However, it has successfully inspected small diameter lines (from 4" diameter up) something confirmed through actual verifications.

4. The proximity of parallel pipes is also another potential limitation. The level of interference caused by a parallel pipe is dependent upon a calculation of the target pipeline's diameter. Within certain bounds, the magnetic interference caused by parallel pipes can be filtered out.

5. Sources of magnetic interference, such as buried metallic debris around the pipeline, can impact on the accuracy of results. However, the integrity of results is not affected by either buried or above-head power lines.

6. SCT cannot be used on pipelines that have already been exposed to MFL inspection until residual magnetization has worn off, a process that can take between 6 months to two years depending on the service provider and pipe material.

WHAT IS THE PROCESS WORKFLOW?

Inspection is usually conducted by a two-man team but in some circumstances it is possible for one man to conduct an inspection alone. Depending upon terrain it is usually possible for a single two-man team to inspect 10kms of pipeline in one working day.

STAGE 1: ENQUIRY

The client expresses serious interest in contracting our services. We request technical data of the pipeline information that includes pipeline diameter, wall thickness, current and historically high operating pressure as well as the material grade of the pipeline. These variables are then used to calculate whether or not the pipeline is suitable for SCT inspection.

STAGE 2: PRE-SURVEY ANALYSIS

Assessment of the pipeline route is carried out to determine terrain and potential obstacles for proposed field inspection.

STAGE 3: FIELDWORK

The pipeline route is marked out, and above ground obstacles such as parked cars are removed from the pipeline route.
Field workers assess the pipeline route for above-ground objects that could cause magnetic interference. They are then moved and if this is not possible, logged into our mapping system to identify any potential false positives at a later stage in analysis.

STAGE 3 (continued)

Once the pipeline route is marked out and is safe and clear, field workers collect magnetic data of the pipeline by walking over the survey route carrying the UNISCAN scanner.

STAGE 4: DATA ANALYSIS

Once fieldwork is finished, the magnetic and surface feature data are uploaded to a computer and sent to our data analysis centre in the UK. Depending on the requirements of the client, preliminary results can be delivered prior to demobilization.

STAGE 5: FINALISATION OF RESULTS

Following the delivery of preliminary results, we send our clients a final integrity report that contains detailed information that the client can use to make informed decisions regarding the safe operation of the pipeline, and to identify locations that may need further investigation or repair.

AN OVERVIEW OF UNISCAN

UNISCAN, developed in partnership with the University of Leeds, is our sophisticated and patented inspection system that brings together state-of-the-art electronic engineering and geophysical modelling in order to assist in the provision of a commercially effective and comprehensive solution for integrity managers worldwide.

UNISCAN is a versatile tool and can be used, to date, in the following applications:

1. As a screening tool to define locations on the pipeline for further investigation.
2. As a standalone inspection tool in the ECDA process.
3. As a validating tool to determine if corrosion has occurred beneath coatings identified as damaged by DCVG.
4. As a tool to monitor deterioration of locations where metal loss has been identified by ILI runs.

TECHNICAL SPECIFICATIONS

Sensing technology:	Passive magnetic	No need to interrupt pipeline operation during survey
Magnetic data storage:	USB Flash memory	Maximum single survey length 200km. Instrument memory does not limit survey length
Typical positioning accuracy:	Survey grade, multi-constellation, GNSS system	15mm relative to fixed point without post-correction, 15mm absolute after post-correction
Sensory array dimensions:	1100mm x 140mm x 120mm	
Total instrument weight:	7kg	
Environmental protection:	IP66 protected against powerful water jets	
Operating temperature range:	-25 to +45 degrees centigrade	
Data processing	Offline	
Survey Speed:	1m/sec	Typically 5 to 10km/day depending on terrain
Instrument Operators:	1	An operator assistant may be required on difficult terrain
Maximum survey length:	Unlimited	Long surveys are conducted as multiple short surveys
Inspectable distance from pipe:	12 pipe diameters maximum	
Pipe diameter range:	100mm - 1400mm	Small diameters dependant on depth of burial
Pipe wall thickness range:	2.5mm to 24mm:	

For more information concerning SCT, please contact us at admin@3-dlinelocating.com

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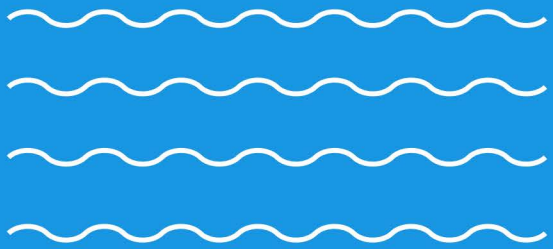

www.3-dlinelocating.com

780 979 0890

admin@3-dlinelocating.com

@3dlocating

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