

INTEGRITY SOLUTIONS SERVICES

PIPELINE INTEGRITY ASSESSMENT



INTEGRITY SERVICES



INSPECTION SERVICES



To maximize the value of the broad range of inspection technologies, each of the services is accompanied by the appropriate assessments.

	RoMat			RoCD				RoCorr					RoGeo			
	RoMat PSS	RoMat MTS	RoMat DMG	RoCD UT-A	RoCD UT-C	RoCD EMAT-A	RoCD EMAT-C	RoCorr UTWM Ultra	RoCorr UTWM	RoCorr IEC	RoCorr MFL-C	RoCorr MFL-A	RoCorr MFL-A Ultra	RoGeo XYZ Mapping	RoGeo MD	RoGeo XT
Long Seam Categorization																
MAOP Validation / Pipe Grade Determination																
Bending Strain / Pipe Movement / Geohazard / Depth of Cover Assessment																
Crack Growth Assessment																
Dent Strain / Stress / Fatigue Life Assessment																
Fitness for Purpose Assessment																
Corrosion Growth Assessment																
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Long Seam Categorization																

Key advantages:

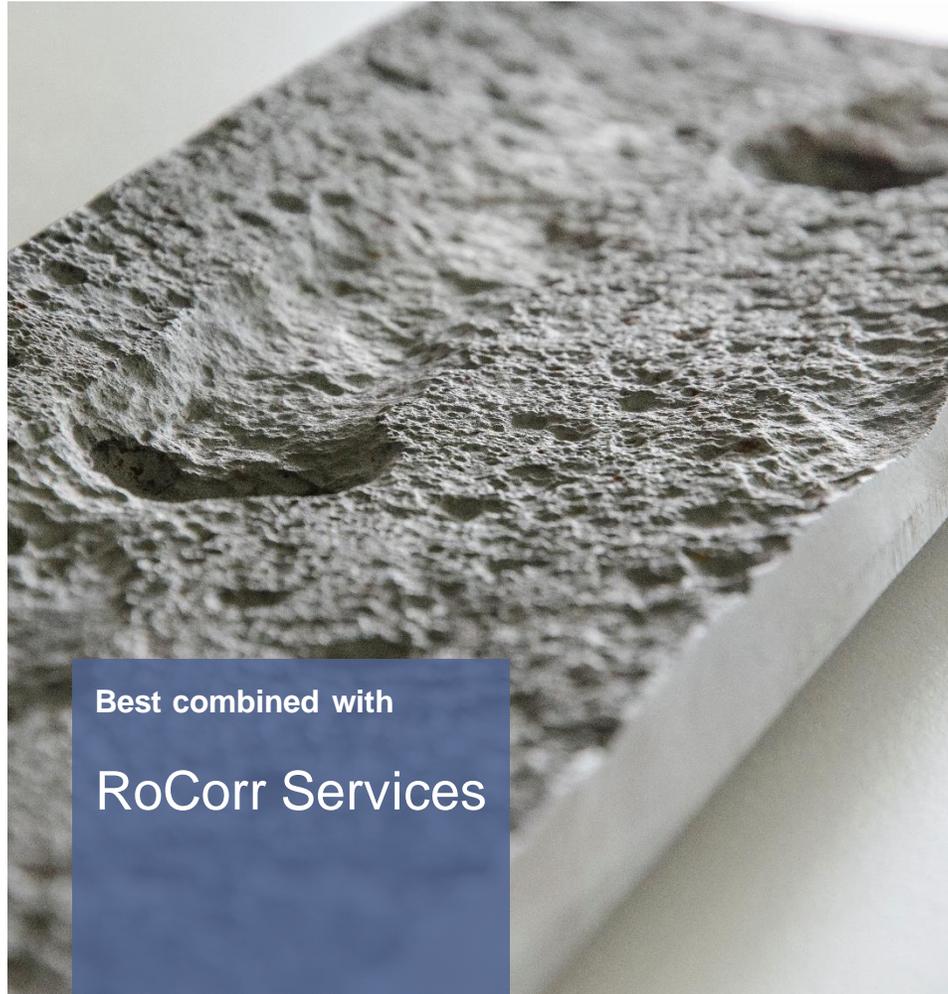
- Combined inspection system and integrity assessment expertise minimizes uncertainty ensuring safe, accurate assessments and recommendations
- Results scheduled with standard inspection reporting
- Access to signal data and expert evaluation minimizes uncertainty.

CORROSION GROWTH ASSESSMENTS

EXPOSING ACTIVE THREATS

ROSEN

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Corrosion Growth Assessments (CGA) identify and quantify corrosion activity that has occurred and provide critical input into fitness-for-service (FFS) assessments.

Our Corrosion Growth Assessments provide a detailed view of how corrosion has developed over time. **This involves:**

- Feature matching
- Identification of corrosion activity
- Matching of non-corrosion features (e.g. dents)
- Raw signal data comparison (incl. multi-vendor)
- Support definition of multi-year repair + maintenance plans (combination with FFS)
- Assessment of corrosion rate credibility

Service options:

- CGA with Box Matching
- CGA^{pro} with Box Matching/Signal Comparison
- CGA^{pro} with Automated Signal Correlation and Normalization (AutoSCAN)

BENDING STRAIN AND PIPE MOVEMENT

IDENTIFY, EVALUATE AND CONTROL GEOHAZARDS



Best combined with

RoGeo Services

Geohazards are a major threat to pipelines:

- They are hard to identify, difficult to predict, can cause failure and are extremely challenging to control.

Our Geohazard Assessments involve:

- Combined ILI technologies to collect bending, deformation and weld quality data.
- GIS tools to process, manage and align relevant data.
- Expert consultancy in geotechnics, weld fracture, strain capacity, stress analysis and related sciences.

Service options:

- L1 Analysis - Identify and quantify locations of bending and changes in bending strain (movement).
- L2 Assessment – Interacting threats, critical limits, probable causes, recommended actions.
- L3 Site Specific – Survey, FEA, modelling future movement, management and rehabilitation plans.

DENT ASSESSMENTS

STRESS-BASED ASSESSMENT OF DENTING AND BUCKLING



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Deformations in pipelines cause stress concentrations and may initiate failure by fatigue. These pose a major threat to pipeline integrity.

Our Dent Assessments involve:

- Screening fatigue assessment in accordance with API 579, PDAM, or EPRG guidance
- Strain assessment in accordance with ASME B31.8
- Finite element analysis (FEA) providing stress-concentration factors or stress range
- Remaining life assessment (RLA)
- Assessment of dents with metal loss or associated with welds
- Repair recommendations

DEPTH-OF-COVER ASSESSMENTS DON'T EXPOSE YOUR ASSETS



Best combined with

RoGeo Services

Depth of cover can decrease over time due to external influences:

- Natural erosion by water, wind and gravity
- Natural shrinkage and erosion as a result of human activity

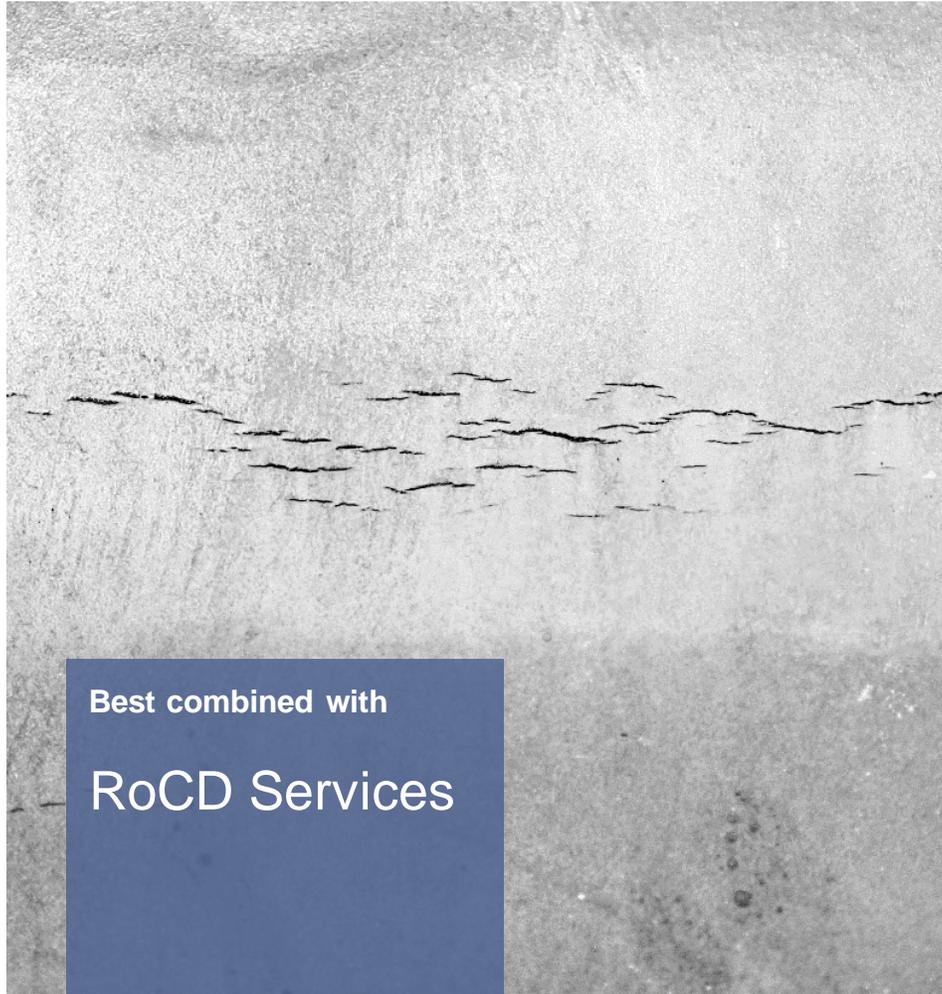
A reduced depth of cover increases the probability of third party damage.

Our Depth-of-Cover Assessments involve:

- An elevation model derived from satellite imagery, aerial photography, drones and radar data/3D scanning data (LiDAR)
- In-line inspection for up-to-date XYZ data
- Evaluation and change identification of depth-of-cover at every girth weld along the pipeline

CRACK ASSESSMENTS

TAKE CONTROL OF CRACKS



Cracking can take many forms. Distinguishing between these is a challenge, and inspection alone can only offer a partial solution.

Our Crack Assessments involve:

- Understanding the cause of cracking
- Engineering critical assessment (ECA) approach to determine tolerable defect dimensions
- Compliance with API 579/ASME FFS-1 and British Standard 7910 (2013)
- Remaining life (fatigue analysis and/or SCC growth analysis)

Service options:

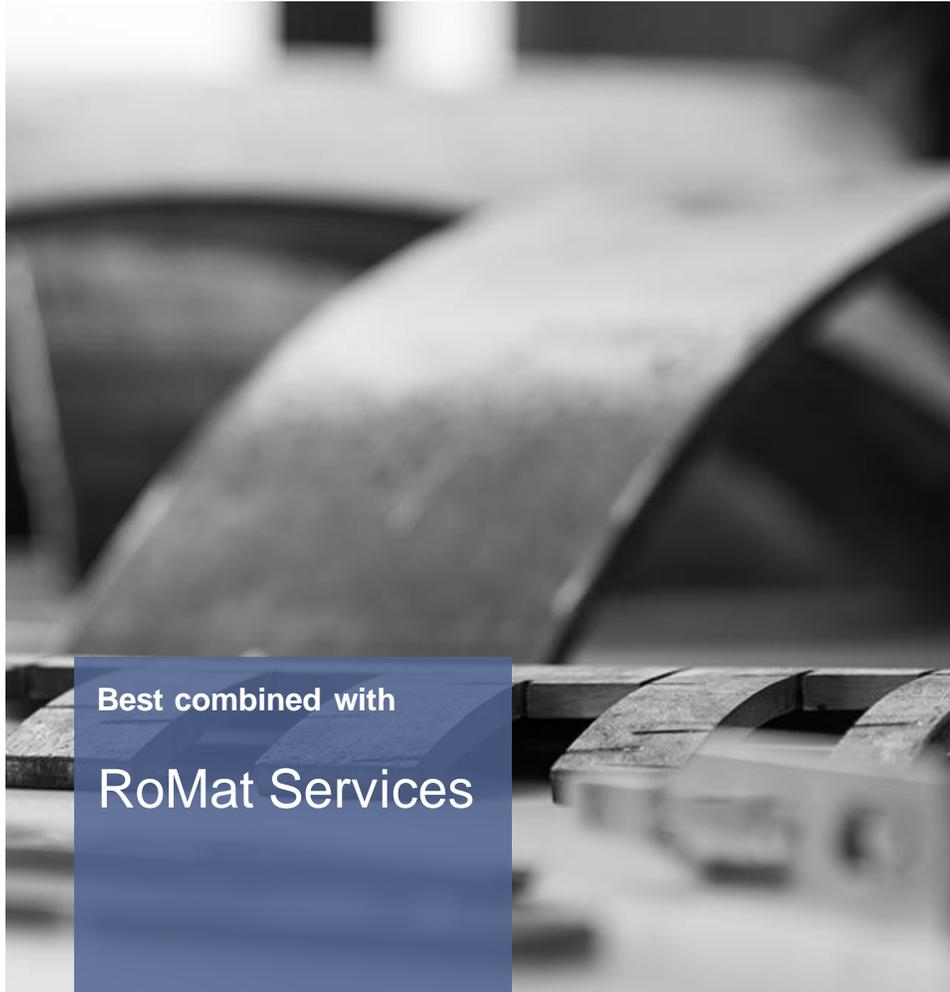
- Crack Assessment
- Crack Comparison
- Crack Management Framework

MATERIAL PROPERTY ASSESSMENTS

PIPELINE DNA UNCOVERED

ROSEN

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Best combined with

RoMat Services

Pipe grade is often uncertain. Yet operators require accurate material information in order to perform meaningful calculations.

Our Material Property Assessments involve:

- Review & alignment of existing pipeline information, pipe information (as built drawing, pipe books, mill certificates, hydro test pressure records, etc.)
- Utilization of existing pipeline inspection data and performance of analysis routines on ILI technologies
- Novel ILI technology utilizing ROSEN's unique recently developed Pipe Grade Sensors (PGS)

Service options:

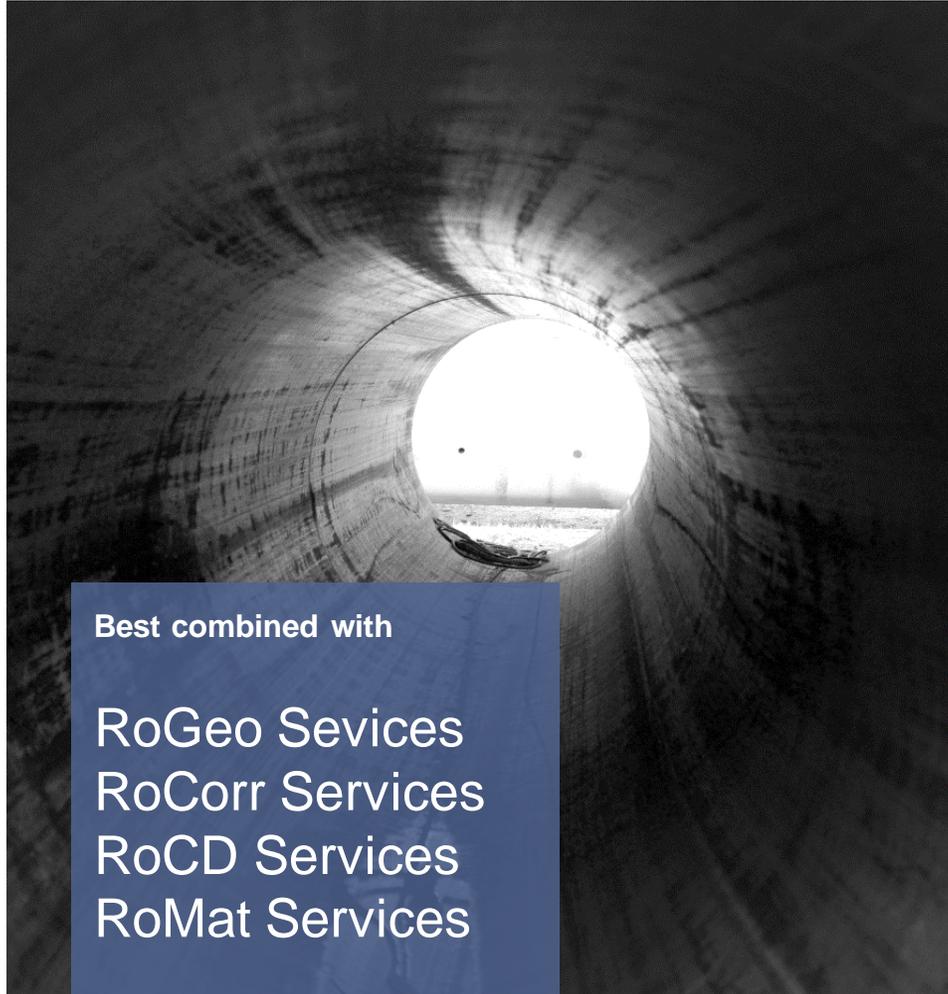
- MAOP Validation
- Pipe Grade Determination
- Outlier identification

FITNESS-FOR-SERVICE ASSESSMENTS

FUTURE-PROOF YOUR ASSET

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Our Fitness-for-service (FFS) assessment tells you:

- Whether the immediate integrity of the pipeline is compromised
- When unacceptable defects could appear in the future

Our FFS Assessments involve:

- Comprehensive analysis of current and future integrity
- Clear program of repair, inspection and mitigation actions
- Full compliance to codes and regulations (e.g. API-579-1/ASME FFS-1)

Service options – FFS assessment for:

- Metal loss defects
- Dents and wrinkles
- Freespans
- Bending strain
- Cracks