

ROCORR MFL-C SERVICE

IN-LINE HIGH RESOLUTION METAL LOSS AND NARROW AXIAL FEATURE ANALYSIS

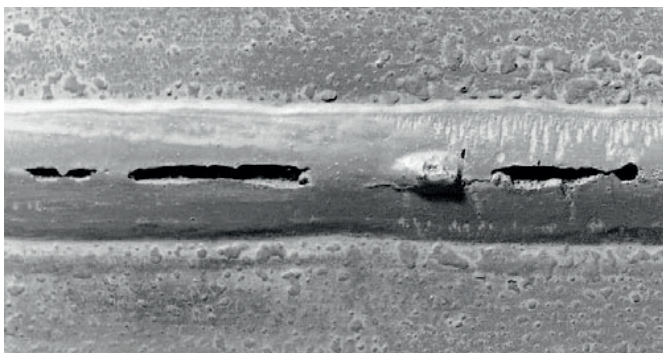
A precise and detailed identification of metal loss and in particular axial oriented anomalies like narrow corrosion, gouging, channeling, crack like features and preferential seam weld corrosion is a basic element for the integrity management of oil and gas pipelines.

Our RoCorr MFL-C service is a reliable and effective means of managing your pipeline integrity especially for concerns related to the long seam (e.g. pre-1970 ERW). All aspects from the inspection request to the final report are covered with the flexibility to choose from various service options.

THE SOLUTION

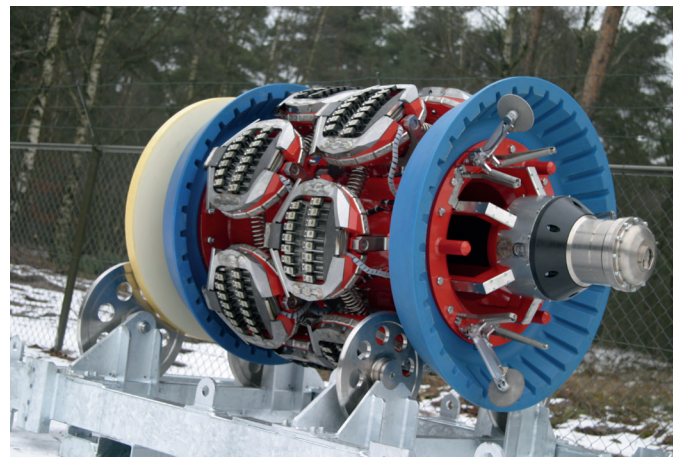
A circumferential induced magnetic field generates an optimum response from any volumetric axial oriented pipeline feature. Combining this with our unique sensor design makes ROSEN's Circumferential Magnetic Flux Leakage Technology most suitable to reliably and effectively detect and characterize challenging metal loss features. Our well-structured, certified data evaluation process enables ROSEN's data analysts to provide the required high quality assessment on-time.

The reporting and data management software ROSOFT ensures easy data visualization and facilitates the broad use of inspection results.



KEY ADVANTAGES

- Precise long seam categorization and assessment using magnetic saturation in circumferential direction.
- Accurate metal loss characterization in welded and specifically in seamless pipeline by extra high sensor density and high sampling rate.
- Lifetime integrity management supported by full recording of the inspection raw data.
- High availability and a wide range of proven tool configurations addressing individual operational pipeline requirements.
- High quality service with certified processes (API 1163), personnel qualification (ASNT) and equipment (CE, ATEX).



SERVICE OPTIONS

All aspects from the inspection request to the final report are covered with the flexibility to choose from various service options.\

- Cleaning – operational and pre inspection
- Speed Control – inspection at high flow rates
- XYZ – route mapping and strain assessment
- Multi-Diameter – pipelines with varying diameter
- Combo – multiple inspection technologies in one run
- Offshore – long distance and high pressure
- Post ILI – data alignment and combined evaluation
- Integrity – RBI, FFP, CGA
- ROAIMS – versatile asset integrity software suite

TECHNICAL SPECIFICATIONS

Standard Operating Specifications

| | |
|-------------------------------------|---|
| Tool sizes available | 6"-56" |
| Pipeline product | Gas or liquids |
| Product temperature range | 0 °C-65 °C (14 °F-149 °F) |
| Maximum operating pressure | 15 MPa (2175 psi) 25 MPa (3625 psi) optional |
| Operating speed range | Up to 4.0 m/s (8.9 mph) |
| Product flow range | Up to 11 m/s (24.6 mph) |
| Minimum pipeline bend radius | 1.5D |
| Wall thickness range | 4-25 mm (0.15"-1.0") |
| Maximum operating time | 400 hours |
| Maximum inspection length | 800 km (500 miles) |

Note: Contact ROSEN for more detailed information.
 *Fitted with optional speed control

Location and Orientation Capabilities

| | |
|--|---|
| Axial position accuracy from reference marker | 1:1000 1 m on 1000 m (3.2 ft on 0.62 mile) marker distance |
| Axial position from closest weld | ±0.1 m (±3.9") |
| Circumferential position accuracy | ±5° |

The axial positioning accuracy specified is based on following criteria:

- Distance between upstream and downstream marker/reference point < 2000 m (1.2 miles)
- Actual above ground distance to both upstream and downstream marker/reference points to be measured and correlated
- Negligible difference between pipeline and soil contour

Performance Specifications

| | General | Pitting | Axial grooving | Axial slotting* |
|---|----------------|----------------|----------------|-----------------|
| Depth at POD = 90 % | 0.15t | 0.15t | 0.10t | 0.20t |
| Depth sizing accuracy at 80 % certainty | ±0.15t | ±0.19t | ±0.15t | ±0.15t |
| Length sizing accuracy at 80 % certainty | ±15 mm (0.59") | ±12 mm (0.47") | ±15 mm (0.59") | ±15 mm (0.59") |
| Width sizing accuracy at 80 % certainty | ±15 mm (0.59") | ±15 mm (0.59") | ±15 mm (0.59") | ±15 mm (0.59") |

*Valid for axial slotting feature width > 1 mm (0.039")
 Abbreviations: POD = Probability of Detection; t = wall thickness

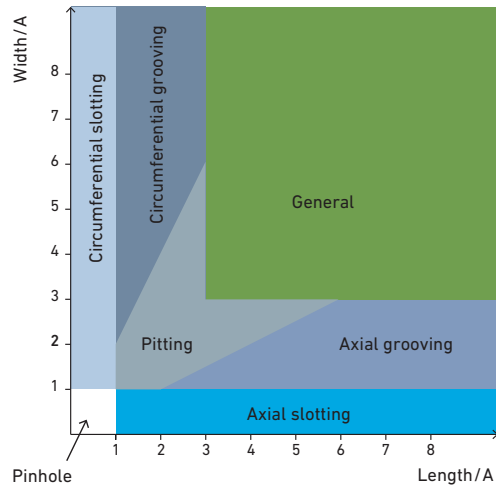
Remarks and Features

- Other tool sizes are available on request
- Higher pressure rating available on request
- Tailored solutions with different specifications available
- API 1163 certified services
- CE and ATEX certification available
- Contact ROSEN for more detailed information about the presented service
- Specifications are subjected to change according to specific requirements or tool configurations

Metal Loss Feature Classification

All reported metal loss features are classified according to the dimensions shown in the following Pipeline Operators' Forum (POF) specification graph.

A = wall thickness or 10 mm (0.39"), whichever value is greater



Wall Thickness Detection

±1 mm (± 0.04") or ±0.1t, whichever value is greater at
 80% certainty
 t = wall thickness