RoCombo MFL-A/MD Service

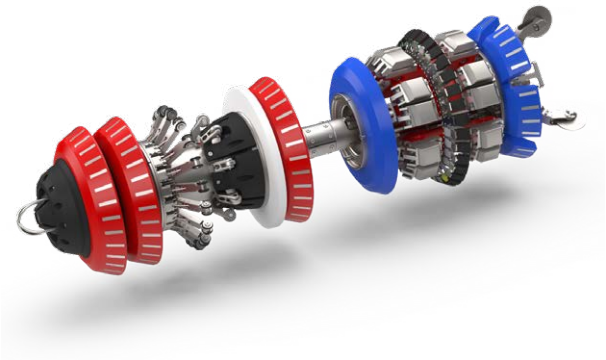
In-line Combined Metal Loss and Geometry Analysis

Detect pipeline corrosion and deformation before it impacts performance

Cost-effective combination for corrosion and deformation assessments

Assess the integrity of your onshore and offshore pipeline assets

Metal loss and geometry anomalies constitute an integrity threat to pipelines, particularly when coinciding. Therefore, a combined in-line inspection is a very efficient approach for safe and reliable pipeline operation. ROSEN's RoCombo MFL-A/MD offers the possibility to investigate pipelines for metal loss and geometry anomalies in only one inspection run.



Solution

The RoCombo MFL-A/MD includes not only a Magnetic Flux Leakage unit but also our entry level geometry in-line inspection solution. This combination enables us to check for both – metal loss and geometry anomalies – in only one inspection run. Unique magnet and sensor designs ensure high sensitivity and precision for the detection of corrosion, erosion, gouging and a huge variety of other metal loss features. Dents, buckles, bends, wrinkles, ID changes and installations, such as valves, tees, flanges and welds can be reliably detected because of the complete circumferential and axial coverage of our geometry technology.

Benefits

- High resolution tri-axial magnetic field analysis ensuring accurate and precise feature classification & sizing in accordance with API and POF regulations
- No need for coupling medium, so optimally suited for accurate inspection of gas and multiphase pipelines
- Prevents deformation-related failure by identifying internal diameter (ID) anomalies, even through 1.5D bends
- A high number of calipers ensure full ID coverage, while bespoke design minimizes lift-off
- Lifetime integrity management supported by full recording of the complete raw inspection data
- Largest tool fleet on the market ensuring global tool availability and flexibility
- Well-proven tools deliver consistent data quality with a first run success rate of 95%
- Minimizing the impact of inspections on daily operations through speed control units to maintain full production flow during inspection
- 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
- Offshore – long distance and high pressure
- Post-ILI – data alignment and combined evaluation
- Integrity Assessments – FFP, CGA, when equipped with IMU: Bending Strain & Pipeline Movement
- NIMA – versatile asset integrity software suite

ROSEN
empowered by technology

Remarks and Features

- API 1163 compliant services
- CE and ATEX certification available
- Tailored solutions with different specifications upon request: multiple tool sizes or multi-diameter tools, higher pressure rating
- Contact ROSEN for more detailed information about the service presented
- Specifications are subject to change, depending on specific requirements or tool configurations

Technical Specifications

Standard Operating Specifications

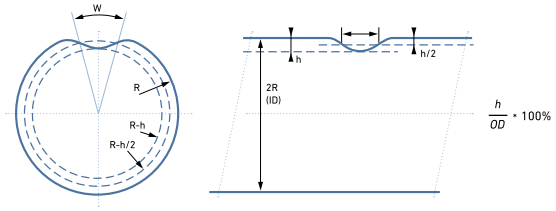
Tool sizes available	4" - 56"
Pipeline product	Gas or liquids
Product temperature range	0 °C - 65 °C (32 °F - 150 °F)
Maximum operating pressure	15 MPa (2,175 psi) 25 MPa (3,625 psi) optional
Operating speed range	Up to 3.0 m/s (9.8 mph)
Product flow range*	Up to 12 m/s (26.8 mph)
Minimum pipeline bend radius	1.5D
Wall thickness range	4 - 32 mm (0.15" - 1.26")
Maximum operating time	400 hours
Maximum inspection length	800 km (500 miles)

* Fitted with optional speed control system (gas lines only)
Note: Please contact ROSEN for conditions outside of these specifications.

Performance Specifications – Geometry

Feature		OD [inch]	Accuracy[1]	Detection Threshold*
OD[2] Changes			±1.5 mm (0.06")	1.5 mm (0.06")
Ovalities	Ovality		1.0 %	1.0 %
	Length		±100 mm (4")	
Dents[3]	Depth	≤8" ≥10"	±1.5 % ±1.0 %	1.0 %
	Length		±25 mm (0.98")	
	Width		±50 mm (1.97")	
	Orientation		±15°	

* Detection of shallow features in outer bend curvature is limited
1 Values are given for a certainty level of 80 % and a POD of 90 %
2 Or ID, respectively
3 Dent definition:



Location and Orientation Capabilities

Axial position accuracy from reference marker 1 m on 1000 m (1 ft on 1000 ft) marker distance	1:1000
Axial position from closest weld	±0.1 m (±4")
Circumferential position accuracy	±5°

The axial positioning accuracy is given at 90 % certainty and is based on following conditions:
1. Distance between upstream (u/s) and downstream (d/s) marker/reference point < 2,000 m (6,500 ft.).
2. Actual aboveground distance to both u/s and d/s marker/reference points have been measured and correlated.
3. Marker points are placed correctly according to respective ROSEN marker specification.

Performance Specifications – MFL

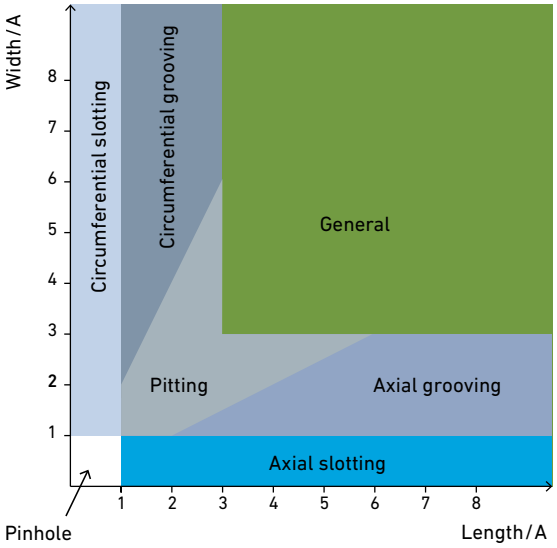
	General metal loss	Pitting	Axial Grooving	Circumf. Grooving	Circumf. Slotting[1]
Depth at POD = 90 %	0.1t	0.1t	0.1t	0.1t	0.15t
Depth sizing accuracy at 80 % certainty	±0.1t	±0.1t	±0.15t	±0.1t	±0.1t
Width sizing accuracy at 80 % certainty	±15 mm (0.59")	±12 mm (0.47")	±12 mm (0.47")	±12 mm (0.47")	±15 mm (0.59")
Length sizing accuracy at 80 % certainty	±15 mm (0.59")	±10 mm (0.39")	±10 mm (0.39")	±10 mm (0.39")	±10 mm (0.39")

Abbreviations: POD = Probability of Detection; t = wall thickness
[1)] Min (L, W)≥½

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

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