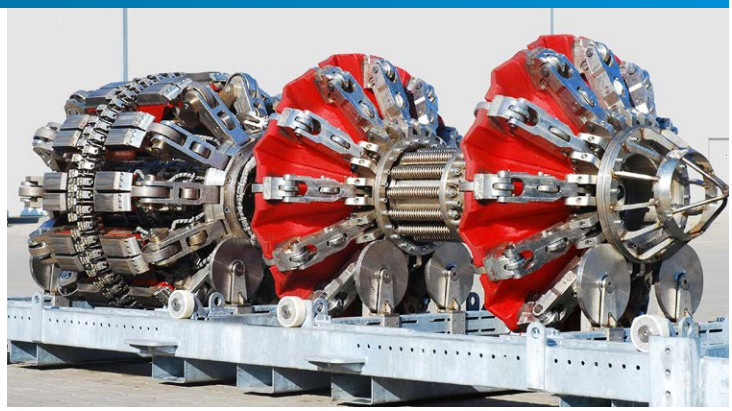
Multi-Diameter In-Line Inspection

Specialized Multi-Diameter Configurations for the Inspection of Pipelines with Varying Internal Diameter in a Single Run

Maximize uptime

Meet safety standards and regulations

Increase efficiency of in-line inspection runs



Because of their varying diameter, many pipelines are classified as incapable of in-line inspection, which poses major cleaning and inspection challenges for the oil and gas industry. In response, ROSEN has developed multi-diameter versions for cleaning tools and for principal inspection technologies, namely high-resolution magnetic flux leakage (MFL) and extended-resolution geometry. By using ROSEN's highly flexible and specialized inspection tools instead of alternative non-ILI approaches, operators can cut costs, save time and get best-in-class integrity assessments.

Solution

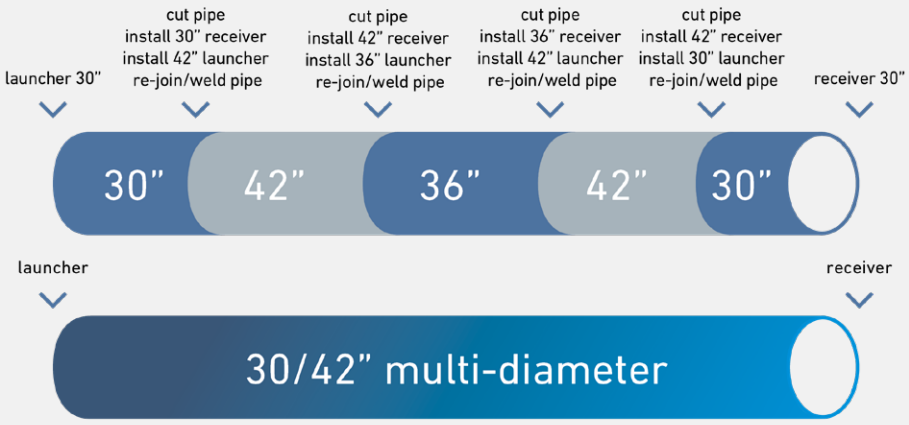
ROSEN's multi-diameter ILI tools are capable of highly accurate inspection and thorough asset cleaning. They are compatible with most launching and receiving facilities, highly maneuverable, reliable and are operated & handled in a similar manner to that of conventional ILI tools.

To provide full sensor coverage, a collapsible MFL sensor ring system is used to enable adjustment to different pipe conditions for specialized tools. The function of the pull unit is to create the sealing effect required to drive the tool through the pipeline and indeed even through 1.5D and 3D bends. The pull unit has a special cup design to ensure maximum flexibility without losing any sealing effect; it therefore delivers the required pull force at all times during the bend passage. Different diameters in lines inevitably lead to varying differential pressure conditions, which can result in uncontrolled tool acceleration and slowdown. Consequently, to stabilize tool velocity, medium to larger tool sizes are fitted with a speed control unit.

All ROSEN multi-diameter tools can be equipped with an XYZ mapping unit and cover a range from 6" to 48", with a stroke of up to 12" (e.g. 30/42") for the larger sizes.

30/42" multi-diameter RoGeo XT tool including speed control.
Bespoke diameter ranges are available upon request.

ROSEN
empowered by technology



Example for the preparation efforts required to make a multi-diameter pipeline piggable: using a single-diameter vs. a multi-diameter ILI tool.

Experience/Field Test

All of ROSEN's tools are subjected to extensive testing. On request, we can re-create the customer line with a 1:1 test line containing all relevant features and special conditions, for example the Y-piece. Extensive testing includes tests of individual tool segments and special pull tests of the driving unit, as well as a pump test of the driving unit and a pressure test of electronic compartments.
Following extensive flow loop testing, the first survey is coordinated in close collaboration with the pipeline operator. In a recent case study, for example, a 30/36" MFL inspection tool was successfully tested in a multi-diameter pipeline. Working together, the client and ROSEN staff coordinated an on-site team of field service technicians who in turn executed a successful first run. Having been launched in the 36" segment of the pipe and having traveled just under 0.5 mi, the tool successfully collapsed, thus ensuring a smooth passage through the 30" segment. It then continued its journey for approximately another 50 mi, before expanding back to 36" for the last 8 mi of the run. In addition to these diameter changes, the tool successfully negotiated three 1.5D bends and several heavy pipe wall changes.

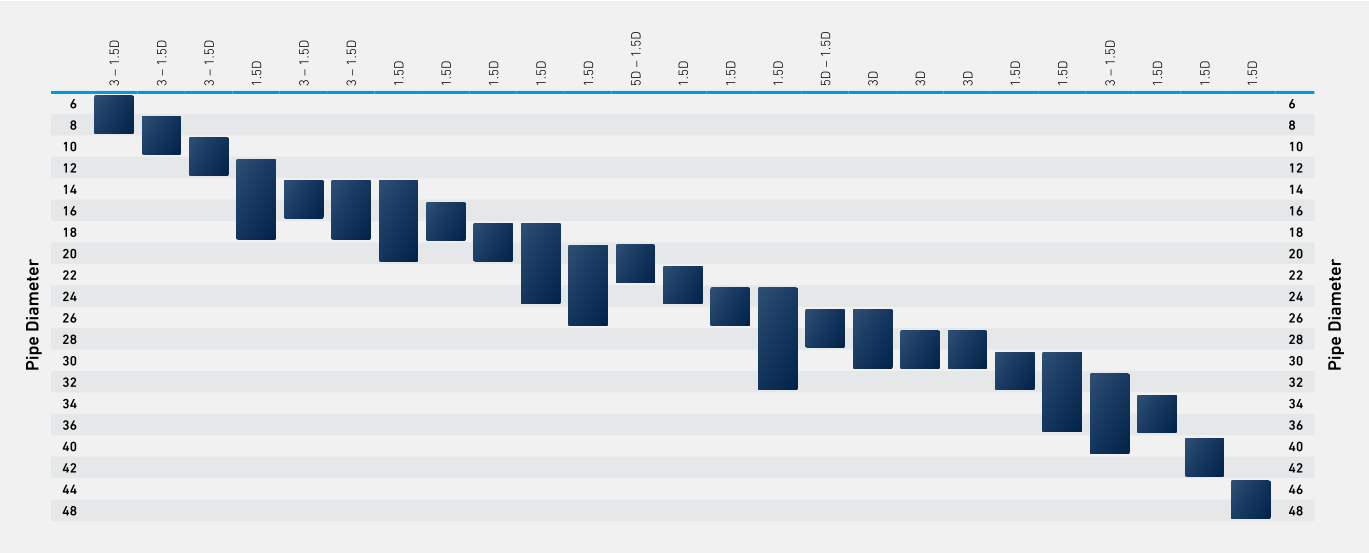
Pre-ILI Cleaning

ROSEN's pipeline cleaning tools have been used for decades in pre-inspection cleaning operations. The experience gained serves as a basis for further improvements of the modular system and design concepts for special applications. Thus, a cleaning tool for multi-diameter pipelines has also been developed in order to optimally clean even such demanding pipelines and to ensure optimum data quality from in-line inspection.
With its slender design, the specialized pipeline cleaning tool has excellent pipe passage properties. Operating life is maximized through the use of highly wear-resistant RoPlasthan high-performance elastomer materials.

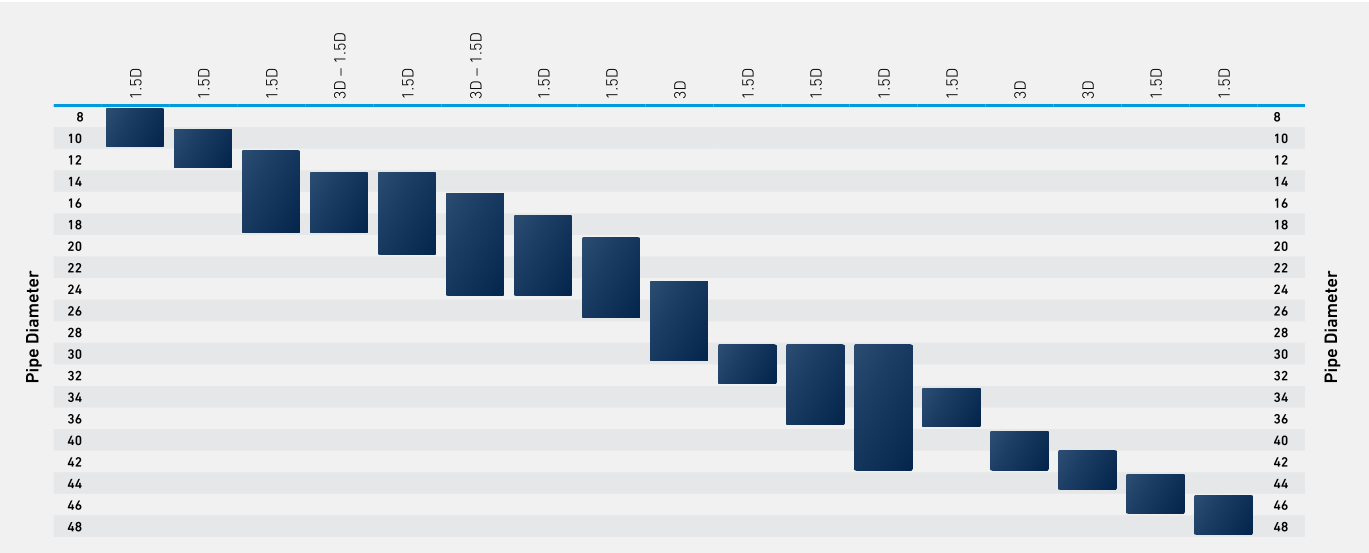
Benefits

- Inspections of multi-diameter pipelines and tight bend radii in a single run
- Optimized mechanical and sensor design to ensure full coverage and complete collection of inspection data in all diameter sections
- Provides operators with flexibility in new pipeline design and construction, as often found in the offshore industry
- Modular design of tools allows easy combination of MFL and extended geometry (XT) tools
- Designed to transverse long Y-pieces or unusual T-pieces
- Compatible with most launching and receiving facilities
- Operates at both high and low pipeline operating temperatures
- Speed control unit means controlled and stabilized tool velocity
- Provides the possibility to connect several line sections with different diameters via valve bypass for continuous inspections
- No more need for costly, time-consuming and less accurate alternative methods
- Detailed reporting and user-friendly assessment software enables easy data visualization and facilitates use of inspection results
- Industry-leading experience in the inspection of multi-diameter pipelines

RoCorr MFL-A Tool Fleet



RoCorr XT / IEC Tool Fleet



Other multi-diameter technologies or bespoke diameter ranges available upon request.

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