Cleaning is a vital aspect of the integrity management of pipelines and pipeline networks and is necessary at every stage throughout their lifecycle. Failure to clean your pipeline at regular intervals leads to reduced efficiency and may result in damages that impact its lifecycle. The ROSEN Group offers a broad spectrum of pipeline cleaning solutions built on more than three decades of experience – experience gained working together with our customers on countless pipeline projects.

Continuous development and innovation ensure that our cleaning solutions are backed by robust service products and experienced service personnel, providing tangible added value for our customers. We recognize that each pipeline is unique and that cleaning needs vary depending its operational purpose and lifecycle stage.
The Challenge
Your Pipeline

Uneven deposit
5%

- c. 35%
- c. 140%
Efficient pipeline operation is dependent on two fundamental aspects: continuous transportation of the medium and maintenance of the internal diameter to ensure optimal flow of the medium. There are several factors that can seriously impact the efficiency of a pipeline, including:

- Buildup of deposits in the line which can cause damage by abrasion or encourage corrosion under deposits
- Product contamination
- Dirty pipeline surfaces prohibit corrosion inhibitors from being applied consistently
- System contamination can complicate the preparatory work necessary to ensure high quality data from an inline inspection (ILI)

Failing to clean your pipeline can dramatically affect the efficiency, safety, and reliability of the entire network. Foreign matter and buildup can damage the integrity of a pipeline, encourage the formation of corrosion and pipe thinning, and will almost certainly reduce throughput.

<table>
<thead>
<tr>
<th>Smooth deposit</th>
<th>No deposit</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>None</td>
</tr>
<tr>
<td>c. 10%</td>
<td>Loss of throughput</td>
</tr>
<tr>
<td>c. 30%</td>
<td>Required increase of pressure to maintain constant flow</td>
</tr>
</tbody>
</table>
Our Solution
The Offer
We aim to combat the challenges of pipeline cleanliness by offering a wide variety of predefined solutions as well as individually tailored approaches backed by an extensive portfolio and substantial experience. The cleaning requirements for a pipeline during its lifecycle are many and varied depending upon the pipeline’s lifecycle stage.

With its considerable in-house expertise in sensor and data-acquisition technologies and corrosion consultancy, the ROSEN Group is your first choice for intelligent cleaning solutions. We use high quality electronic measurement instruments, data analysis software, and integrity management systems.

Backed by over six technology and research centers worldwide, the ROSEN Group is able to create and provide expert, customized cleaning solutions for our customers. With the support of our operating units around the globe, we help you maintain your pipelines, increase operational performance, and extend the operational lifecycle of your valuable assets.
Cleaning solutions for the entire pipeline lifecycle

**Decommissioning Cleaning**
Proper cleaning is also required at the end of a pipeline’s lifecycle before the asset is abandoned, recovered or reused. Utilizing some of the best cleaning solutions and tools, our decommissioning cleaning services ensure that the pipeline is thoroughly cleaned and that no pollutants are released in the process.

**Cleaning Prior to Cessation of Production (COP)**
Whenever a pipeline is to be taken out of service (temporarily or permanently), cleaning and servicing of the line is vital in order to maintain the integrity of the asset during the dormant period.

**Change of Service Cleaning**
Liquids (crude oil, water, refined product, etc.) all have different characteristics and effects on the pipe wall. When a pipeline is scheduled to undergo a product change, a strict cleaning program must be executed to avoid any product contamination.

**Post Construction Cleaning**
During the pipeline manufacturing process, oils, greases, protective coatings and mill scale can contaminate pipe wall surfaces. Failure to remove this material before the pipeline is put into service can lead to considerable product contamination upon initial start-up of the pipeline. ROSEN delivers expert cleaning services essential to avoid potential upsets.

**Pre-Commissioning**
Once installed, pipelines are often filled with water for flooding and hydro testing. This requires cleaning tools for filling and dewatering activities. In addition, special wet buckle contingency cleaning programs and support services are often required. ROSEN’s in-house polyurethane material is renowned for providing ideal properties for efficient cleaning services.

**Operational Cleaning**
Once in service, deposits can begin to settle on the pipe wall. If cleaning is not performed on a regular basis during production operations, these deposits can build up, encouraging corrosion growth and potentially preventing inhibitors that can protect the system from being properly applied. In addition, cleaning at this stage prepares the pipeline for further inline inspection services.
Our Solution
Your Benefit
Your Gain
The ROSEN Group has provided reliable cleaning solutions to pipeline operators throughout the world for more than 30 years. Partnering with ROSEN and working closely with our experienced personnel to execute successful cleaning programs will help you achieve your objectives by:

- Maximizing pipeline uptime and sustaining or even increasing product throughput
- Extending asset lifespan
- Optimizing maintenance processes
- Saving costs by reducing inefficiencies
- Ensuring the success of future inline inspections

Implementing proactive integrity management and an adequate cleaning program translates into cost optimization, thus enabling you to retain control of your maintenance budget. This is one of the ways we create ultimate value for our customers, and another reason why ROSEN is the most reliable, competitive and flexible solutions provider – a partner you can trust.
Engineering Support, Training & Testing
Let our experience work for you

Advanced Cleaning Solutions
Tailored to meet the challenge

Maintenance Cleaning Solutions
Extending the pipeline lifecycle

Solutions and services explained
Maintenance
Cleaning Solutions
Extending the pipeline lifecycle
Our Service Offer

Routine maintenance programs are crucial in the lifecycle extension of any system. Pipelines are no exception. Many of our cleaning solutions are designed to fulfill regular maintenance requirements and to provide pre-inspection cleaning support. As part of our maintenance service we:

- Understand your pipeline by reviewing system geometry, transport medium, type of debris to be removed, debris loading, and its distribution
- Design an appropriate cleaning program including the careful selection of cleaning tools
- Provide operational support including tracking and data collection
- Equip operators with diagnostic feedback of cleaning progress and effectiveness

Our Product Suite

Cup and disc tools can be fitted with an array of cleaning support elements, including but not limited to brushes, magnets, descaling and dewaxing equipment, as well as geometric gauging plates and bend detection technologies.

Our RoClean suite for maintenance includes:

- **RoClean Easy** – used for general cleaning applications such as batching, removal of liquids, light debris removal
- **RoClean Ultimate** – used for demanding cleaning challenges and recommended for cleaning prior to intelligent pipeline inspection
- **RoClean Heavy Duty** – used for heavy cleaning needs, specifically to remove stubborn deposits comprising of e.g. paraffin wax, asphaltenes, scales etc.

Furthermore, all tools can be equipped with ROSEN-developed instrumentation including transmitters for tracking or pipeline data loggers to record operational data and cleaning effectiveness. ATEX/Ex compliant tools are commonplace in ROSEN’s portfolio of electronic instruments.

Your Benefits

- Maximization of operational efficiency >>> maintaining flow rates
- Reduction of operational costs >>> efficient energy expended
- Extension of pipeline lifetime >>> effective corrosion management
- Efficient chemical expenditure >>> effective debris removal ensuring efficient inhibitor application
- Improved product quality >>> reduced product contamination
- Safe operations >>> ensuring the structural integrity of the pipeline
Advanced Cleaning Solutions
Tailored to meet the challenge
Our Service Offer

No two pipelines are the same. There are many challenges when cleaning a pipeline that can render a standard approach impractical or even unfeasible. With comprehensive experience gained from a variety of challenging cases over the years, our advanced solutions go beyond maintenance cleaning and tackle special requirements of the project in questions.

ROSEN’s engineers design suitable high-performance solutions considering:

- Unique pipeline design or complex geometry
- Non-optimal operating conditions such as high-temperature environments, adverse flow conditions (e.g. slug flow)
- Heavy-duty debris removal such as black powder, heavy paraffin wax, etc.

From pre-commissioning cleaning of new pipelines to hydrocarbon removal solutions for pipelines being de-commissioned, or for those special projects where a tailor-made tool is required, ROSEN has the knowledge, expertise and in-house capability to deliver a solution that addresses every aspect of the challenge.

Examples include, but are not limited to, design adjustments for subsea launching and recovery purposes, provision of high-performance tracking technologies, incorporation of housings for onboard tracking equipment, latching systems, pressure bypass systems, speed control measures and many more.

Our Product Suite

Our RoClean suite for advanced applications includes RoClean Active. This all-inclusive service line includes solutions for black powder removal, controlled liquids removal, and the provision of speed and bypass controlled cleaning solutions. Additionally we provide dual and multi-diameter line cleaning technologies as well as SMART (Pipeline Condition Monitoring) cleaning solutions.

Your Benefits

- Maximization of operational efficiency by maintaining flow rates
- Minimized downtime due to optimized solutions
- Safe operations to ensure the structural integrity of the pipeline
Engineering Support, Training & Testing
Let our experience work for you
Our Service Offer

In order to deliver a truly comprehensive portfolio, ROSEN offers desktop feasibility studies as well as testing, and also provides training support for field cleaning operations. Additionally, ROSEN is experienced in providing a range of corrosion consultancy and flow assurance related services.

Uncertainty is something to be avoided when dealing with the safety and efficiency of a critical pipeline asset. Feasibility studies provide the opportunity to minimize risk. For example, in the case of a challenging pipeline cleaning project requiring the development of a specially designed solution, a feasibility study can increase confidence in its implementation. It can also ensure that a systematic approach is adopted, and can develop useful process documentation.

As an additional step in creating confidence, ROSEN can offer pull and/or pump tests. These tests can verify the passage of cleaning tools in pipelines that contain several challenging features. Testing can also validate any special requirements such as tracking systems and data recording in authentic environmental conditions.

Our engineering support extends to operational project management on turn key projects requiring ancillary support services – managing everything from initiation – through planning and design, execution, monitoring, controlling and post remediation follow up (e.g. in-field verification) works.

Our integrity management support – incorporating our corrosion consultancy services – includes, auditing and inspection, corrosion monitoring, modeling and mitigation support services in addition to remnant life prediction and evaluation and strategy management.

Your Benefits

- Cost savings due to targeted approach
- Minimized downtime due to optimized solutions
- Safe operations due to in-depth testing
- Control of corrosion threats through a proactive integrity management program