

# Corrosion and Erosion Monitoring

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# Rysco UK Overview



Established in 2022, Rysco Corrosion UK is responsible for the distribution of Rysco Corrosion and Rysco Integrity's equipment and services within the European and African markets.

Primary Services Include:

- , - Design & Supply of Internal Corrosion Monitoring Systems, including:
  - , - High & Low Pressure Access Systems
  - , - Mechanical Monitoring, e.g., Corrosion Coupons
  - , - Electronic Monitoring, e.g., Electrical Resistance Instruments
  - , - Injection & Sampling Systems
  - , - Custom Equipment Design & Manufacturing
  
- , - Field Services, including:
  - , - High and Low Pressure Monitoring Device Retrieval
  - , - Monitoring Data Analysis and Reporting
  - , - Monitoring System Audits
  - , - Sampling and Lab Analysis
  - , - Hot Tapping
  
- , - Online Reporting, including:
  - , - Custom Reporting Dashboards via Business intelligence Software
  - , - Interactive Mapping

Rysco UK is a proud sponsor of The Institute of Corrosion and AMPP, and holds ISO 9001, 14001 and 45001 certifications.

Rysco are SEQual and Achilles approved.



# Introduction

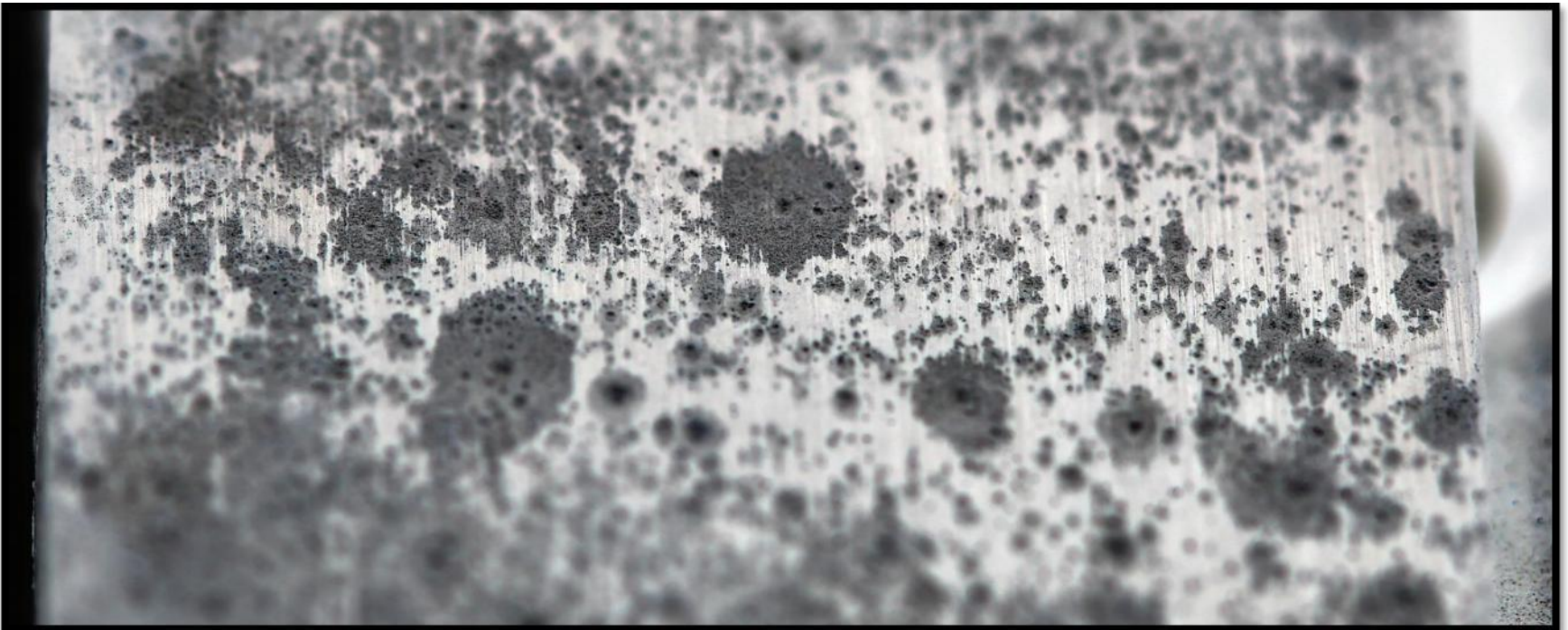
Corrosion and Erosion are two major threats faced by the oil and gas industry during production and transportation processes. These challenges can lead to:

- Substantial economic losses
- Operational disruptions
- Safety hazards

Understanding the root causes and implementing effective monitoring and mitigation strategies is imperative to ensure efficient and safe operations.

# Corrosion Causes

Corrosion is driven by chemical reactions between the metal surfaces and the environment. Factors such as the presence of corrosive elements (such as hydrogen sulphide - H<sub>2</sub>S and carbon dioxide - CO<sub>2</sub>), moisture content, dissolved gases (such as oxygen), temperature fluctuations, and pressure variations contribute to the corrosion process. Microbiological activity can also aggravate this.





## Corrosion Effects



Corrosion manifests as material degradation and thinning, which can compromise the structural integrity of equipment and pipelines. This can eventually lead to leaks, ruptures, and even environmental disasters if not properly managed.

# Internal Corrosion Monitoring

➤ Internal Corrosion monitoring

involves proven techniques like  
corrosion coupons and Electrical  
Resistance (ER) probes.

➤ Corrosion coupons are metal

strips immersed in the process  
and periodically removed for  
analysis, offering information  
about corrosion rates.

➤ ER probes, on the other hand,

measure changes in electrical  
resistance due to corrosion,  
providing continuous insights  
into metal loss.



# Corrosion Coupons

Corrosion coupons are sacrificial metal samples exposed to the process fluid.

By periodically analysing the coupons, operators can quantify the extent of corrosion, helping in the formulation of targeted mitigation strategies and maintenance schedules.

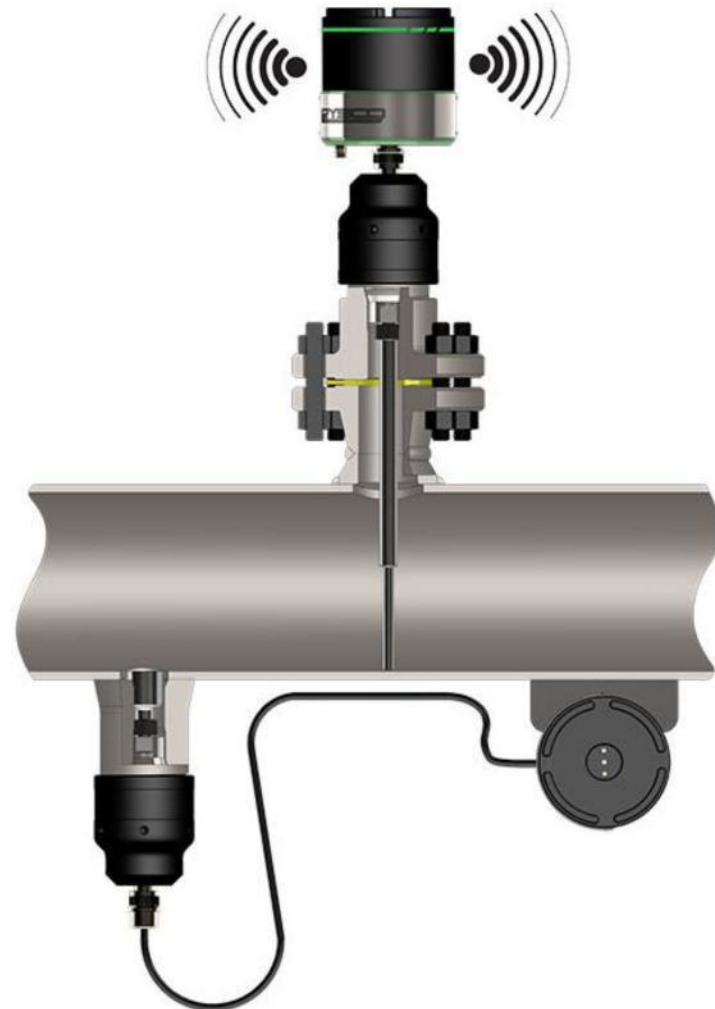
Also, coupons can provide information about the pitting morphology (appearance) and can be swabbed for sessile microbial analysis.



# Corrosion Probes (Electrical Resistance)

An ER probe utilises the electrical resistance of a measuring element. As the measuring element loses mass due to corrosion or erosion of the environment, the electrical resistance of the measuring element changes. Comparison to an unexposed reference element provides a metal loss value. Comparison of values over short periods of time provides real time values.

These probes can provide continuous, near real-time data on corrosion rates, enabling operators to take prompt action when corrosion rates exceed acceptable limits.





## Erosion Causes

Erosion is primarily caused by high-velocity fluid flow, which can lead to the detachment of small particles from surfaces.

Factors such as the presence of abrasive solids (such as sand) in the fluid and the turbulence generated in pipelines and equipment exacerbate the erosive effects.



## Erosion Effects

The erosive impact on equipment surfaces leads to material loss, resulting in reduced equipment efficiency and increased maintenance frequency.

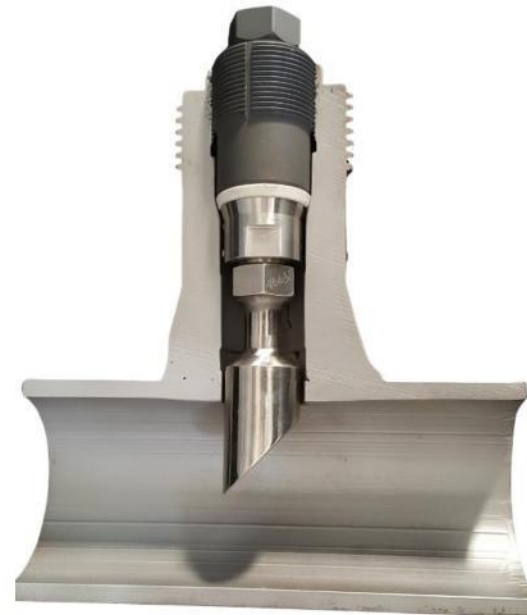
Severe erosion can cause equipment failure, compromising the safety of personnel and the environment. Proper monitoring and mitigation are essential to prevent these adverse effects.



# Erosion Monitoring

Erosion monitoring techniques, such as erosion probes and ultrasonic sensors, enable the real-time tracking of material loss due to fluid impact.

These tools provide valuable insights into erosion rates, allowing operators to assess the health of equipment and plan maintenance effectively.



# Advantages of Effective Monitoring

Effective corrosion and erosion

monitoring systems offer

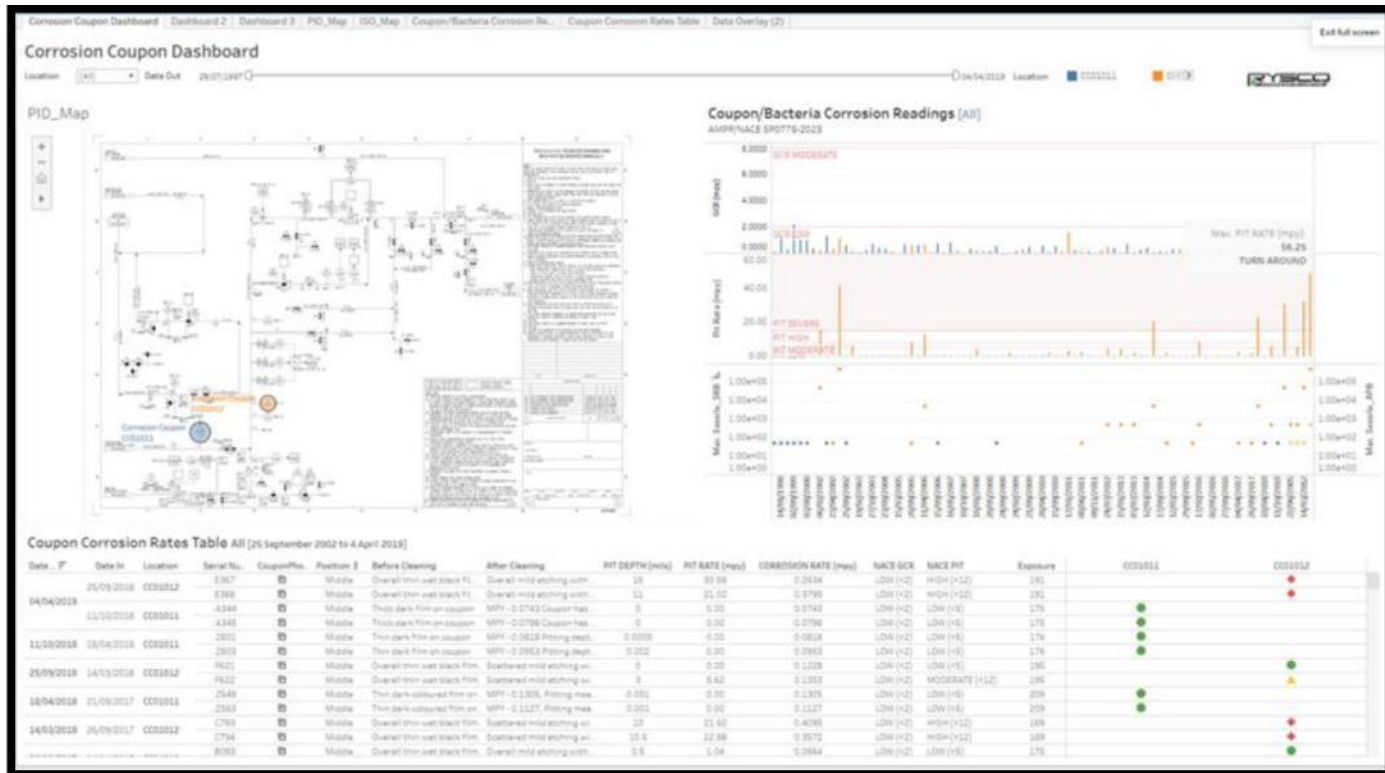
several advantages, including

- Early detection of issues
- Reduction in unplanned  
downtime
- Optimization of maintenance  
schedules
- Improved safety for both  
personnel and the  
environment



# Data Driven Decision Making

Accurate and reliable monitoring data serves as a foundation for informed decision-making. It helps operators assess risks, prioritize maintenance efforts, and avoid unnecessary maintenance, which can lead to additional costs.



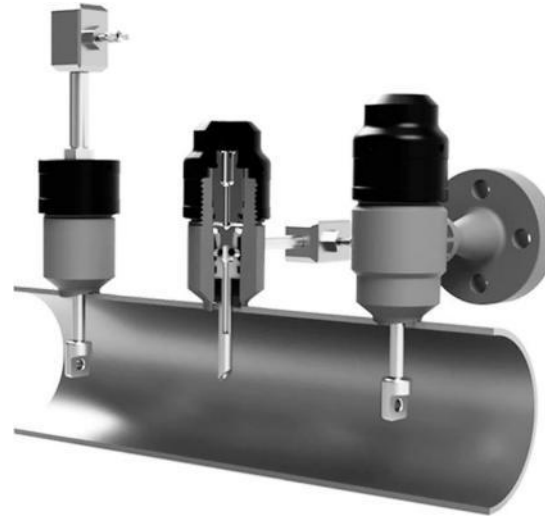


# Mitigation Strategies – Internal Corrosion

Corrosion can be mitigated

through:

- Selection of corrosion-resistant materials
- The application of protective coatings and linings
- The injection of production chemicals to prevent and reduce the effects of corrosion mechanisms
- Mechanical cleaning of the pipe internals, commonly known as pigging



# Mitigation Strategies - Erosion

To mitigate Erosion operators can employ strategies such as:

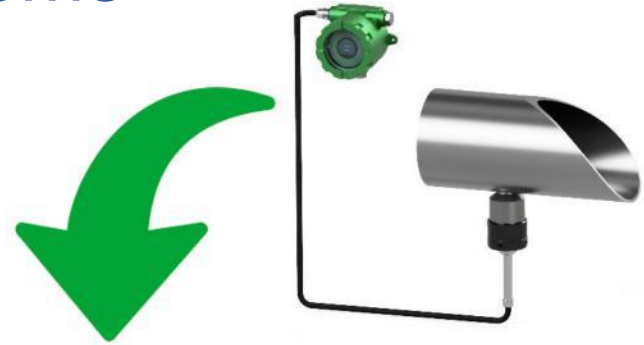
- Installing flow modifiers and deflectors to
  - control fluid velocity
  - direct flow patterns
- Additionally, the optimization of fluid velocity and pressure can help minimize erosive effects.



# Integrating Monitoring Systems

Integrating erosion and internal corrosion monitoring systems provides a comprehensive understanding of asset health.

Synergies between these systems enable operators to anticipate maintenance needs accurately and prevent potential equipment failures.



# Training and Personnel

A skilled workforce is crucial for the proper installation, operation, and maintenance of erosion and corrosion monitoring systems.

Training programs ensure that personnel are proficient in utilizing monitoring techniques safely and effectively.





## Conclusion

Erosion and corrosion pose significant challenges to oil and gas production, impacting safety, efficiency, and profitability.

Effective monitoring techniques, combined with ongoing innovation and investment, are essential to mitigate these challenges and ensure the sustainability of the industry.





## Questions and Open Discussion



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Thank you for your attention...

Q & A

