Emerson Corrosion Monitoring Solutions

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Corrosion Solutions
The consistent corrosion & erosion threats to your business

**UPSTREAM**
- Integrity threats from sand erosion, both to wellbore and wellhead assets
- Maintenance challenges related to sand accumulation
- Integrity threats from corrosion of wellhead assets
- Costly chemical treatment programs

**MIDSTREAM**
- Integrity threat from corrosion
- Costly integrity management programs
- Inefficient and intermittent maintenance tools
- Challenging access in remote locations

**DOWNSTREAM**
- Widespread integrity threats from corrosion
- Challenging corrosion risk evaluation due to process complexity
- Great variety of assets under threat

Safety  Availability  Cost  Performance
The real challenge lies in Maximizing your potential, safely

- Ensure that YOUR strategy drives the solution

- Measurements
  - Technology selection
  - Re-use existing instrumentation

- Connectivity
  - Get data to desk

- Visualization
  - Present the right information to the right user

- Quality
  - Data correlation from complimentary technology
  - Proper signal processing

- Scalability
  - Both financially and technically
# The Emerson toolkit – Industry leading solution portfolio

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Measurements &amp; infrastructure</th>
<th>Visualization</th>
<th>Services</th>
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</thead>
</table>
| • Site assessments  
• Solution mapping  
• Design engineering  
• ROI evaluations | • No-intrusive  
• Inline  
• Data to desk | • Data collection, processing and conditioning  
• Trending & reporting  
• Dashboards  
• Advanced visualization and analytics | • Turnkey Services from Emerson  
• Strong presence in local services clusters  
• Service Engineers experienced in delivering solutions  
  - Hardware and Software Configuration  
  - On-Site Installation  
  - Start-Up and Commissioning  
  - Training  
  - Long-Term Service Agreement for Maintenance Support |
Proper insight to you challenges

**EVALUATE RISK**

**Intrusive**
- Electrochemical (LPR, Galvanic)
  - Corrosivity
- Electrical resistance (ER)
  - Corrosivity or erosion through metal loss
  - High sensitivity, quick response

**Acoustic**
- Solids detection

**MEASURE IMPACT**

**Non-intrusive**
- Ultrasonic (UT)
  - Wall thickness
- Field Signature Method (FSM)
  - Wall thickness, area coverage

- Actual metal loss, wall thickness
Proper insight to you corrosion challenges

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Proper insight to your corrosion challenges - Applications

**EVALUATE RISK**

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<td>Field Signature Method (FSM)</td>
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- Any process
- Verification
- Corrosion mechanism analysis
- MIC verification
- Conductive media (water systems)
- After potential process changes
- Uniform corrosion impacts
- Critical locations
- Phase changes
- Chemical injection
- After process changes
- Main integrity verification tool
- Localized attacks
- Chemical injection
- High velocity, turbulence

**MEASURE IMPACT**

- High sensitivity, quick response
- Actual metal loss, wall thickness
Proper insight to you corrosion challenges - Recommendations

**EVALUATE RISK**

**Intrusive**
- Electrochemical (LPR, Galvanic)
  - Any process
  - Verification
  - Corrosion mechanism analysis
  - MIC verification

**Non-intrusive**
- Ultrasonic (UT)
  - Flexible, highly distributable, single point wall thickness integrity measurements
  - High end area monitoring
  - Localized corrosion detection

**Electrical resistance (ER)**
- Quick response time
- Detect process changes
- Chemical treatment verification

**Electrochemical (LPR, Galvanic)**
- Conductive media (water systems)
- After potential process changes
- Quick response time
- Detect process changes
- Chemical treatment verification

**Ultrasonic (UT)**
- Actual metal loss, wall thickness

**Field Signature Method (FSM)**
- Critical locations
- Localized attacks
- High velocity, turbulence

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Emerson Gold Standard

- Flexible, highly distributable, single point wall thickness integrity measurements

Emerson Gold Standard

- High end area monitoring
- Localized corrosion detection

High sensitivity, quick response
Delivering actionable information to desk

**Infrastructure**
- Flexibility in deployment and integration with a wide portfolio of communications and connectivity technologies
- Wireless or wired
- Project certainty enablers

**Software**
- Flexible software platform to ensure proper data processing and visualization
- Simple dashboards
- Advanced trending & analytics
- Distributed deployment options
Data Visualization through Roxar™ Fieldwatch

Real time reliable data from multiple sources presented to multiple users in one system

- Reliable trend analysis
- Correlate corrosion/erosion with process change for process control and actions
- Improved verification prior to corrective actions, such as process changes
- Real time alarm generation and handling
- Data more available to expert users
- Reliable data acquisition
- Interactive 3D viewing
Roxar Fieldwatch: The “Traffic Light” Status
Emerson Global Corrosion & Erosion services

- **Start-up**
  - Installation and commissioning
  - System handover and user training

- **Reliability**
  - Walkdowns and system status reviews
  - Periodic performance testing and data quality assessment
  - Trouble shooting and help desk

- **Maintenance**
  - Field Services
  - Inventory planning, spare parts
  - Periodic field maintenance

- **Performance**
  - Monitoring data evaluation and reporting
  - Corrosion & Erosion consultancy and advice
  - Integration of corrosion & erosion monitoring as part of asset integrity and process solution
  - Long Term Service Agreements

Long term service agreements focusing on knowledge and data, ensure maximum user satisfaction and value
Emerson solutions help meet future business demands safely

- Reduce OPEX safely
- Optimize operations
- Avoid major incidents

SAVE $100,000s
GENERATE $ BILLIONS
AVOID SPENDING/LOSSES $ $$$ TENS OF MILLIONS+