

# Crude Unit Overhead

Predictive Corrosion Management

Empowering refineries to proactively manage corrosion risk





Today's refineries spend millions of dollars each year to maintain piping integrity at their facilities. The goal of downstream oil and gas operators is to identify and manage corrosion before it impacts plant operations.

At Waygate Technologies, a Baker Hughes business, we understand your need to increase efficiency, productivity, reliability and predictability. But we also realize you are skeptical of the promises of large-scale, "state-of-the-art" technologies that come with increased complexity and high capital investment.

That's why Waygate Technologies empowers you with predictive corrosion management (PCM) capabilities, offered as part of our Asset Performance Management (APM) portfolio. We give you the insights you need to:

- + Proactively manage corrosion risk
- + Make data-driven decisions
- + Reduce total cost of operations



## Our PCM offering gives you:

### Enhanced risk avoidance with a big picture view of operational conditions:

- Near real-time data for corrosion rates, temperature, and wall thickness
- Access to data that often is siloed
- Streamlined auditing

### Less downtime with continuous pipe monitoring via sensor data collection:

- Reduced need for manual inspection
- Remote Rightrax PM sensors for difficult-to-access areas
- Increased asset coverage with new higher temperature threshold capability (400°C)
- Ultrasonic wall thickness monitoring system for pipe corrosion and erosion

### Proactive insight with powerful predictive analytics:

- “What if” scenarios enabled through artificial intelligence (AI) to calculate potential impact
- Drill-down views of asset health, including easy filtering features
- Improved User Interface



## Atmospheric tower overhead systems monitoring

Zones of potential corrosion activity that should always be monitored:

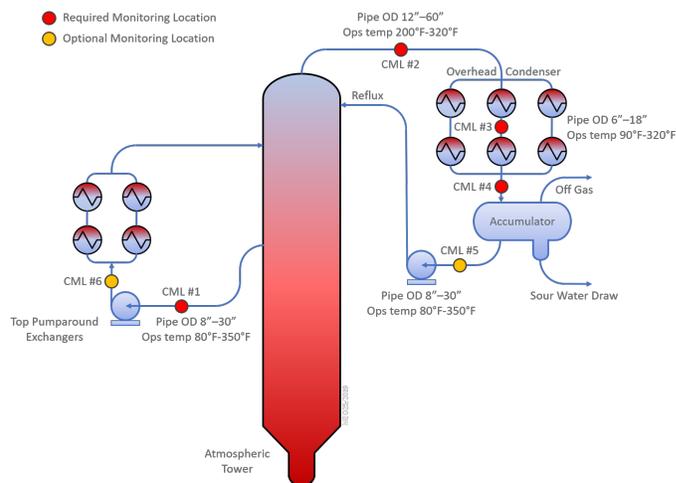
- Main overhead vapor line
- Downstream of condensed water phase (or downstream of water wash injection)
- Overhead drum inlet
- Vapor line from 1st stage drum
- Naphtha reflux from 1st stage drum (dry 1st stage)
- Top pump around draw piping

Although not strictly required, monitoring might be useful for other zones:

- Naphtha reflux (single stage overhead)
- Naphtha reflux (wet 1st stage)
- Top pump around pump discharge line

The following scenarios provide typical examples of atmospheric tower overhead configurations, including both required and optional sensor locations. When implementing sensor installations, Waygate Technologies technical representatives work closely with you to tailor a proper monitoring program for your particular overhead configuration.

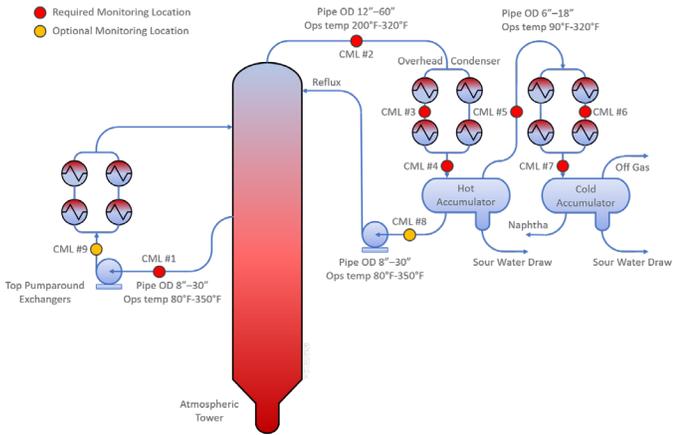
Scenario #1: One-Stage Overhead



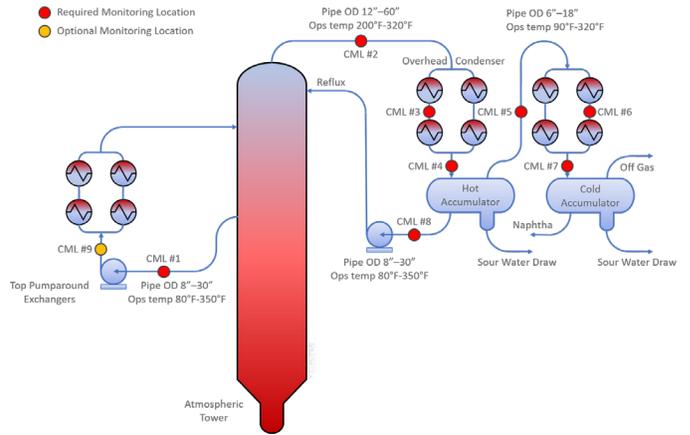
Scenario 1 – Proposed Rightrax Sensor Locations One-Stage Overhead



Scenario #2: Two-Stage Overhead, 1<sup>st</sup> Drum Wet



Scenario #3: Two-Stage Overhead, 1<sup>st</sup> Drum Dry



Scenario 2 – Proposed Rightrax Sensor Locations  
Two-Stage Overhead/1<sup>st</sup> Drum Wet

Scenario 3 – Proposed Rightrax Sensor Locations  
Two-Stage Overhead/1<sup>st</sup> Drum Dry



## The nuts and bolts of our PCM offering

### Sensor configuration

Default sensor configurations are depicted in Figures 1 and 2. For straight piping, eight sensors are needed; on elbows, 12 are used. The number of sensors can be customized, too, depending on application requirements. We determine the exact required hardware and installation duration upon completion of the site survey.

### Limitations on number of sensors per strap

The number of sensors in circumference, i.e. sensors per strap, is limited. The maximum number of sensors per strap is determined by the pipe's outer diameter (OD), as shown in Figure 3 below. The strap must touch the pipe between two adjacent sensors, as is shown in Figures 1 and 2 below.

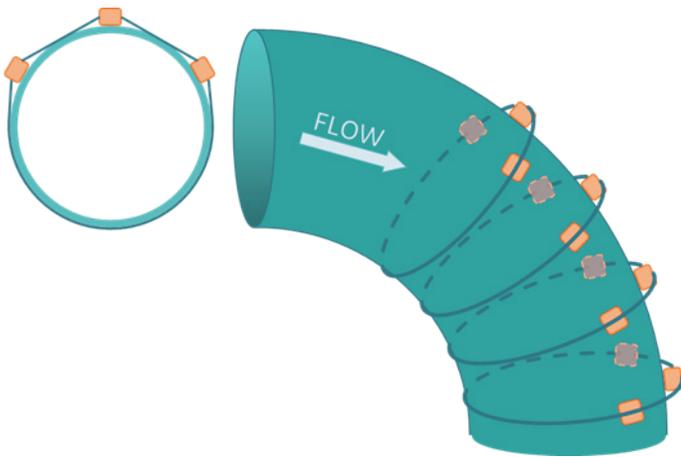


Figure 1: Sensor configuration on elbows

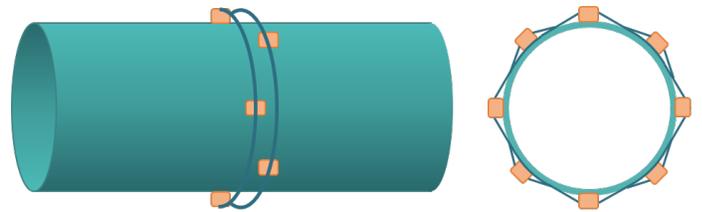


Figure 2: Sensor configuration on straight piping



## Number of sensors on elbows

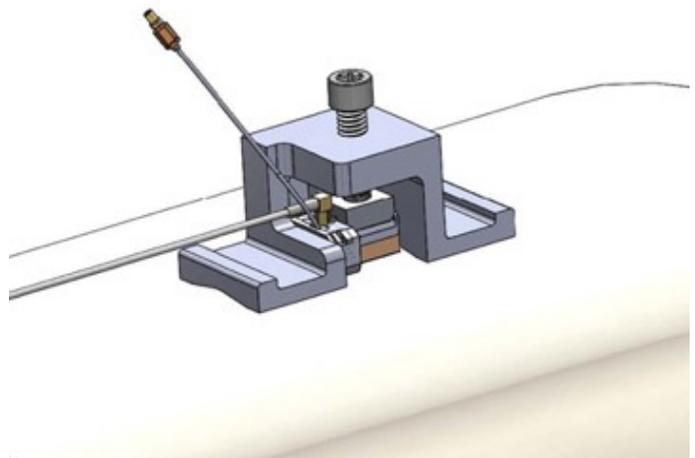
How close the sensors can be in the axial direction along the elbow depends on elbow radius (e.g. 1.5D) and pipe OD. The limiting factor is the width of the straps at the inner bend (intrados). The straps can touch each other but may not overlap.

## Large pipe diameter

For pipe diameters exceeding 24 inches, a so-called large OD clamp is required to attach to each sensor on the pipe. This is applicable for pipes with OD from 24 to 72 inches, and is heat resistant up to 400°C/752°F. Installation is similar to sensor installation on pipes with OD less than or equal to 24 inches, and requires two straps instead of one.

## Sensor type

For all corrosion monitoring locations, low temperature sensors will be applied. These sensors are heat resistant up to 200°C/392°F. If the asset operating temperature exceeds this, then high temperature sensors will be applied. These are heat resistant up to 400°C/752°F.



Let Waygate Technologies' ground-breaking technologies empower you to proactively monitor your refinery's corrosion risk. See how our predictive corrosion management solutions can provide you with a safer and more cost-effective way to make your refinery more efficient, productive and reliable.