GUIDED ULTRASONICS LTD.

GUL MONITORING

CASE STUDY – EARLY DETECTION OF CORROSION IN JETTY LINES

JETTY LINES

- Jetty facilities are critical operational elements of sea-borne refineries, enabling import of crude and feedstocks and export for finished products and intermediates.

- Often a considerable distance out from the shore to enable safe berthing of vessels to load/unload, so the various pipelines from the refinery to the jetty can be several kilometres long.

- The pipelines are exposed to severe weather conditions including sea spray, increasing the possibility of external corrosion in addition to the corrosion from materials transported through the pipeline.

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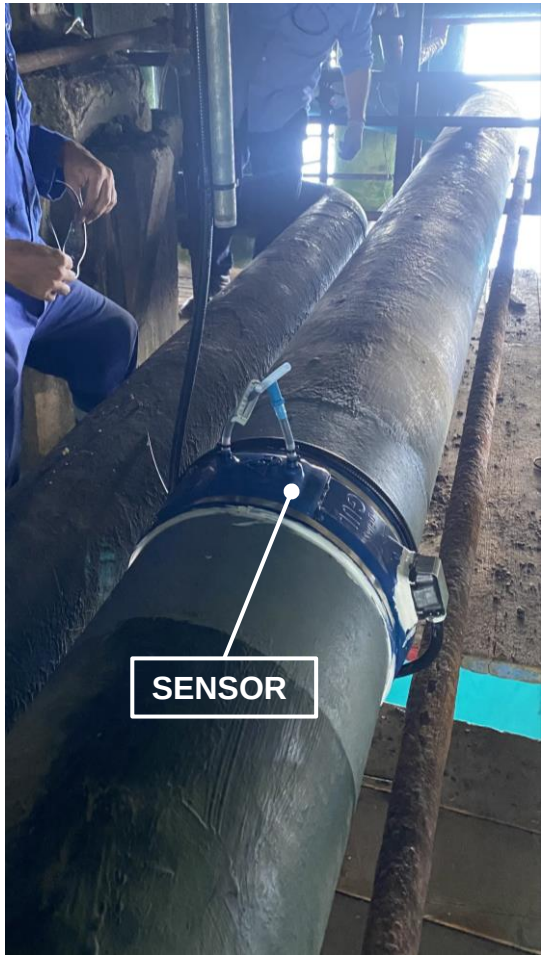
INTEGRITY MANAGEMENT

- Ensuring the integrity of these pipelines is a major challenge because access for regular inspections is difficult.
- Unplanned maintenance results in shipment of product by alternative means, resulting in a forced reduction in the refinery throughput or increased storage requirements.
- In addition to the operational and financial implications, any loss of containment may have serious environmental and reputational consequences.
- Proactive integrity management is therefore crucial for the safe and efficient transfer of fuel, chemicals, or other materials between ships and shore facilities.

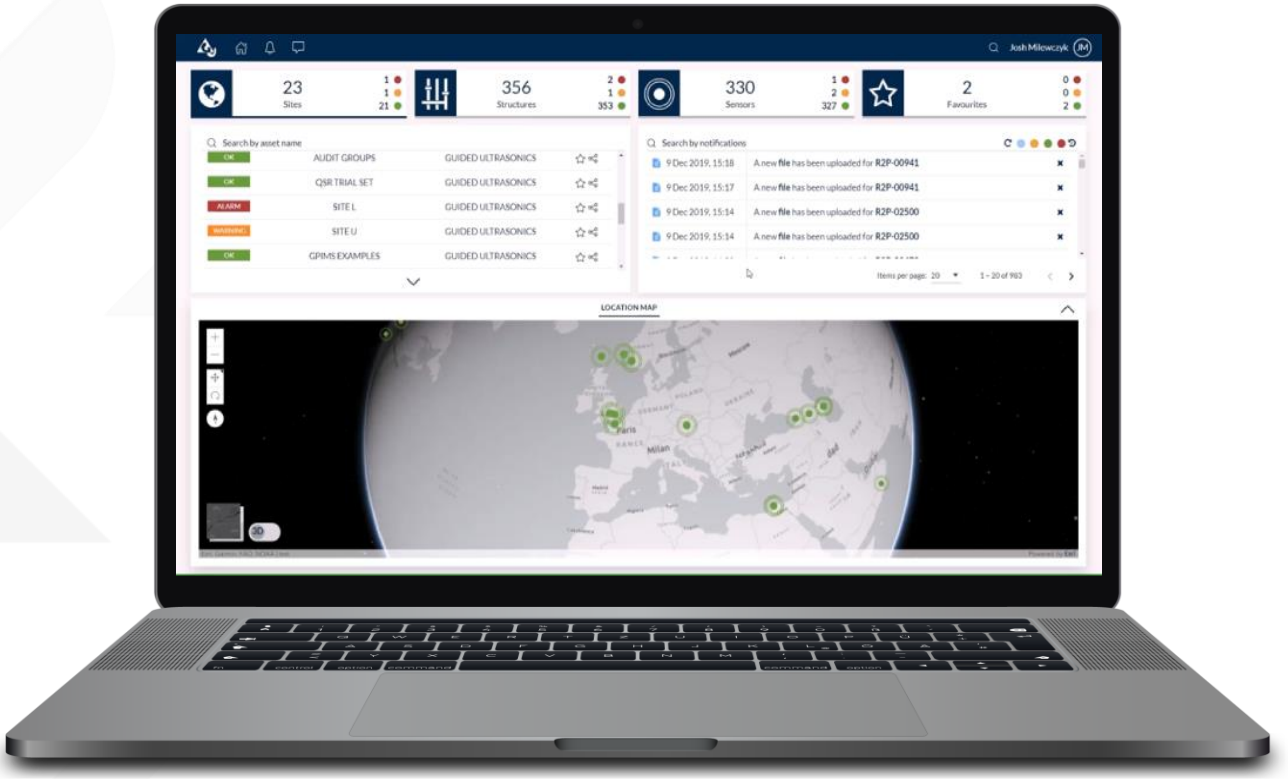
JETTY LINE MONITORING

A client installed gPIMS monitoring sensors in 2022 on pipelines underneath and besides the jetty structure to assist with managing their integrity. The sensor installation on a 16inch crude oil line (12.7mm WT, corrosion allowance 3.17mm) used for this case study, located in an EX-area, is shown below.



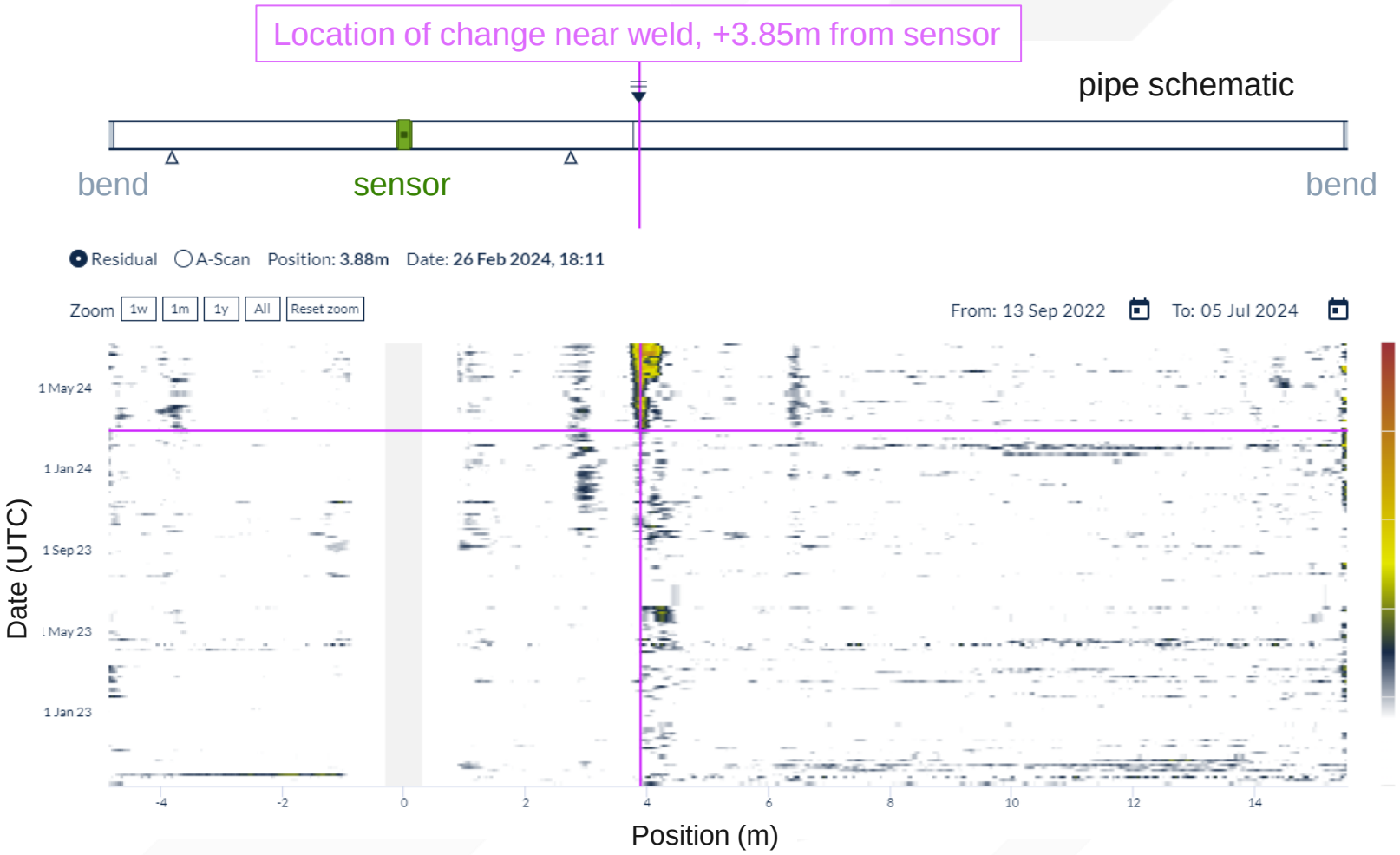
SENSOR TO INFORMATION

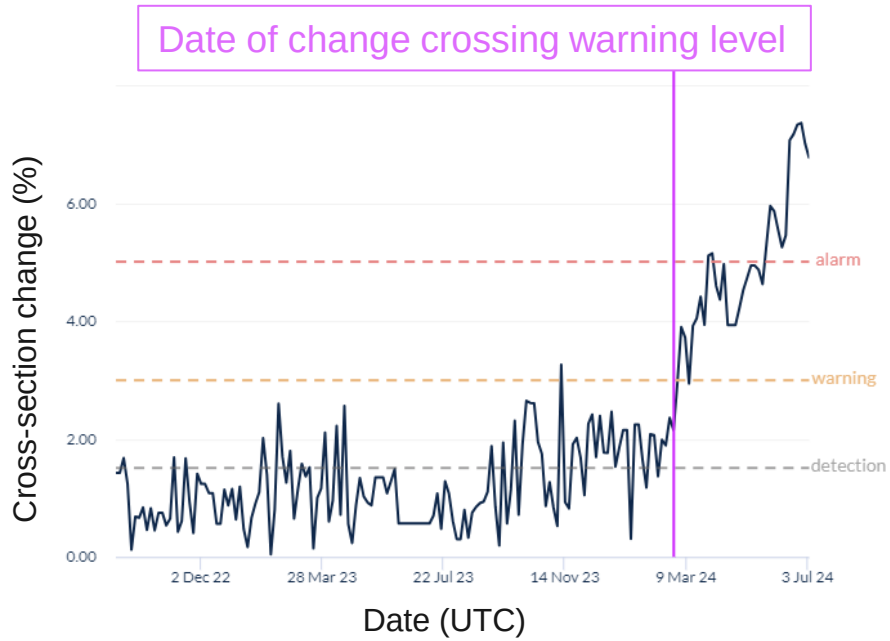
The system delivers frequent data via a Wi-Fi connection provided by field control units directly to the desk of the client's corrosion engineers. The information from the sensors is accessed via the browser-based **GUL Monitoring Studio**.



AREA MONITORING

1.5 years after installation an alarm was raised in the Monitoring Studio on cross-section changes observed near a weld.

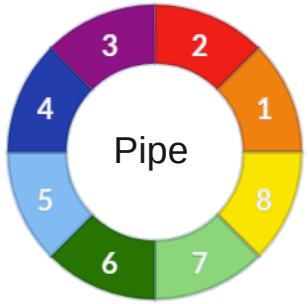




WALL THICKNESS MONITORING

Wall thickness underneath the sensor location was stable throughout the period, showing there was no threat from generalized internal corrosion.

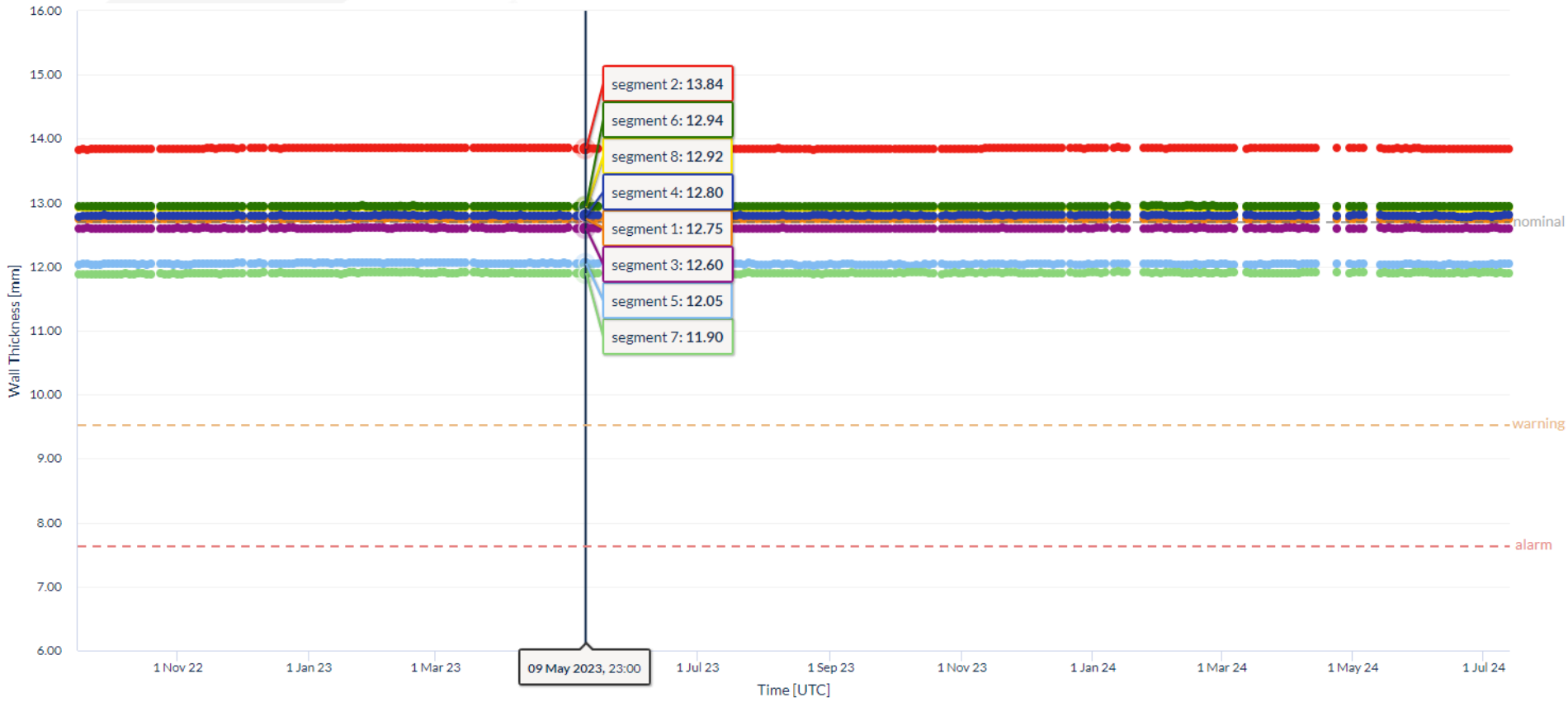
Sensor segments



SELECT ONE SEGMENT

DESELECT ALL | SELECT ALL

Minimum segment:	7
Minimum:	11.87 mm
Mean:	12.73 mm
Max:	13.87 mm

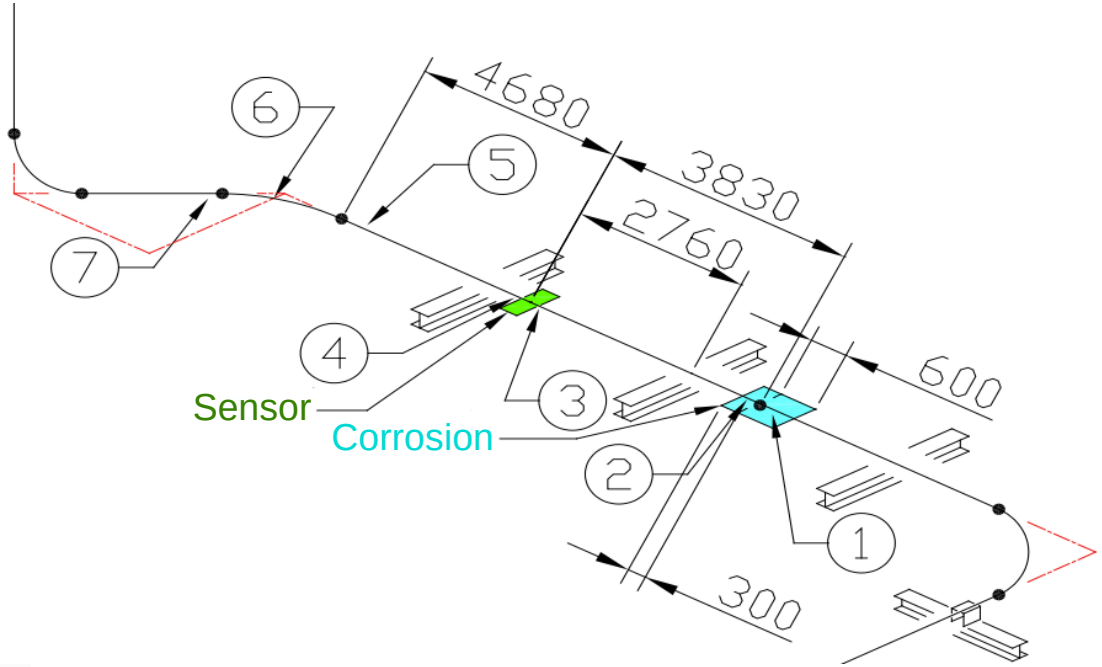


FOLLOW-UP INSPECTION

Visual follow-up inspection revealed corrosion scale in the area of the weld. The scale was removed and the area around the weld inspected:

Visual testing: ~ 1-3mm wall loss in the affected area

Ultrasonic testing in area ① : minimum WT **10.8mm**; in area ② : minimum WT 11.2mm



BENEFITS OF AREA MONITORING

- gPIMS monitoring allowed early detection of active corrosion before corrosion allowance limits were reached.
- The recommendation of the follow-up inspection was to clean the area affected and re-apply a coating suitable for marine environments. Therefore, more extensive, costly and unplanned maintenance, which could result in loss of profits from refinery operations due to restriction of jetty capacity, was prevented.
- The pipe is not directly accessible for visual inspection as it is supported below the jetty structure and above water. Even with visual inspection, active corrosion underneath a coating can easily be missed. Therefore, without area monitoring, this corrosion could have resulted in loss of containment, causing environmental pollution, regulatory non-compliance, reputational damage and loss of stakeholder confidence.
- Local monitoring methods, such as coupons and UT point monitoring, will not find this type of corrosion as it is external and can occur anywhere along the pipe. In this application, gPIMS monitoring covered an area of ~250,000cm^2 ensuring early detection of the threat.

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