CorrSolutions

THE E²G DIFFERENCE

Strategic mix of
data science, CAD expertise, and actual plant experience

Provides quality and timely support
in all areas of reliability

- Improve operational reliability
- Optimize inspection and maintenance costs
- Streamline inspection planning
- Visualize corrosion behavior

INDUSTRIES

- Biofuels/ Renewables
- Chemical & Specialty Chemicals
- Nitrogen & Fertilizer
- Oil & Gas
- Petrochemicals
- Pipelines

TAKE DATA-DRIVEN RELIABILITY TO THE NEXT LEVEL

Typical refineries or petrochemical plants have more than 150,000 piping inspection points. Inspecting each inspection point can be costly and time consuming, especially if additional equipment is needed to access each point. Knowing the answer to the following questions will streamline your piping inspection program.

- Do you know which corrosion monitoring locations (CMLs) provide the most value?
- Have you identified all susceptible piping locations?
- Do you know if you are inspecting the right locations?

Achieve measurable benefits and new insights into corrosion management by applying the advanced thickness analysis methodology developed by CorrSolutions, a subsidiary of E²G | The Equity Engineering Group, Inc. This method aligns with industry inspection standards as it analyzes corrosion monitoring data, integrates the latest improvements in inspection capabilities, identifies data anomalies that are outside the anticipated thickness ranges, and develops strategies for immediate resolution. Plan your next inspection with confidence – use advanced thickness analysis to eliminate unnecessary inspection points, achieve safer facilities, and minimize inspection costs.

KNOW **WHERE** TO INSPECT

Confidently know which CMLs to inspect.

We will assess your circuits and identify the magnitude and locality for your corrosion.

KNOW **HOW** TO INSPECT

Understand which NDE methodology is appropriate for the corrosion you are experiencing.

We will recommend the most practical inspection technique based on the results of the assessment:

- Ultrasonic (UT)
- Radiographic testing (RT)

KNOW **WHEN** TO INSPECT

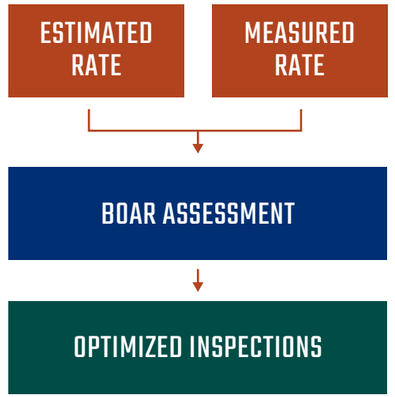
Schedule next piping circuit inspection based on rate of corrosion and thickness projection, not time or half-life estimates.

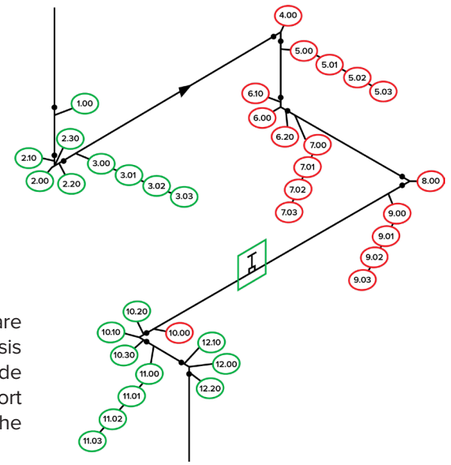
We will use corrosion rates with appropriate levels of uncertainty based on the operating service or consequence of failure (COF) to schedule the next inspection.

BAYESIAN OPTIMIZED ASSET RELIABILITY (BOAR) ASSESSMENT

CorrSolutions has developed a patented methodology that combines historical thickness data, related inspection program information, and inspector experience to provide better and more predictive results. Using your thickness data, we can identify localized corrosion issues and provide recommendations to optimize inspection points and reduce maintenance costs.

- Optimize CML allocations, inspection dates, and locations
- Determine if current corrosion rates are over or underestimated
- Quality check circuitization and recommend changes if a circuit is experiencing multiple environments
- Quantify localized and generalized corrosion
- Identify corrosion “hot spots”
- Provide informed corrosion rates that can be added to any risk-based inspection (RBI) program





BOAR REPORTS AND RESULTS

BOAR assessment results are provided with multiple analysis levels to enhance facility-wide communication and support broad acceptance of the streamlined inspection plan.

- Quickly identify the CMLs to inspect and determine which ones to deactivate with color-coded isometrics
- Project future thickness measurements for each CML
- Compare assets on a risk matrix and plot to the current, future turnaround, or plan dates

CASE STUDY: OPTIMIZE CMLs IN CRUDE UNIT FEED SYSTEM

The CorrSolutions team recently worked with a North American refinery to prioritize the CMLs in a subset of its Crude Unit piping circuits. Even though the CMLs were not causing any issues, the owner-user thought they may be spending unnecessary time and maintenance money inspecting each location.

To prioritize which CMLs were necessary, CorrSolutions conducted a proof-of-concept BOAR assessment on 16 circuits, including the crude preheat section and two overhead circuits. CorrSolutions found limited corrosion occurring in the preheat sections, while in the overhead circuits, the BOAR assessment confirmed what our team expected: localized corrosion was occurring with rates higher than the feed system.

The BOAR assessment identified both the areas of limited and higher localized corrosion. As a result, the owner-user was able to reduce CMLs on 60% of the crude unit feed systems.

SYSTEM DESCRIPTION	ACTIVE	INACTIVE	VERIFY	TOTAL	% ARCHIVE
Crude Feed - Cold Preheat	45	86	2	133	65%
Crude Feed - Desalter	18	48	0	66	73%
Crude Feed - Hot Preheat	32	60	0	92	65%
Crude Feed - PSV Outlets	12	27	0	39	69%
Preflash Tower OH Piping	21	3	0	24	13%
Atmospheric Tower OH Piping	24	0	0	24	0%
TOTAL	152	224	2	378	60%