

Osmose®

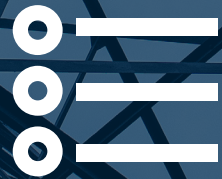
Steel Tower & Pole Turnkey Solutions



Osmolytics



Structure
Assessment



Engineering
Review



Corrosion
Mitigation



Engineered
Designs



Structural
Restorations



Osmose Utilities Services Turnkey Solutions

Since 2010, Osmose has assessed hundreds of thousands and rehabilitated tens of thousands of steel structures.

As a turnkey solution provider, Osmose assists electric utilities with every aspect of implementing a steel infrastructure management program for steel distribution and transmission assets.

We offer the necessary industry expertise to develop effective steel asset life extension programs. Our skilled field technicians thoroughly assess structures and categorize and prioritize those needing follow-up action. Osmose has the engineering resources necessary to design and implement complex structural restorations for both steel and concrete, including the application of protective coatings and cathodic protection.

- Industry expertise in corrosion remediation
- Experienced Professional Engineers to design steel and concrete restorations
- Highly-trained field technicians and NACE-certified corrosion experts

Understanding and Addressing the Risks of Aging Steel T&D Assets

Steel transmission and distribution towers and poles were once thought to be permanent structures free from maintenance and reliability concerns. History has revealed that steel towers and poles do degrade over time due to corrosion activity and mechanical damage. This degradation leads to weakening to the point where structures can no longer support their intended design load. Such deterioration, if unaddressed, may eventually lead to structure failure.

Age alone is not an accurate predictive indicator of which structures may be experiencing corrosion degradation. There are many contributing factors that can cause corrosion and affect the rate at which a structure corrodes, including:

Structure Characteristics

- Age
- Structure type and design
- Material type
- Foundation construction
- Existing coatings

Environmental Conditions

- Terrain and soil conditions
- Moisture content
- Stray current
- Agricultural activity
- Industrial emissions

An **Asset Management Workshop**, provided by Osmose at no cost to utilities, can help steel transmission asset owners determine the best assessment methodologies to optimize both structural and financial performance of this asset class.

The objective of the workshop is to develop a steel management program that is financially beneficial to your utility, the rate payer, and the shareholder, while extending the service life of the assets and improving system reliability, resiliency, quality, and safety.

The workshop integrates industry best practices to help your utility develop an asset management program that extends the performance life of the assets, while mitigating risk and optimizing future financial outcomes.



Corrosion Assessment

Osmose steel corrosion assessment programs locate and classify deterioration on steel structures to identify those in need of mitigation and restoration, helping you avoid costly replacements.

Structural Ratings & Corrosion Potential Assessment

The assessment process involves both structural and corrosion potential assessments.

As part of the structural assessment, each foundation member of each tower is measured and evaluated and assigned a structural rating based on the extent of existing corrosion and the structure's ability to support its original design loads. The structure and its environment are also scientifically evaluated and given a corrosion potential rating that indicates how aggressive corrosion may be if not properly managed. This comprehensive rating is indicative of the structure's current corrosive condition and potential for future deterioration based on environmental factors.

Data Deliverables

All relevant structural and environmental data collected during the assessment process is recorded and delivered to you. You receive all raw field data as well as project summary reports that summarize the findings and provide recommendations for logical, cost-effective next steps for asset life extension.

Accurate, comprehensive data allows you to immediately address any emergency concerns and understand the overall condition of the transmission plant. The environmental data collected allows the utility to develop a plan for corrosion mitigation and structural restoration of deteriorated and damaged structures.



Corrosion Risk Modeling

Using Osmolytics™, an application which leverages environmental databases and data from over 125,000 steel structure inspections, structure owners can also obtain valuable predictive modeling results designed to aid in the decision-making process.

Engineered Restorations

Osmose provides restoration solutions for structurally weakened or damaged structures with all foundation types and configurations. These engineered restorations can often reset the service life of the steel asset, effectively making the structure perform to its original design or better. The restoration solution is a fraction of the cost of asset replacement.

Structural Steel Restoration

(Designed and implemented to ASCE 10 specifications)

- Corrosion rehabilitation to restore original strength
- Structure is temporarily supported where required; lines remain in service
- Structural uprates

Concrete Foundation Restoration

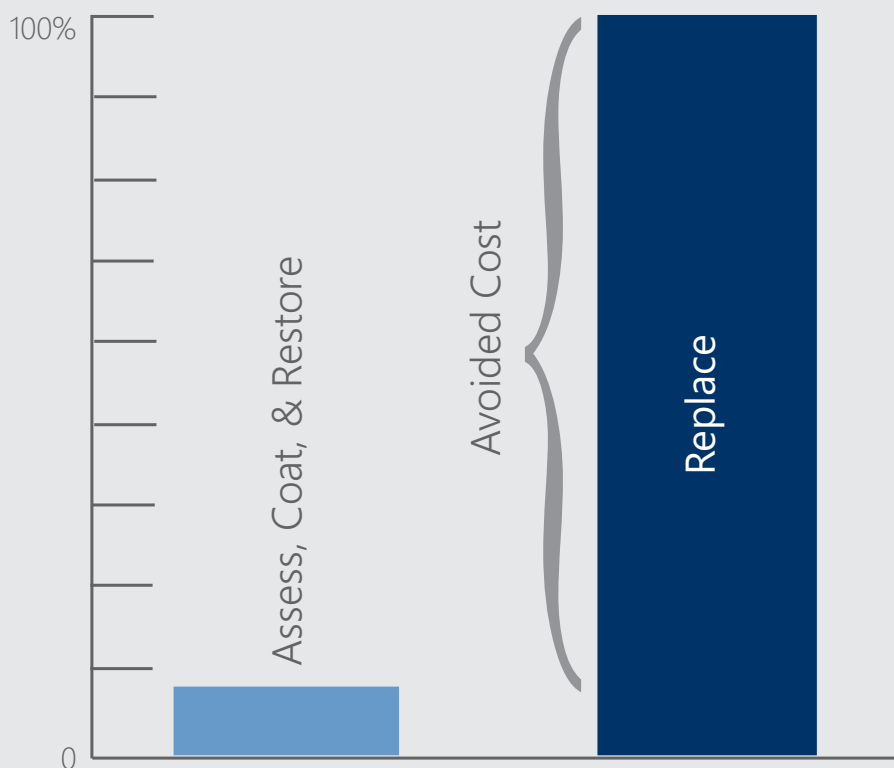
(Designed and implemented to ACI standards)

- Concrete rehabilitation
- Total structural rebuild of concrete foundations



Operational & Financial Benefits - Making Sense of the Investment

A comprehensive steel asset management program has both operational and financial benefits. By controlling corrosion activity through mitigation and restoration, the program will add years of reliable service life to the system. By providing a well-documented life extension service, the program extends replacement CAPEX requirements many years into the future.



Capital budget optimization is achieved by proactively managing transmission assets in lieu of reactively replacing structures at time of failure. The cost to comprehensively inspect, restore, and mitigate a steel tower on a programmatic basis is a fraction of the cost of tower replacement. An Osmose coating and rehabilitation program significantly extends the useful life of steel towers and poles. As a result, many utilities are presently capitalizing part of their programs.

Adding years of dependable service life to steel structures in a programmatic manner defers costly restoration and replacements, thereby reducing capital and O&M budget requirements and facilitating investments in other key projects and programs. The net result of a well-managed corrosion program is more effective regulatory compliance, safe and reliable system operation, and predictable financial outcomes.

Corrosion Remediation

Application or installation of corrosion countermeasures, such as specialized below-grade coatings or cathodic protection, can help extend the performance life of steel poles and towers an average of 20 to 30 years, depending on which mitigation solutions are implemented. Osmose has the professional experience and skills to develop optimal corrosion remediation and management programs that provide long-term protection and life extension.

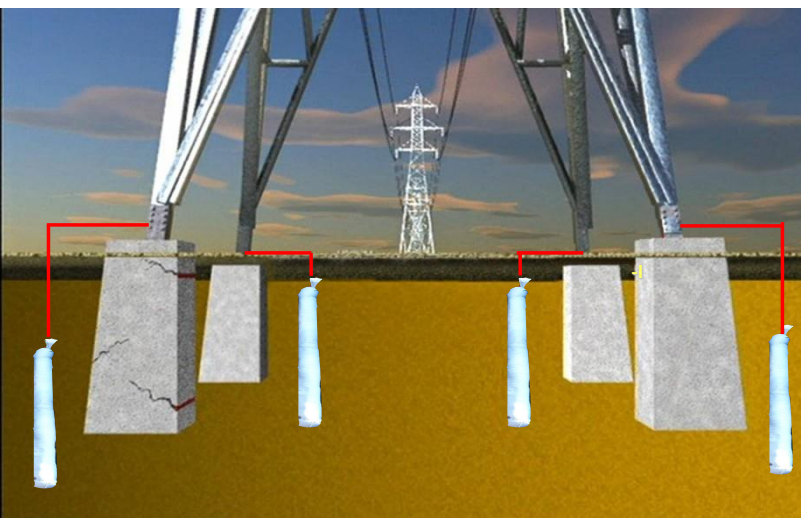
Coatings

Application of below-grade coating systems adds an improved measure of protection to mitigate corrosion and effectively extend the service life of structures.



Galvanic Cathodic Protection Systems

Cathodic protection is often used as a secondary mitigation method to target specific difficult-to-access structures, or structures in highly corrosive environments. Applying sacrificial anodes to steel structures provides an additional layer of corrosion mitigation. Cathodic protection does not eliminate corrosion activity, it simply transfers the corrosion activity from the steel structure to the anodes, which sacrifice themselves to protect the asset. In addition, remote monitoring units are available for installation in difficult to access areas or conservation lands to regularly transmit cathodic protection information back to utilities.



RELIABILITY STANDARDS

Osmose steel asset management programs help utilities ensure the safety and reliability of high-value bulk transmission assets that fall under FERC oversight.



Osmose is an active member, participant, and/or complies with the following organizations and their standards:

ASCE

American Society of Civil Engineers

ACI

American Concrete Institute

AISC

American Institute of Steel Construction

NACE

National Association of Corrosion Engineers

IEEE

Institute of Electrical & Electronics Engineers

NESC

National Electrical Safety Code

SSPC

Steel Structures Painting Council

ANSI

American National Standards Institute

ASTM

American Society for Testing and Materials

DOT/OPS

Department of Transportation/Office of Pipeline Safety

AWS

American Welding Society

ICRI

International Concrete Repair Institute

Osmose[®]
The Structure Company

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