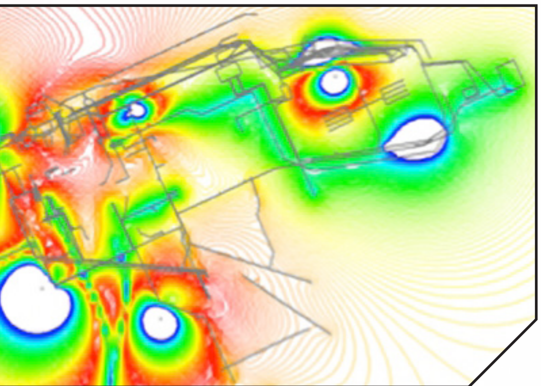
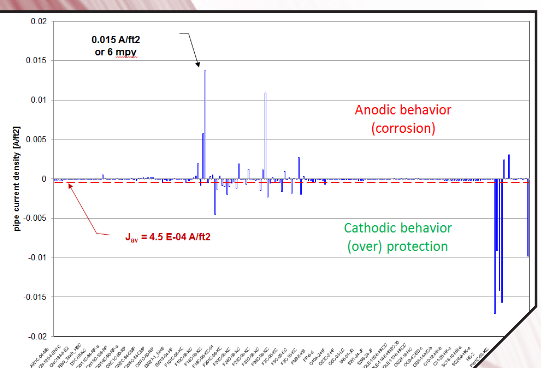
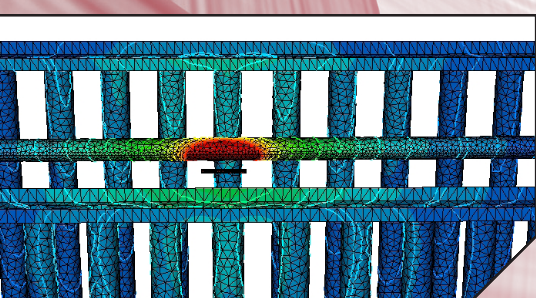
Structural Integrity Associates, Inc.®

Modeling Cathodic Protection for Improved Designs & Performance







The use of impressed current Cathodic Protection (CP) to protect buried piping is a proven approach for external corrosion control when coatings degrade and expose buried pipe to a soil environment. Historically, the design and installation of a CP system has been based on the experience of a NACE CP Specialist. A methodology now exists to reassure the corrosion engineer regarding design aspects or for optimizing installations.

CP Challenges

The foremost challenge in CP system design is achieving effective CP current distribution to overcome variations in CP system circuit resistance resulting from local coating conditions, soil resistivity, mixed metals and the existence of other bare metal surface areas. CP system designers can only estimate some of these conditions, so CP systems are routinely over designed and managed by trial and error.

Modeling to Make "The Invisible, Visible"

A combination of finite element and boundary element modeling techniques simulate the current flow of CP systems based on a three dimensional understanding of the piping network configuration, analysis of soil conditions and interferences such as grounding and structures.

The resulting model is calibrated against field acquired half-cell potentials and refined to incorporate interaction rules and polarization behaviors. The output allows the simulation of ON and Instant-OFF potentials anywhere along the piping route, which leads to a greater understanding of expected CP levels referenced to typically adopted CP criteria. This optimization up-front provides assurance that the installation will be properly designed and installed the first time, minimizing ongoing costs. In addition to potentials, the CP current distribution is calculated/visualized allowing prediction of corrosion rates for risk ranking and life cycle assessment for each individual pipe in the system.

Advantages of Modeling

Identified as CatPro™, these FEA/BEM models have been developed to facilitate integration with your MAPProView™ buried pipe data. This ensures you can:

- optimize CP designs or maintenance enhancements in advance to evaluate proposed changes, maximize performance, while minimizing cost and re-work;
- avoid Configuration Control problems and extended CP System modifications;
- facilitate Third Party review of new CP designs;
- predict failing performance in advance to better plan CP system repairs while; maintaining safety and corrosion control;
- demonstrate CP effectiveness anywhere in the plant to stakeholders by better leveraging annual readings;
- identify the highest value locations in the piping network for the placement of; corrosion monitoring devices as part of an overall asset management program.

Our combined worldwide expertise in CP analytical modeling and corrosion engineering provide unmatched knowledge and capabilities. Modeling CP system behavior provides the rigorous quality analysis needed in nuclear applications to demonstrate the validity of a proposed enhancement or the effectiveness of the CP system to any stakeholder – regulators, auditors, management and system engineering. We will work with you to develop the practical tools and strategies to mitigate the detrimental effects of buried pipe external corrosion.

For more information, please contact:

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