SOUTHWEST RESEARCH INSTITUTE

Guided Wave Systems for Screening Buried Anchor Rods

Nondestructive evaluation (NDE) of anchor rods that secure towers such as communication antennas is challenging, given that some 90 percent or more of the long, small-diameter cylindrical rods have been buried for more than 40 years.

Southwest Research Institute® (SwRI®) has developed and field-deployed a high-powered magnetostrictive transducer (MsT®) guided wave system to examine buried anchor rods.

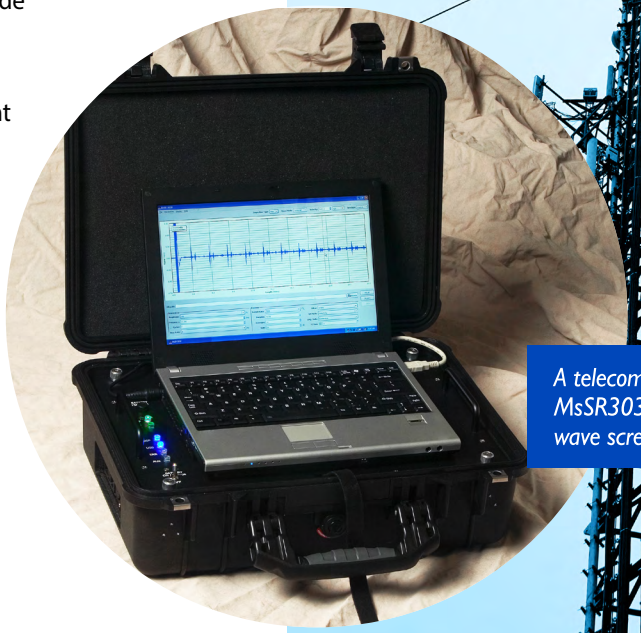
Low frequency L-mode guided waves have been used extensively in the past due to an inability to reverberate in the buried section of the anchor. SwRI's MsT probe system has a solenoidal excitation coil wrapped around an iron cobalt (FeCo) strip magnetized by a belt of permanent, built-in magnets.

Challenging anchor configurations require probes with higher power output, higher axial resolution, and capable of using T(0,1) guided-wave modes.

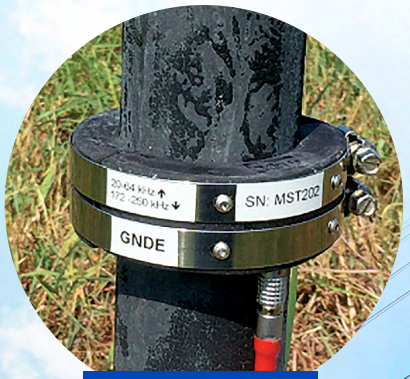
Advantages of MsT probes:

- High signal amplitudes produced by a solenoidal excitation coil allows signal-to-noise ratios above 60 dB
- Dry-coupled method allows for quick installation
- High axial resolution due to the shorter wavelength of torsional mode compared to longitudinal mode
- Applicable frequency range: 20-170 kHz
- Stable permanent magnets provide consistent signal amplitudes over long periods of time
- Ruggedized transducer design allows for repeat applications or long-term use of same transducer

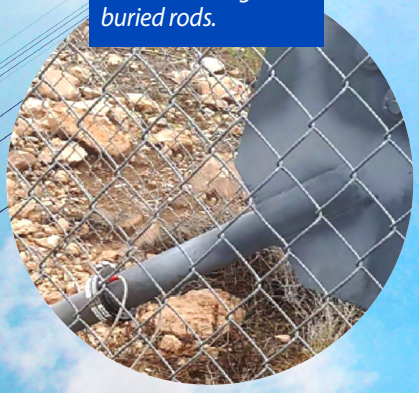
Field evaluations have shown this method to be very effective in finding problem areas and in ranking the anchors based on criteria of good, medium, or bad. Typically, lower frequencies (20-70 kHz) are used to identify the presence of corrosion in a buried anchor section. A second probe can verify relevant indications.



A telecommunication tower and MsSR3030R instrument used for guided wave screening of buried anchors.



MsT probe for guided wave screening of buried rods.



We welcome your inquiries.
For more information, please contact:

Sergey Vinogradov, PhD
Staff Engineer
210.522.3342
sergey.vinogradov@swri.org

Adam Cobb, PhD
Manager
210.522.5564
adam.cobb@swri.org

Sensor Systems and NDE Technology
Structural Engineering Department
Mechanical Engineering Division

ndesensors.swri.org

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