

Take Control of Quality Assurance
Underground Pipeline Coating



**Coating Scan
Technology**

A white paper
from Element Integrity Group, Inc.

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Executive Summary

Companies spend millions of dollars every year installing new or upgrading old pipeline infrastructure. After installation typically years go by before the line is inspected for any type of integrity issue including coating integrity.

If a coating issue is found during an inspection that is performed years after installation the cost of the repair is fully upon the owner/operator. How do you know that coating issue wasn't there from day one? It was good when you buried it...right? Was the coating in excellent shape after it was buried? Did you know if you got what you paid for? Most owner/users will have trouble answering those questions.

Despite the lack of clarity in the answers, ask yourself this. Why do you want to pay for a repair 2, 3, or even 10 years down the road, when it was bad the day it was installed? You don't, no one does. You want assurance that you are getting the product you are investing your capital in.

There is a technology that can help you take control of your Pipeline Quality Assurance Program.

Coating Scan Technology known as C-Scan is a unique and efficient attenuation survey that will provide your company with the assurance you need. C-Scan will find issues with poorly installed coatings or confirm that your pipeline coating is in good condition after it is buried.

Coating Scan Technology system is comprised of:

- A signal generator: output pure sine wave at 937.5 Hz
- Detector Unit: does not require electrical contact with ground or signal generator
- Proprietary DECAPP software: in field analysis capability

Coating Scan System was designed to be a versatile information acquisition tool by utilizing electromagnetic field attenuation measurement technology to obtain very accurate

C-Scan scan can look at over 500 feet of coating in one shot and cover over 2 miles of pipe in one survey, now that is efficient.

All parts of the system are designed to perform in tough field conditions.

*Why not get the same results
in a fraction of the time?*

data on coating condition, pipeline location, and anomaly definition and location.

Unlike voltage gradient measuring systems such as CIS, DCVG, and ACVG, the Coating Scan detector unit does not require electrical contact with the Coating Scan Signal Generator, the pipeline, or with the ground. The speed and efficiency of the survey is virtually unaffected by the type of material covering the pipeline. Yes that means we can measure the integrity of your pipelines coatings across roadways and river crossings.

The Coating Scan Survey is completed by two trained field technicians and backed up by SME and Engineering review of the data. Even with that 80% of the anomaly calls are made in real time in the field.

The QC Burden of New Buried Pipelines

So isn't the industry doing enough already? Do I really need to inspect my piping after it's buried to truly control the quality? Let's look at what PHMSA Construction Inspections discovered in 2009.

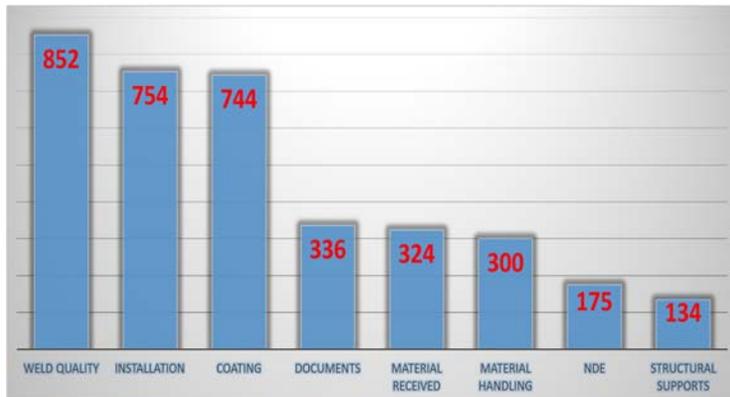
*After your lines are covered
with dirt, how do you
know it's not damaged?*

Issue Area	No. of Problems
Coatings	117
Welding	87
Excavation	20
Nondestructive Testing	20
Pipe Materials	12
Bending	9
Lowering/Installation in Ditch	7
Hydrostatic Testing	4
Design	3
Miscellaneous	5

Figure property of PHMSA (Pipeline Construction FAQs)

As you can see from the data coating issues were the number one finding during these inspections. That is 117 potential defects that would have been buried under the dirt.

Why is data that is nearly 6 years old still relevant? Let's take a look at Element Integrity Group's own data from 2014.



Please note why coating issues was not our number one finding, it is just as prevalent an issue today as it was 6 years ago. This thorough quality assurance inspection discovered 744 potential defects that would have been buried and put into service. After burial was complete on this same project, C-Scan uncovered over 50 more anomalies. These anomalies were the result of mechanical damage during install/backfill and of poor coating application at the butt welds.

C-Scan can help you take control of your Capital Project Quality Assurance.

The owner/operator, more often than not carries the full responsibility of a pipelines performance, so it is in the owner/operators best interest to make sure the line coating is intact upon start up.

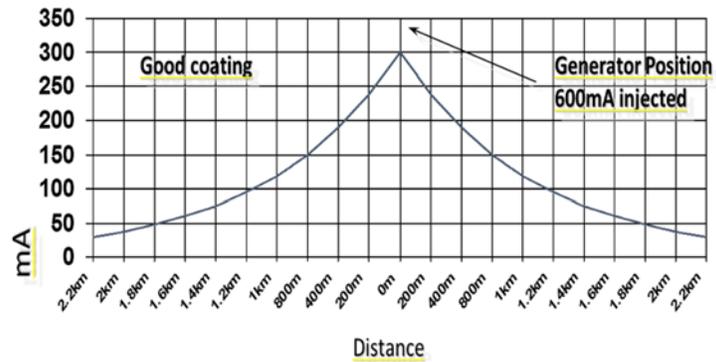
Who is responsible for jeepping your new lines?

Jeepping is one of the best ways to tell if your coating is good before your line is lowered into the ground. Did you know that most of the construction contractors building, coating, and backfilling the lines are responsible for the jeepping of the line? The problem is if you are not there to see a perfectly coated pipe get gently installed and back filled with care, you will never be assured it is ready to go. Let's not even raise the question of how you know if that coated line pulled in through a bore didn't get scraped up or scraped off in the process.

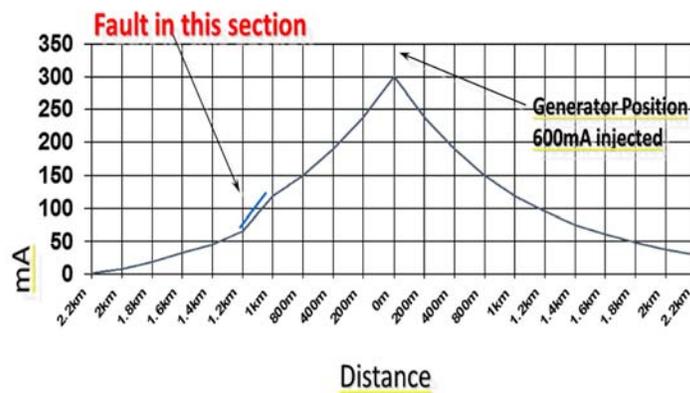
Coating Scan Technology

Coating Scan functions by measuring the attenuation of an A.C signal conductively applied to a pipeline.

That low frequency A.C. signal will gradually be lost to the surrounding soil through the pipelines resistive coating as it passes along the buried pipeline. This is the Rate of Attenuation as can be seen in the figure below.

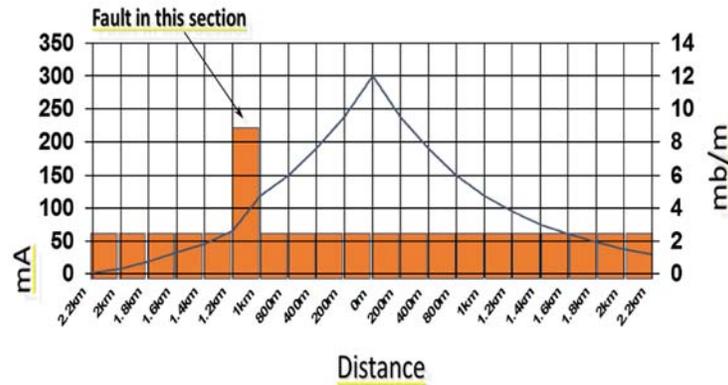


Where the coating is decaying or damaged, there is a significant increase in the rate of current loss. This is an Increase in the Rate of Attenuation. In the figure below you can see a slight step change in the exponential curve of the AC signal.



Shot locations can vary along the survey chainage information is gathered via the on board GPS.

The fault can be clearly seen when logarithmically plotting this curve. The rate of current loss over any section of pipeline measured in millibels per meter (mB/m), is effectively an absolute measure of the average quality of the coating over that section. The fault can be clearly seen in the graph below.



Specialized Applications

The theory is simple enough, but it's the application of the theory that makes this technology purposeful.

No CP system required for survey. Can your current technology do that?

- We have averaged over 5 miles a day and obtained as much as 9 miles of surveys in one day. From a business standpoint it results in less than half the \$/mile of a comparative DCVG survey.
- Provide underground coating analysis below roadways and river crossings.
- Provide immediate in field real times results. 80% of anomaly calls are made in the field.
- No CP system is required for the survey. We can inspect the line almost immediately after it is installed before it comes online or has the CP system hooked up.
- If your pipeline is covered with sand, soil, ice, snow, asphalt, gravel, concrete, it does not affect the survey.
- GPS location of every shot taken, inspections are easily repeatable.

Future repairs cost you thousands of dollars. Warranty repairs protect your assets.

C-Scan is quality assurance that goes beyond visual inspection!

Eagle Ford Proving Grounds

Coating Scan Technology was deployed to evaluate one of six creek bores in an Eagle Ford gathering field. All six lines crossed under a semi dry creek in a shared right of way. The lines did not have cathodic protection and were installed less than 6 months before the evaluation was performed.

The bores were approximately 300 to 400 feet in length and were electrically isolated. The line in question, a 4 inch liquids line, was independently surveyed with C-scan. The survey indicated a large anomaly in the range of 40 millisiemens at the crossing. A bore profile drawing was provided by the owner/user which indicated the pipe depth to be in the 12-15 foot range. It was determined the line would be taken out of service and further evaluated before a repair would be scheduled. The bore was exposed on both sides and a cut was made so a "smart pig" could be deployed to further assess the line. It was discussed up front that Coating Scan Technology only looks at coating integrity and not wall loss and that the internal tool would be looking at wall loss and not coating.

The internal "smart pig" inspection found no anomalies with the line and recommended the bore not be replaced.

Due to the conflicting recommendations by the two technologies utilized to assess the line and the 87% success rate of the C-Scan findings for the owner/user, the decision was made to pull the bore. The results were very eye opening as can be seen in the photos below.



Did you know many in line inspection (ILI) technologies such as smart pigs struggle to see wall loss at the welds or in the heat affected zone?

The bore consisted of 6 joints of pipe with an average length of 42 feet. The pipe was coated with an abrasive resistant coating. However, all of the girth welds joints had been coated with a tape wrap. This wrap was removed or “wiped” off while the pipe was being pulled through the bore leaving the entire heat effected zone bare. Severe metal loss was found from 3-6 o’clock positions on the girth weld location number 3 (see left photo below). Weld number 4 (see right photo below) had a corrosion cell that measured .187 in deep on a .237 in wall pipe.



The five remaining creek bores were later inspected with C-Scan. Four of the remaining five lines in the crossing were found to have anomalies. These bores were also pulled and all were found to be lacking coating on the head effected zones.

Turnkey coating integrity programs or reporting that fills gaps in your current program.

Customized Reports and Programs

The Coating Scan Survey reporting is completely customizable. We can export the data in a variety of formats and include Google Earth applicable KML files for geo mapping. The reports and program can be set up for:

- New construction QC to confirm coating meets NACE TM0102-2002 criteria
- Profiling 3 axis baseline information for unknown pipeline paths and depths.
- Anomaly location callouts within a 10 foot window
- Baseline and Condition monitoring program for coating degradation over time.

C-Scan assess coating to the same industry standards as other survey methods.

*Why not get the same results
in a fraction of the time?*

Conclusions

Coating Scan Technology is a powerful system. It will streamline your coating inspection program making it fast and economical. You will get instant feedback to put the control of underground coating quality assurance back in your hands.

No CP system is required to perform this service. All C-Scan needs is a single metallic connection to the pipeline and a remote ground location. The detector unit does not even need actual contact in the ground giving your program eyes that can see beneath roadways and water crossings. No other coating technology can do that.

This is a great complimentary technology to add to your pipeline integrity program. It can replace a slower and less efficient DCVG or ACVG survey in many applications and all the data can be uploaded directly into your PIMS program.

There is no better post install coating quality assurance technology on the market. We believe you should get what you pay for on costly pipeline installation projects and we know you believe that too.

Coating Scan Technology allows for real time coating condition assessments to be made in the field, so it is a perfect fit for those tight capital project deadlines.

Contact Us

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