

SpotOn Remote Monitoring

NVI recognizes that there are times in which the intermittent inspection and nondestructive testing of an asset is not sufficient. Assets subject to the higher probability of corrosion, stress cracking, leaks, third party damage, or those located in high consequence areas such as river crossings, road crossings, and public gathering areas often require more attention. NVI's exclusive solution for North America is the deployment of real time monitoring systems designed by A3 monitoring. Our remote monitoring packages are true turnkey, noninvasive solutions geared at achieving regulatory compliance and extending the life of the asset.



Our remote monitoring technologies are unmatched in providing value over the life of the asset which, in turn, are often the lowest cost solution. Our remote monitoring packages are scalable, and start with a base communications system in which 'plug and play' inspection technologies are added. Unlike other technologies available on the market, multi-method monitoring is achievable without the added cost of additional communication units at the same monitoring location. Ultrasonic monitoring (UT) can be paired with acoustic emissions (AE) and cathodic protection (CP) technologies all in the same installation and

with a single communication unit and shared software resulting in lower overall installation and ongoing monitoring costs. Monitoring communications are also customizable according to the best available technology per installation site such as satellite (Iridium), GSM, UMTS, LTE, or fixed site data logging.

Ultrasonic Thickness Remote Monitoring

NVI utilizes a permanently- installed real-time corrosion monitoring solution called spotOn U (Ultrasonic Thickness Monitoring). This type of technology is designed to operate in most environments and locations such as offshore, above ground, and below ground.

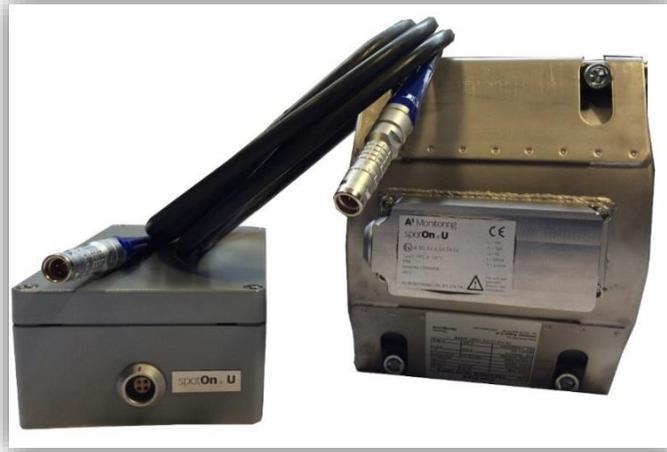


Robust

Withstands harsh environments, and can be buried or submerged

Safe

- Ex II 3G, Ex ic IIA T4 GC intrinsic safety rating.
- Non-Intrusive operation.
- Minimum access risk.



Simple

- Ease of Installation
- Fully automatic software configuration and network connection
- Works with existing IT systems.

Reliable

- Automated sensing for minimal measurement error.
- Continuously self-checking.
- Remotely configurable to maximize battery life.

Accurate

- Wall thickness and corrosion trends can be carefully measured.
- Remotely configurable data collection rate to track fast – evolving events and test corrosion

Real Time

- Data is available in real-time.
- Custom thresholds can be defined, and warnings are dispatched automatically
- Remotely configurable to track fast-evolving events and test corrosion inhibitors.

Works Everywhere

- 14°F to 248°F
- IP67 to IP69K
- GSM, WiFi or satellite link
- Submersible up to 300 metres.

Cost-Effective

- One time access to difficult and challenging locations.
- No need for additional IT investments.

Ultrasonic Thickness Remote Monitoring Technical & Operating Specifications

Probe type	3-5MHz frequency longitudinal wave, dry coupled dual-crystal UT probe
Pipe diameter	3" (DN90) and above
Pipe nominal wall thickness	1/8"(3.175mm) to 1" (25.4mm)
Pipe temperature	-10°C to 120°C / 14°F to 248°F
Ambient temperature	-40°C to 85°C / -40°F to 185°F
Ingress protection	IP68 – IP69K optional, submersible up to 300m
Intrinsic safety	Ex II 3G, Ex ic IIA T4 GC
Battery type	Lithium metal, located on pipe or away from pipe for easy replacement
Data link	Quad-band GSM, WiFi, Iridium or Inmarsat, internal or external antenna
Device management	Custom scheduling via shieldCube to maximize battery life or data collection frequency
Data management	Data delivered to shieldCube platform, or to designated private server
Data analysis	State-of-the-art shieldCube statistical, with custom-defined fixed and intelligent threshold and automatic notifications via email and mobile phone.
Installation	Minimum surface preparation, no metal-to-metal contact

Louisiana: Gray, New Iberia, New Orleans, Lafayette; Texas: Carthage, Midland, Aransas Pass, Houston; Alabama: Tuscaloosa, Theodore; Pennsylvania: Wysox, Pittsburgh; Colorado: Northglenn; New York: Buffalo

Guided Long Range Remote Monitoring

NVI's corrosion monitoring solution, spotOn Guided Long Range, leverages on an innovative patented technology providing **remote threat identification** for pipes that are difficult or expensive to access.



Guided Long Range Remote Monitoring has the ability to access difficult areas in order to identify internal and external corrosion threats in pipelines.

Great flexibility and high performance is achievable utilizing Guided Long Range monitoring.

Compared to screening, AUTO LR software improved detection capabilities.

Where is Guided Long Range Remote Monitoring?

- Bare Pipes
- Under insulation
- Road crossing
- Buried pipes where threat areas may be large
- Under repair
- Large subsea sections

Safe

- Non-Intrusive operation
- Minimum access risk

Works Everywhere

- Up to 180°C
- 3 inches and above
- Bare, insulated, buried and underwater pipes

Cost Effective

- Long Range
- Retrofit only at specific locations



Robust

- Outside carcass made of stainless steel
- Withstands harsh environments, and can be buried or submerged

Flexible

- Normal cable exit radial, axial exit also possible to place within confined space
- Reposition transducer

Guided Long Range Remote Monitoring Technical & Operating

probe type	Dry coupled
Pipe diameter	3" (DN90) and above
Pipe nominal wall thickness	2mm to 50mm
Pipe temperature	-40°F to 248°F (standard) / -40°F to 356°F (high)
Data management	Manual data collection delivered via shieldCube platform
Data analysis	State-of-the-art shieldCube statistical, with custom-defined fixed and intelligent threshold.
Probe ingress protection	IP68 – IP69K optional, submersible up to 300 m
Installation	Minimum surface preparation, no metal-to-metal contact

Acoustic Emission Remote Monitoring

Acoustic Emission (AE) is the most flexible NDT method. NVI utilizes AE for monitoring structures.



AE can be used for monitoring the ‘acoustic activity’ generated while hitting the pipe both accidental (digger hitting pipe) and intentional (theft attempt). Third-party interference are equipped with appropriate alarms that are sent to the asset owner or pipeline operator.

AE enables to monitor pipelines for identification of:

Cracks: Utilizing Acoustic Emission, you can detect noise/emission of cracks growing, and other active damages in pressure vessels, tanks, and piping systems.

Leaks: AE is an excellent tool for detecting and locating leaks in buried and liquid-filled pipelines. It is required to have access to the pipeline in order to mount AE sensors. The

AE sensors detect the turbulent flow at the leak orifice, and with the use of digital acoustic emission systems and specialized software, the position of the leak is provided.

Corrosion: Different types of corrosive processes can be detected using Acoustic Emission, including stress—corrosion cracking, pitting, crevice, corrosion, and intercrystalline corrosion.

Acoustic Emission detects any noise produced along a pipeline.

Accurate

- Detect leaks quickly
- Issue no false alarms

Works Everywhere

- -10°C to 70°C
- IP67 to IP69K
- GSM, WiFi or satellite link
- Works effectively under all operating conditions.

Robust

- Withstands harsh environments, and can be buried or submerged

Cost Effective

- Retrofit only at specific location.
- Long range

Reliability

- Use sensors with high reliability and low maintenance

Acoustic Emission Remote Monitoring Technical & Operating Specifications

AE probe type	20kHz – 100 kHz dry coupled
Pipe diameter	3" (DN90) and above
Pipe nominal wall thickness	1/8" (3.175mm) to 2" (50.8mm)
Pipe temperature	-10°C to 70°C / 14°F to 158°F
Battery	Lithium metal, located in control unit away from pipe for easy replacement
Data management	Data delivered via shieldCube platform, or via designated private server
Data analysis	State-of-the-art shieldCube statistical, with custom-defined fixed and intelligent threshold.
Probe ingress protection	IP68 – IP69K optional, submersible up to 300 m
Data Visualization	Active visualization on Google Maps

Cathodic Protection Remote Monitoring



Packages include coupons which are linked to the communication system allowing for instant pipe to soil potential readings.

NVI utilizes Cathodic Protection Remote Monitoring to identify external threats with sudden change of voltage due to coating damages.

By using CP remote monitoring, NVI can detect when and where third-party damage or illegal derivation has been attached.

If a value exceeds the user's threshold, Cathodic Protection monitoring will immediately check voltage and alarm. This communicates using mobile, satellite, or wifi. Automatically stored Data can be accessed at any time via the internet.

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Advantages of paired remote technologies:

Often times, monitoring data is provides greater value when paired with a complementary inspection method. Examples of successful pairings and their applications are listed below:

U	AE	LR	CP	U+CP	AE+CP	U+LR	AE+LR
Internal Corrosion	Cracks	External Corrosion	Coating condition	Integrated pipeline integrity monitoring for internal corrosion and coating condition	Third party damage	Local thickness trend and information about long length of pipe	Monitor both presence of large corrosion and small leaks
Erosion	Leaks	Internal Corrosion			Theft detection		
Substitute corrosion coupons	Corrosion						

For additional information and to schedule a consultation to discuss turn-key project solutions, please contact us at:



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