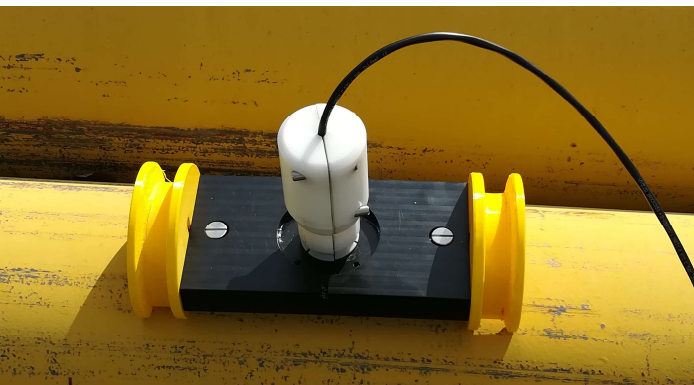


CyX-Guard

Nonintrusive Impact Detection System for Onshore Pipelines



Our offer / expertise

CyX-Guard is a **nonintrusive temporary monitoring** system designed to immediately alert both the works supervisor and control room of all unplanned pipeline impacts during **construction and repair operations**.

When excavation and installation work is being undertaken within the pipeline ROW (Right of Way), the risk of damage to the pipeline under construction and other third party pipelines within that ROW is increased.

CyX-Guard uses pipeline mounted acoustic sensor(s), processing electronics, machine learning(*) and wireless communication to report in **real time** when the system detects an **impact** or **near miss** incident.

(*): under development

Purpose and Benefits

- CyX-Guard reports in real time all unplanned shock and vibration incidents detected on or near a pipeline during civil or excavation works
- **Quick Alert** - issues a “stop the job” cell / mobile phone notification directly to the works supervisor when a near miss or impact is detected
- **Impact Alert** - generates an anomaly report and creates a log of the incident for investigation and potential remedial action

CyX-Guard Systems fits any pipeline

Easy installation

Sensors have magnetic mounts that will fit any size of pipeline.

Self powered autonomous system

CyX-Guard requires no external services to operate.

Patented acoustic technology

Acoustic sensors detect **impact** and **near miss** events up to 100m (330ft) away from any measurement point.

Alarm messaging

Automatically sent to designated recipients in **real time**.

Main characteristics

- CyX-Guard consists of **measurement and wireless communication beacons** located along the pipeline section to be monitored.
- Each beacon consists of one non-intrusive sensor mounted **on top of the pipeline protective coating**. The beacon(s) communicate automatically and forward alarms and reports directly to designated client touch points.
- For pipelines under construction or repair (evacuated), CyX-Guard provides **installation integrity data**.
- For adjacent third party pipeline (operational), CyX-Guard provides **non-contact confirmation data**.
- CyX-Guard is a self powered system with internal batteries and an external solar panel. It is equipped with wireless communication between beacons, works supervisors and control centres



Technology

- CyX-Guard uses **acoustic sensor(s)** to measure sound generated by impact(s) “on” or “close to” the pipeline.
- The sensor(s) detect and characterize sound **transmitted within the pipeline wall**.
- The signal is recorded and analysed in real time with GPS time synchronization. **Machine learning** is used to identify and classify the **cause and risk** to potential loss of integrity of the pipeline.
- Incident alarms are generated and once validated, a message **with time stamping, event description and localization is sent** to one or more Client touch points by phone and email.



Impact Detector



Performance

Monitoring Specifications (typ.)

Application	Impact detection and localization
Monitoring Range	<ul style="list-style-type: none"> • 1 x sensor - 200m (660ft) total range • 2 x sensors - 300m (985ft) total range with detailed event location in central 100m (330ft) • 3 x sensors - 400m (1310ft) total range with detailed event location in central 200m (660ft)
Capability for	<ul style="list-style-type: none"> • Additional sensors can be added to increase monitored range • Equipment can be moved to a new construction location
Pipeline Under Construction or Repair (Evacuated)	<ul style="list-style-type: none"> • Additional sensors can be added to increase monitored range • Equipment can be moved to a new monitoring location
Monitoring Range	<ul style="list-style-type: none"> • 2 x sensors - 500m (1640ft) range with detailed event location • 3 x sensors - 1000m (3330ft) range with detailed event location
Capability for	<ul style="list-style-type: none"> • Additional sensors can be added to increase monitored range • Equipment can be moved to a new monitoring location
Adjacent Third Party Pipeline (Operational)	<ul style="list-style-type: none"> • Additional sensors can be added to increase monitored range • Equipment can be moved to a new monitoring location
Localization Accuracy	1m (3ft)
Response time	2 seconds
Shock detection	Minimum impact energy of 100 joules
Environmental Specifications	
Temperature range	from -40°C (-40°F) to +65 °C (150°F)
Environmental	Onshore installation
Pipe dimension	All sizes (buried, aerial, partially immersed)
Pipeline Product type	All pipeline product (liquid, gas)

Hardwire Characteristics

- **Sensor(s)** nonintrusive acoustic.
- **Beacon(s)** (data processing and communication).
- **GPS antenna** (time synchronization).
- Autonomous **power supply** (solar panel and batteries).
- **Wireless** communication using GSM/3G network.