



Asset Integrity Survey Services

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AISS Case Study

Hydrocarbon Gas Leak Detection And Risk Management using CupixWorks Digital Twin SiteView Technology

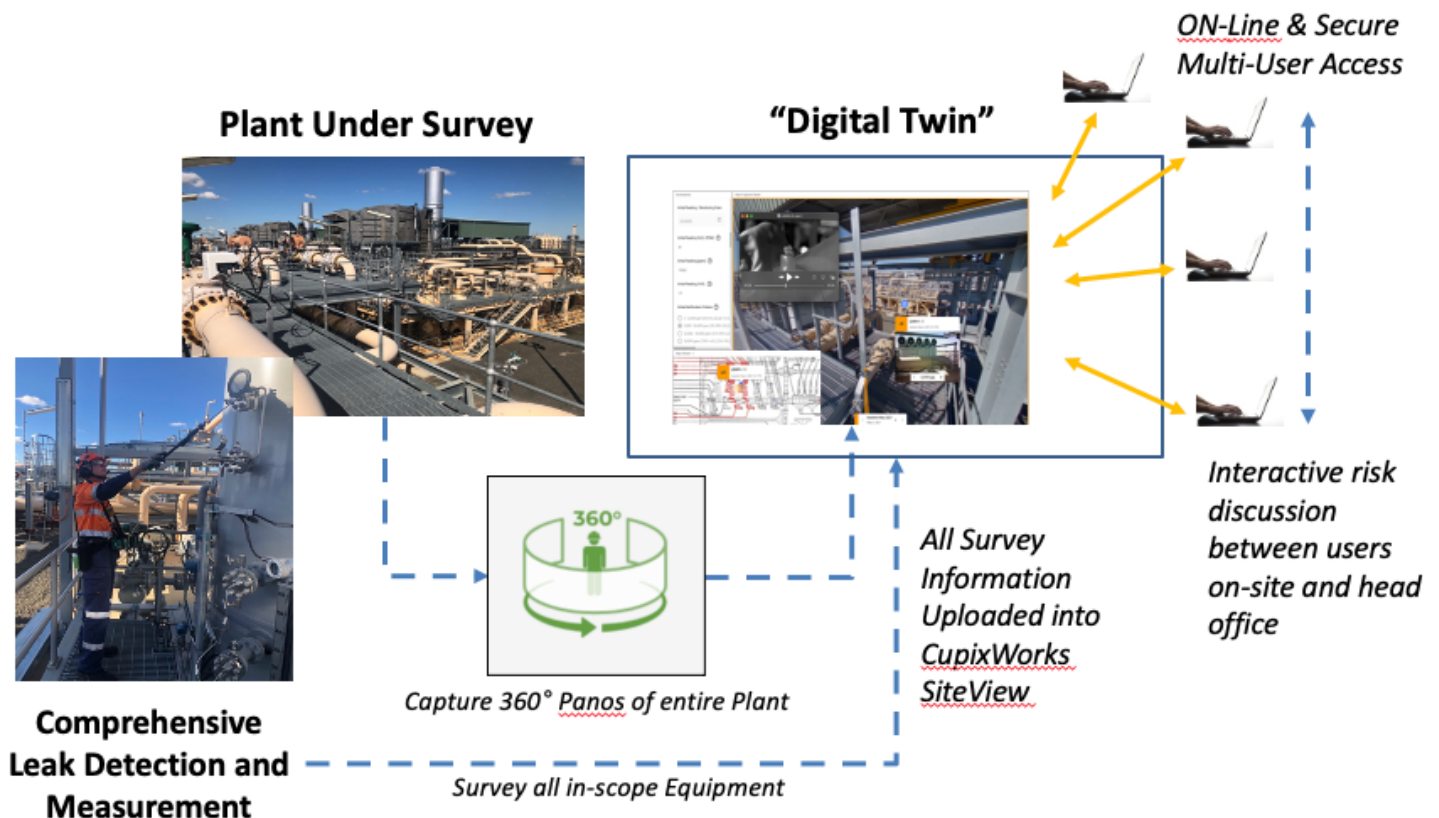
The purpose of this case study is to illustrate a comprehensive process for detecting, quantifying and risk management of hydrocarbon gas leaks in and around process equipment and storage facilities using state-of-the-art gas detection and reporting technology.

A comprehensive list of leaks is compiled in 'risk register' format together with risk ranking data in compliance with statutory requirements.

Simultaneously, a CupixWorks 360° photographic digital twin of the facility is developed covering all levels across all process units.

Process equipment data and leak information is accessed through the digital twin to facilitate on-line review of the leak detection, risk assessment and remedial action information generated during the survey process.

Access to all the information is available for multi-user review and interaction – thereby facilitating inter-office discussion of risks, priorities, and remedial / follow-up actions, etc.



The AISS CupixWorks SiteView leak detection survey and risk management process enable facility operators to comply with all statutory, environmental, safe working and risk management requirements as well as assuring on-going asset capability and reliability.

Asset Integrity Survey Services Pty Ltd (AISS)

Industrial Asset Condition Monitoring Leak Detection And Risk Management Since 1993

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Objective

- Establish an industry best practice program for hydrocarbon gas leak detection and risk management using state-of-the-art digital twin remote collaboration technology to enable context-based risk assessment, response management and demonstrate regulatory compliance.

The Project

- Create a secure online web-based high resolution photographic interactive digital twin of all the client's gas processing assets across the Surat Basin.
- Use the digital twin as a shared user interface to locate, identify, quantify, risk assess, and report all methane leaks from process components across all gas processing assets.
- Remote collaboration and leak risk prioritisation between head office and field operations using reality captured context rich visual asset condition imagery.
- Integrate leak risk management communication with the client's internal incident management systems (IMS) and the Petroleum & Gas Inspectorate (PGI) regulatory reporting workflows.

Key Results

- AISS delivered labour (cost) savings and survey duration (time) savings by deploying highly experienced personnel with state-of-the-art leak detection and information management technology.
- AISS captured and processed 5966 high-resolution 360 degree panoramic images then generated a digital twin of 5 coal seam gas processing facilities covering 35,000 square meters of plant and equipment.
- AISS Survey scope covered leaks from Pipe Flanges, Pressure Vessels, Instrumentation, Pressure Safety Relief Valves, Check valves, Control Valves and Manual block valves.
- The AISS leak detection and risk management digital twin reporting system quickly reduced residual leak risk across all 5 plants by locating, qualifying, quantifying, risk assessing and reporting a range of process equipment leaks across all 5 plants.
- Process and regulatory risk reductions were achieved quickly through online collaboration between site and head office using the AISSOZ CupixWorks SiteView Digital Twin LDAR system.

Client

- LNG Producer

Work Site

- Surat Basin, Australia

Scope of work

- Roll-out of companywide digital twin technology and leak risk management user interface covering 35,000 square meters of in-scope assets across 5 gas processing facilities.
- Generate qualitative, quantitative, and contextual leak risk management information to minimise process risk and enable regulatory compliance reporting .
- On-Site Risk Management, JSEA, ePermitting
- Methane Gas Leak Detection & Quantification
- Methane Gas Leak Risk Assessment
- Process Asset Condition data capture & reporting
- Contextual Leak Risk Reporting
- Leak Repair Priority Assessment
- Leak Response Recommendations
- Develop secure online digital twin of all plants to enable collaborative and interactive leak risk assessment, response prioritisation and compliance reporting.





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Key Challenges

Hazardous Atmospheres & Environments

- Potential for Methane rich explosive gas atmospheres.
- Surveying in proximity to Hot or Cold Surfaces
- Surveying at Height
- Surveying live process equipment
- High process pressures & temperatures
- Potential leak points located in restricted or confined spaces
- Noise around compression assets

Leak Detection and Quantification

- Methane leaks are highly buoyant and disperse quickly
- Methane gas concentration quantification down to 2ppm
- High noise environment can mask leaks

AISS Survey Solution

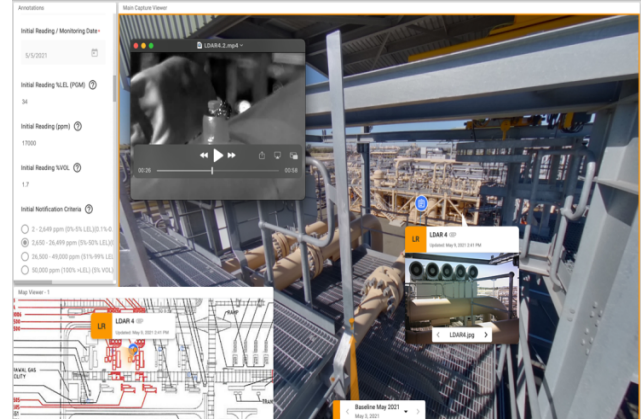
Sensitive Detection Technology

- AISS deployed intrinsically safe ultrasonic scanning sensors to locate and validate ultrasound signatures from low- and high-pressure gas leaks that are otherwise masked by process plant equipment and noisy environments.
- AISS deployed highly portable intrinsically safe laser-based technology to validate and quantify methane process gas leaks down to parts per million (ppm).

Appraisal Criteria & Value Added

Safety & Risk Management

- AISS constructed the digital twin reporting user interface and performed the leak survey with all process assets online and without interruption to concurrent other work activities.
- AISS complied with all client site specific personnel health safety and environmental (HSE) compliance requirements. From electronic work permitting to comprehensive activity specific job risk assessments (JRA) and access requirements.





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- Effective engagement of Operations and Maintenance personnel, corporate engineering, HSE supervision and principal contact personnel to deliver a safe and cost-effective program.
- Base-line asset condition survey performed, and condition data delivered safely with zero HSE incidents.
- Facilitate efficient and cost-effective remediation of leaks in accordance with regulatory timeframes.

Reporting & Risk Visualisation

- Condition monitoring and risk assessment data delivered to key stakeholders via the AISS CupixWorks SiteView LDAR digital twin web-based reporting system.
- AISS report provides contextually rich scene information to facilitate leak risk assessment and repair action prioritisation through marked-up conventional 2-D images, video and 360 Degree panoramic SiteView scenes of leak locations.
- Interactive 360 Degree SiteViews of 5 plants covering 35,000 square meters providing a collaborative visual interactive digital workspace to plan and manage a range of asset integrity inspection activities.
- Leak risk ranking in accordance with agreed repair action prioritisation assessment criteria.
- Leak root cause assessment and suggested remedial options.
- Asset condition data is compatible with the client's maintenance and process integrity risk management systems.



Related AISS services

- [Pre-Shutdown leak detection and shut scope verification surveys.](#)
- [Plant Start-up leak detection surveys to verify the pressure integrity of all assets disturbed during a plant maintenance activity.](#)
- [Confined space asset condition surveys using reality capture sensors on remote operated vehicles or drones.](#)
- [Thermographic anomaly surveys of critical process equipment – Switchboards, Motor control systems.](#)
- [Inert Gas, Instrument Air, Compressed Air Leak Surveys of process plant utility systems.](#)
- [Storage tank and pipe coating condition surveys and data management using reality capture CupixWorks Digital Twin technology.](#)
- [Process plant asset identification services – Tagging, P&ID as-built verification & Asset digitisation](#)
- [Fugitive Emissions Reduction & Regulatory Compliance reporting programs.](#)



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