Safer, More Predictable Inspections in Confined Spaces

How tethered drone systems are changing inspection practice in oil, gas and heavy industry.

The hidden cost of confined-space inspections

Confined-space inspections remain one of the most underestimated risk and cost drivers in oil and gas operations. Tanks, pressure vessels, cargo holds, shafts and process units often require inspections in environments with no GPS coverage, limited access, poor lighting and strict safety constraints.

Traditional inspection methods rely heavily on scaffolding, rope access or manual entry. These approaches are proven, but they come with well-known drawbacks: long preparation times, exposure of personnel to hazardous environments, and inspections that are often fragmented across multiple shifts or campaigns.

Battery-powered drones have helped reduce some of these challenges, but they introduce new limitations of their own. Limited flight time, unstable positioning and interrupted data capture can compromise both inspection efficiency and data quality. In confined spaces, where repeatability and decision confidence matter most, these limitations quickly become critical.



Tethered inspection drone operating inside a confined industrial structure, the tether providing continuous power and connectivity.

Why tethered drones change the inspection logic

Tethered drone systems represent a fundamental shift in how inspections are planned and executed. Instead of treating flight time as a constraint, tethered systems enable continuous operation with uninterrupted power and data transfer.

This changes the inspection logic from short, segmented flights to one coherent inspection process. Continuous operation allows inspectors to maintain context, ensure full coverage and collect consistent datasets without interruption for battery changes.

Equally important is stability. Wired connectivity enables deterministic control and precise positioning, which is essential for reliable measurements and repeatable inspection results. In large or visually sparse environments, stability is often the difference between "useful footage" and data that can actually support technical decisions.



Then Scout 137 Gen 3 is an industrial inspection drone platform for GPS-denied environments, combining continuous operation, spatial awareness and multi-sensor data capture.

Precision navigation and spatial understanding

Modern confined-space inspection is no longer just about seeing defects. It is about understanding where those defects are, how they relate to surrounding structures, and how they evolve over time.

Advanced 3D LiDAR technology plays a central role in this shift. High-resolution point clouds provide a spatial framework that supports navigation, stabilization and documentation in a single system. The same sensor data used to stabilize the drone is also used to generate accurate 3D representations of the inspected asset.

This dual use of spatial data improves both operational safety and data consistency. Inspections can be performed in large volumes with few visual references, while still maintaining precise positioning and repeatability.

From visual inspection to actionable data

Visual inspection remains the foundation of most inspection programs, but visuals alone are often insufficient in high-value or safety-critical assets. Increasingly, operators require measurement data, spatial context and traceability in addition to imagery.

Modern inspection platforms integrate multiple sensor types into a single operation. Visual data, 3D spatial information, gas detection and non-destructive testing can be collected simultaneously, rather than through separate, sequential workflows.

For example, ultrasonic thickness measurements can be performed during the same flight as visual inspection, with integrated surface preparation enabling direct measurement without manual intervention. Gas sensors provide continuous monitoring of the environment, adding an additional safety layer for both equipment and personnel.

The result is a richer, more coherent dataset, collected in less time and with fewer operational steps.

Collaboration beyond the inspection site

Inspection decisions rarely involve only the personnel on site. Subject matter experts, asset owners and decision-makers are often located elsewhere, sometimes on the other side of the world.

Live data streaming and cloud-based inspection platforms enable real-time collaboration during inspections. Visuals, 3D models and measurement data can be shared instantly with off-site experts, allowing faster clarification and better-informed decisions while the inspection is still ongoing.

This reduces the need for repeat inspections, shortens decision cycles and improves overall inspection efficiency.



Combined video feed and 3D visualization, plus full control of measurements and POI allows the spatial awareness necessary during BVLOS (Beyond Visual Line Of Sight) flight in a confined space.

Operational maturity matters more than autonomy

While autonomy often dominates discussions around robotics and drones, practical inspection operations prioritize predictability, repeatability and procedural robustness.

Deploying inspection drones in oil and gas environments requires more than advanced hardware. It requires mature operating procedures, trained personnel, integration with existing inspection practices and close collaboration with classification societies and asset owners.

In many cases, semi-automated systems that offer high stability and fine operator control deliver more value than fully autonomous solutions that struggle with edge cases in complex environments. Especially in BVLOS situations where the robot needs to venture far into the confined space without human company.

Applications across energy and heavy industry

Tethered drone inspection systems are already in use across a wide range of applications, including storage tanks, cargo holds, tunnels, hydropower installations and process facilities.

What these applications have in common is restricted access, complex geometry and high requirements for safety and documentation. Wherever scaffolding, rope access or manual entry are used today, there is significant potential to reduce risk and improve efficiency through remote inspection.

A step toward safer, more efficient inspections

As inspection requirements continue to evolve, the focus is shifting from isolated inspection tasks to fully digitalized inspection workflows. Continuous operation, multi-sensor data collection and real-time collaboration are becoming baseline expectations rather than future ambitions.

By reducing human exposure, improving data quality and enabling better decisions, tethered drone systems are helping redefine how confined-space inspections are performed across oil, gas and heavy industry.

Learn more via the QR code

scoutdi.com



Human entry remains a reality in many confined-space inspections, despite the availability of remote and robotic inspection technologies.